From: Steve Kallin
To: Mike Blenden
Cc: Ryan Moehring
Subject: RE: NER Call
Date: Wednesday, July 20, 2016 3:41:53 PM

Mike:

I appreciate Will's flexibility. It seems like this meeting can be accomplished with me participating by phone, so I completed the Doodle Poll with that approach in mind. I can move most of my commitments around except for the morning of August 12 (another Step Down Plan Meeting). I will be happy to travel to Denver the next time we need to give an updated briefing to Noreen/Matt.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Blenden, Mike [mailto:mike_blenden@fws.gov]
Sent: Wednesday, July 20, 2016 3:05 PM
To: Steve Kallin
Cc: Ryan Moehring
Subject: Re: NER Call

Steve,

Will thinks it sufficient for you to call in but doesn't want to limit you if you want to travel in for it.

On Wed, Jul 20, 2016 at 8:02 AM, Steve Kallin <steve_kallin@fws.gov> wrote:
Ryan/Mike:

Will I be attending in person, or by phone?

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Ryan Moehring [mailto:ryan_moehring@fws.gov]
Sent: Tuesday, July 19, 2016 4:53 PM

To: will_meeks@fws.gov; Anna Munoz; Maureen Gallagher; Blenden, Mike; Steve Kallin
Subject: NER Call

All,

Will would like us to meet regarding the NER BEMP step-down, the CCP, and our related engagement strategy. Given the challenges of getting us all together schedule-wise, Mike and I compared a few calendars and have put together a Doodle poll. Please fill it out at your earliest convenience and hopefully we'll find a day/time that works for the majority of us.

http://doodle.com/poll/qq6dq7g7yfcpen62

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

Web |Facebook | Twitter | Flickr | YouTube

--
Michael Blenden
Refuge Supervisor - Montana, Wyoming and Utah
134 Union Boulevard
Lakewood, CO 80228
303-236-4306
303-710-7934 cell

Too often we...enjoy the comfort of opinion without the discomfort of thought.
John F. Kennedy

From:	Steve Kallin
To:	Dale Deiter; Murphy, Kerry M -FS; Sarah Dewey; David Gustine; Brad Hovinga; doug.brimeyer@wyo.gov; Steve Cain; Cris Dippel; Eric Cole
Subject:	SAVE THE DATE - Next BEMP Step Down Planning Meeting, August 12, 2016 at 8:00 AM
Date:	Wednesday, July 20, 2016 3:47:33 PM

Hi All:

Please save this date for the next BEMP Step Down Planning Meeting. This date above works for everyone who attended the BEMP Step Down Planning meeting on Monday (July 18).

I hope to email you an updated Step Down Plan by tomorrow or Friday.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Steve Kallin
To: Tom Segerstrom
Subject: Easement Research
Date: Friday, July 29, 2016 2:51:08 PM

Hi Tom:

I was traveling this week so missed you at Rotary. Just wondering how the progress is coming on answering the question about holding Conservation Easements by the Teton County Conservation District?

Hope all is going well,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From:	Tom Segerstrom
To:	Steve Kallin
Subject:	RE: Easement Research
Date:	Friday, July 29, 2016 4:07:17 PM

I'm still researching Attorney General opinions. Will let you know when I find the answer I'm looking for. Thanks for the reminder.

Tom Segerstrom
Executive Director
Teton Conservation District
P.O. Box 1070
Jackson, WY 83001
Phone: (307) 733-2110
Fax: (307) 733-8179
Cell: (307) 413-2704
Email: tom@tetonconservation.org

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Friday, July 29, 2016 2:51 PM
To: Tom Segerstrom <tom@tetonconservation.org>
Subject: Easement Research

Hi Tom:

I was traveling this week so missed you at Rotary. Just wondering how the progress is coming on answering the question about holding Conservation Easements by the Teton County Conservation District?

Hope all is going well,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Google Calendar on behalf of Mike Blenden
To: steve_kallin@fws.gov; will_meeks@fws.gov; maureen_gallagher@fws.gov; lori_iverson@fws.gov; natalie_sexton@fws.gov; ryan_moehring@fws.gov
Subject: NER step down plan call, update and progress
Attachments: invite.ics

HYPERLINK "https://www.google.com/calendar/event?action=VIEW&eid=OWd2OHJlZTNnNHBodXZtZ2E3cnVpZ2o2ZTQgc3RldmVfa2FsbGluQGZ3cy5nb3Y&tok=MjAjbWlrZV9ibGVuZGVuQGZ3cy5nb3ZlOGQ0ZGZlZWRhZjI0ZjdiYzgwYzljZDNlM2E2ODBmNDA3MjBlOTY4&ctz=America/Denver&hl=en"more details »

NER step down plan call, update and progress

TOLL FREE DIAL-IN NUMBER: 866-715-6268

PASS CODE NUMBER FOR THOSE DIALING IN: 3502932#

PASS CODE FOR LEADER: 2613353# (LEADER ONLY)

When
Mon Aug 29, 2016 1pm – 2pm Mountain Time
Video call
HYPERLINK "https://plus.google.com/hangouts/_/doi.gov/mike-blenden?hceid=bWlrZV9ibGVuZGVuQGZ3cy5nb3Y.9gv8ree3g4phuvmga7ruigj6e4"https://plus.google.com/hangouts/_/doi.gov/mike-blenden
Calendar
steve_kallin@fws.gov
Who
• mike_blenden@fws.gov
- organizer
• will_meeks@fws.gov
• maureen_gallagher@fws.gov
• steve_kallin@fws.gov
• lori_iverson@fws.gov
• natalie_sexton@fws.gov
• ryan_moehring@fws.gov

Going?
HYPERLINK "https://www.google.com/calendar/event?action=RESPOND&eid=OWd2OHJlZTNnNHBodXZtZ2E3cnVpZ2o2ZTQgc3RldmVfa2FsbGluQGZ3cy5nb3Y&rst=1&tok=MjAjbWlrZV9ibGVuZGVuQGZ3cy5nb3ZlOGQ0ZGZlZWRhZjI0ZjdiYzgwYzljZDNlM2E2ODBmNDA3MjBlOTY4&ctz=America/Denver&hl=en"Yes - HYPERLINK "https://www.google.com/calendar/event?action=RESPOND&eid=OWd2OHJlZTNnNHBodXZtZ2E3cnVpZ2o2ZTQgc3RldmVfa2FsbGluQGZ3cy5nb3Y&rst=3&tok=MjAjbWlrZV9ibGVuZGVuQGZ3cy5nb3ZlOGQ0ZGZlZWRhZjI0ZjdiYzgwYzljZDNlM2E2ODBmNDA3MjBlOTY4&ctz=America/Denver&hl=en"Maybe - HYPERLINK "https://www.google.com/calendar/event?action=RESPOND&eid=OWd2OHJlZTNnNHBodXZtZ2E3cnVpZ2o2ZTQgc3RldmVfa2FsbGluQGZ3cy5nb3Y&rst=2&tok=MjAjbWlrZV9ibGVuZGVuQGZ3cy5nb3ZlOGQ0ZGZlZWRhZjI0ZjdiYzgwYzljZDNlM2E2ODBmNDA3MjBlOTY4&ctz=America/Denver&hl=en"No HYPERLINK "https://www.google.com/calendar/event?action=VIEW&eid=OWd2OHJlZTNnNHBodXZtZ2E3cnVpZ2o2ZTQgc3RldmVfa2FsbGluQGZ3cy5nb3Y&tok=MjAjbWlrZV9ibGVuZGVuQGZ3cy5nb3ZlOGQ0ZGZlZWRhZjI0ZjdiYzgwYzljZDNlM2E2ODBmNDA3MjBlOTY4&ctz=America/Denver&hl=en"more options »

Invitation from HYPERLINK "https://www.google.com/calendar/"Google Calendar

You are receiving this email at the account steve_kallin@fws.gov because you are subscribed for invitations on calendar steve_kallin@fws.gov.

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U.S. Fish & Wildlife Service

A Conservation Proposal to Assist Jackson Area Ranchers in the Prevention of Brucellosis Transmission from Elk and Bison to Domestic Livestock

September 9, 2016

Purpose of Program

The purpose of this proposed program is to provide area livestock producers assistance in mitigating a Human-Wildlife Conflict. Specifically, this program addresses the issue of transmission of brucellosis between elk and bison herds and domestic livestock by preventing co-mingling.

Background

History

The Jackson Hole area enjoys a rich ranching and wildlife heritage. In the 1880s, cattle ranching was first introduced to the valley and remains an important economic and social component of the Jackson Hole's character.

Elk figure prominently in Jackson Hole's history and culture. In the late 1800s, when elk populations all over North America were being extirpated, the residents of Jackson Hole protected elk from "tusk hunters" and from large-scale commercial hunting operations. Today, the Jackson Elk Herd is recognized world-wide and contributes significantly to the local economy.

A free-ranging bison herd started in 1968 when 18 bison escaped from a wildlife park near Moran. Today this bison herd, approximately 800 in size, resides primarily on the National Elk Refuge and the Grand Teton National Park.

Ranching and wildlife are interwoven into the historic and cultural fabric of the Jackson Hole Area. This proposal is designed to contribute to the healthy continuation of both.

Bison and Elk Management Plan (BEMP)

Elk and bison contribute significantly to the ecology of the Greater Yellowstone Ecosystem. In 2007, the U.S. Fish and Wildlife Service and the National Park Service completed a 15 year plan for managing bison and elk on the National Elk Refuge and in Grand Teton National Park. The plan was developed in accordance with the National Environmental Policy Act and included extensive public input and close collaboration with several cooperative agencies and partners.

Since implementation of the BEMP, the percentage of the Jackson Elk Herd wintering on the NER has continued to increase. Up to 80% of the Jackson Elk Herd now winters on the NER, making the herd more vulnerable to a catastrophic disease outbreak.

One of the key features of the BEMP is to support Wyoming elk and bison herd size objectives by minimizing the potential for significant disease outbreaks. This would be accomplished by decreasing winter herd concentrations through reducing reliance on the supplemental feeding program. Reducing elk use of the NER by encouraging the use of traditional native winter range would disperse the elk herd and reduce the concentration of and potential exposure to a catastrophic disease outbreak.

Brucellosis and Co-Mingling

Brucellosis and the high rates of infection in both the bison and elk herds is of concern because of the economic impact it could have on livestock producers if cattle contract the disease. Encouraging elk and bison to utilize native winter range will likely result in some of these animals dispersing back to their summer range on area cattle ranches. This proposed program will provide a tool to mitigate the potential conflict of co-mingling between these wildlife herds and domestic livestock.

Program Synopsis

This program would develop a conservation easement/lease program to assist Jackson Area ranchers in reducing Human-Wildlife Conflicts. It would provide payments to area ranchers through either a long-term easement (50 yrs.) or a shorter-term lease (5 yrs.). These payments would provide financial assistance and incentive to modify existing cattle operations to prevent co-mingling. Ranchers completing the 5 year lease program would also be eligible for the long-term easement, but not an additional 5 year lease.

This voluntary program would be available to Teton County livestock producers on a priority area basis.

Program Benefits

This program will contribute toward the long-term viability and sustainability of two of Jackson Hole's historic and currently important features influencing the county's character; ranching and the iconic Jackson Elk Herd.

This easement/lease program will provide financial

assistance and incentives to allow ranchers to make modest modifications to their ranch management and prevent Human-Wildlife Conflicts while preserving a viable livestock operation.

Preventing co-mingling conflicts with livestock will enable elk and bison, which have typically been concentrated on the NER, to disperse and reduce herd concentration and disease transmission potential.

This program will also contribute to the long-term health of the elk and bison herds, helping to ensure they continue to significantly contribute to the ecology of the Greater Yellowstone Ecosystem.

Co-mingling between elk and livestock is a concern for ranchers in other parts of Wyoming. This proposed conservation program could serve as a demonstration project providing benefits for other Conservation Districts attempting to address co-mingling issues.

A Public/Private Conservation Program

This program is proposed as a public private partnership to benefit the local economy and conservation practices in Teton County. It would involve the voluntary participation by ranchers, the prioritization and document development by the U.S. Fish and Wildlife Service, private funding through the National Wildlife Refuge Association, and administration by the Teton County Conservation District.

Program Development and Partnership Commitments

Develop Conservation Documents

The U.S. Fish and Wildlife Service will provide draft conservation documents (Easement, 50 year; Lease, 5 year) for review and modification by the Teton County Conservation District (TCD). This collaboration will ensure these options include important conservation features and the legal requirements necessary for future administration by the TCD.

Funding

Although public conservation funding may become available in the future, this program would initially be funded by contributions from private conservation foundations through the National Wildlife Refuge Association. It is anticipated that approximately $10 million would initially be available to start this program.

Funds would be used for payments to area ranchers and for administrative overhead for the TCD.

Landowner Contracts

Approximately 17 ranches covering up to 13,000 acres could qualify for this conservation program. Initially, contacts and program enrollment would focus on the high priority area primarily in the Spring Gulch area. This priority area includes eight ranches covering up to 6,120 acres.

Landowner contacts can be made using a variety of approaches, consistent with the standard procedures followed by the TCD. All initial landowner contacts could be made by the TCD, the NER staff or a combination of both. The TCD will determine the standard process for reaching out to ranchers that qualify for this program.

Program Administration

The TCD would administer this program which would include document recording, payment to enrollees, compliance monitoring, notification to new landowners purchasing lands enrolled in the program, and compliance enforcement. The TCD would also contact 5 year lease enrollees at the end of their program term to offer a long-term easement as funds permitted.

It is anticipated the number of landowners enrolled in this program would be relatively low, approximately 10 or fewer. The selection of enrollees would be coordinated with the NER.

Easement/Lease Description

Long-term Easement

- Length of Time: 50 years
- Livestock Management: Livestock (a domestic female cow or horse) would be prohibited on identified lands during the primary brucellosis transmission period from January 1 through April 15.
- Exemption: Livestock could occupy lands covered

by easement if confined within a high fence (minimum 7' tall) designed to exclude elk and bison from January 1 through April 15. Fencing for this exemption would be consistent with Teton County guidelines and limited in scope to prevent an impediment to wildlife movement.

- Hay Storage: Hay storage sites would be protected by a high fence (minimum 7' tall) designed to exclude elk and bison from January 1 through April 15.
- Hunting: Elk and bison hunting would be allowed during the State of Wyoming hunting seasons. Landowners would control access and determine who would be allowed to hunt. Landowners may charge fees for hunting and include a limited range weapons restriction as desired.

Short-term Lease

- Length of Time: 5 years
- Livestock Management: Same as long-term easement
- Exemption: Same as long-term easement
- Hay Storage: Same as long-term easement
- Hunting: Same as long-term easement

Additional Option

An additional option, at the landowner's request, can be to eliminate intensive forage production practices during the duration of the conservation agreement. This would include the exclusion of irrigation, fertilization, or the production of high quality forage to prevent attracting elk and bison. This option would include an additional payment. Few requests for this additional option are anticipated.

For More Information

Contact:
Steve Kallin
Refuge Manager
National Elk Refuge
307/201-5409
steve_kallin@fws.gov

From:	Steve Kallin
To:	Tom Segerstrom
Subject:	DRAFT Conservation Easement Proposal
Date:	Friday, September 09, 2016 2:37:29 PM
Attachments:	DraftConservationProposalToAssistRanchers 9-9-2016.pdf DRAFT Brucellosis Conservation Program Proposal 9-9-2016.docx

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Hi Tom:

Attached are two versions of the same document. This is a very rough draft of the Co-mingling Conservation Easement Program Proposal we have discussed. Please feel free to make comments in any manner that is easiest for you; in either version, or by hand on a hard copy. Or, if you just have several general comments, place them in an email.

I appreciate you reviewing this draft and I'm especially interested in your suggestions for information that should be added or deleted.

Thanks again. I know your time is extremely limited!

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

DRAFT

A Conservation Proposal to Assist Jackson Area Ranchers in the Prevention of Brucellosis Transmission from Elk and Bison to Domestic Livestock.

September 9, 2016

PURPOSE OF PROGRAM

The purpose of this proposed program is to provide area livestock producers assistance in mitigating a Human-Wildlife Conflict (HWC). Specifically this program addresses the issue of transmission of brucellosis between elk and bison herds and domestic livestock by preventing co-mingling.

BACKGROUND

History

The Jackson Hole Area enjoys a rich ranching and wildlife heritage. In the 1880's, cattle ranching was first introduced to the valley and remains an important economic and social component of the Jackson Hole's character.

Elk figure prominently in Jackson Hole's history and culture. In the late 1800s, when elk populations all over North America were being extirpated, the residents of Jackson Hole protected elk from "tusk hunters" and from large-scale commercial hunting operations. Today, the Jackson Elk Herd is recognized world-wide and contributes significantly to the local economy.

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Ranching and wildlife are interwoven into the historic and cultural fabric of the Jackson Hole Area. This proposal is designed to contribute to the healthy continuation of both.

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Elk and bison contribute significantly to the ecology of the Greater Yellowstone Ecosystem. In 2007, the U.S. Fish and Wildlife Service and the National Park Service completed a 15 year plan for managing bison and elk on the National Elk Refuge and in Grand Teton National Park. The plan was developed in accordance with the National Environmental Policy Act and included extensive public input and close collaboration with several cooperative agencies and partners.

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One of the key features of the BEMP is to support Wyoming elk and bison herd size objectives by minimizing the potential for significant disease outbreaks. This would be accomplished by decreasing winter herd concentrations through reducing reliance on the supplemental feeding program. Reducing elk use of the NER by encouraging the use of traditional native winter range would disperse the elk herd and reduce the concentration of and potential exposure to a catastrophic disease outbreak.

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PROGRAM SYNOPSIS

This program would develop a conservation easement/lease program to assist Jackson Area ranchers in reducing Human-Wildlife Conflicts. It would provide payments to area ranchers through either a long-term easement (50 yrs.) or a shorter-term lease (5 yrs.). These payments would provide financial assistance and incentive to modify existing cattle operations to prevent co-mingling. Ranchers completing the 5 year lease program would also be eligible for the long-term easement, but not an additional 5 year lease.

This voluntary program would be available to Teton County livestock producers on a priority area basis.

DRAFT

PROGRAM BENEFITS (improve this section)

This program will contribute toward the long-term viability and sustainability of two of Jackson Hole's historic and currently important features influencing the county's character; ranching and the iconic Jackson Elk Herd.

This easement/lease program will provide financial assistance and incentives to allow ranchers to make modest modifications to their ranch management and prevent Human-Wildlife Conflicts while preserving a viable livestock operation.

Preventing co-mingling conflicts with livestock will enable elk and bison, which have typically been concentrated on the NER, to disperse and reduce herd concentration and disease transmission potential.

This program will also contribute to the long-term health of the elk and bison herds, helping to ensure they continue to significantly contribute to the ecology of the Greater Yellowstone Ecosystem.

Co-mingling between elk and livestock is a concern for ranchers in other parts of Wyoming. This proposed conservation program could serve as a demonstration project providing benefits for other Conservation Districts attempting to address co-mingling issues.

A PUBLIC/PRIVATE CONSERVATION PROGRAM

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PROGRAM DEVELOPMENT AND PARTNERSHIP COMMITMENTS

Develop Conservation Documents

The U.S. Fish and Wildlife Service will provide draft conservation documents (Easement, 50 year; Lease, 5 year) for review and modification by the Teton County Conservation District. This

DRAFT

collaboration will ensure these options include important conservation features and the legal requirements necessary for future administration by the TCD.

Funding

Although public conservation funding may become available in the future, this program would initially be funded by contributions from private conservation foundations through the National Wildlife Refuge Association. It is anticipated that approximately $10 million would initially be available to start this program.

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It is anticipated the number of landowners enrolled in this program would be relatively low, approximately 10 or fewer. The selection of enrollees would be coordinated with the NER.

EASEMENT/LEASE DESCRIPTION

Long-term Easement

-Length of Time: 50 years

DRAFT

-Livestock Management: Livestock (a domestic female cow or horse) would be prohibited on identified lands during the primary brucellosis transmission period from January 1 through April 15.

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Short-term Lease

-Length of Time: 5 years

-Livestock Management: Same as long-term easement.

-Exemption: Same as long-term easement.

-Hay Storage: Same as long-term easement.

-Hunting: Same as long-term easement.

Additional Option

An additional option, at the landowner's request, can be to eliminate intensive forage production practices during the duration of the conservation agreement. This would include the exclusion of irrigation, fertilization, or the production of high quality forage to prevent attracting elk and bison. This option would include an additional payment. Few requests for this additional option are anticipated.

For more information contact:

Steve Kallin
Refuge Manager
National Elk Refuge
307/201-5409
steve_kallin@fws.gov

DRAFT

From: Steve Kallin
To: Dale Deiter; Brad Hovinga; David Gustine
Subject: Updated Draft BEMP Step Down Plan
Date: Monday, September 12, 2016 4:37:35 PM
Attachments: Draft NER Step Down Plan Post Peer Review Copy_01_SEP_ 2016.docx

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Per our last Step Down Planning meeting, we have updated the draft plan (see attached) which included the addition of FAQs. This version was sent out to everyone on the Planning Team for comments but none were received. We are still working on a map to show the general area where we do not want animals to disperse. I will send you a copy of the map once it is generated. Also, we are in the process of completing some document formatting changes for the final draft to be released for public comment.

I will be briefing our Regional Office this Friday concerning the status of this Step Down Plan. The next step in the completion and implementation schedule is to release this plan to the public for comment. That could happen as early as next week. If necessary, please discuss the status of this plan and its possible release for public comment with others in your agency as your procedures require. As a reminder, this is not a NEPA process.

Don't hesitate to call if you have any questions. Thanks again for all of your help,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

U.S. Fish and Wildlife Service National Park Service

September 2016 Draft

BISON AND ELK MANAGEMENT STEP DOWN PLAN

A Structured Framework for Reducing Reliance on Supplemental Winter Feeding

National Elk Refuge
Grand Teton National Park

DRAFT

September, 2016

September 2016 Draft

BISON AND ELK MANAGEMENT STEP DOWN PLAN

For the

National Elk Refuge,
Grand Teton National Park,
John D. Rockefeller, Jr. Memorial Parkway

Teton County, Wyoming

DRAFT

***Suggested Citation**:* U.S. Fish and Wildlife Service: 2015. Bison and Elk Management Feeding Reduction Step Down Plan, National Elk Refuge and Grand Teton National Park. U.S. Department of the Interior, Washington D.C. Available online at:

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Appendix I. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section

DRAFT

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DRAFT

EXECUTIVE SUMMARY

Overview

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands, focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The final plan directed the NER and GRTE (in conjunction with the Wyoming Game and Fish Department: WGFD) to maintain the state's elk herd objective of 11,000; establish a bison population objective of 500; restore habitat on the NER and in GRTE; continue hunting bison and elk on the NER; continue the elk reduction program, when necessary, in GRTE; allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available; and develop a dynamic, structured framework and Step Down Management Plan for decreasing the need for supplemental feeding on the NER. ***This Bison and Elk Management Step Down Plan (MSP) was developed to specifically addresses the criteria for a structured framework referenced in the Record of Decision.***

Background

Winter feeding of elk in Jackson was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. The loss of available winter range in Jackson Hole due to new ranching operations and a growing town resulted in significant numbers of elk dying during several severe winters in the late 1800s and early 1900s. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, established the National Elk Refuge. Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding.

Bison were extirpated outside Yellowstone National Park (YNP) by the mid-1880s but in 1948 were reintroduced to Jackson Hole when 20 bison from YNP were released near Moran, Wyoming. The herd remained small until discovering elk feedlines in 1980, when the population began sustained population growth. Bison and elk that winter on the NER are migratory and occupy summer ranges predominantly to the north.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER (Boyce 1989), high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases (Murie 1951, Franson and Smith 1988, Samuel et al. 1991), which is currently demonstrated by the high level of brucellosis in the elk and bison herds (Cross et al. 2010, Kamath et al. 2016). It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands (Smith et al. 2004), thereby reducing other wildlife associated with woody vegetation.

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. The potential risk of catastrophic disease outbreaks and the need to mitigate this threat is a vital component in achieving the BEMP Sustainable Populations Goal.

Comment [CE1]: This might be worth its own callout box similar to FAQs to draw attention to this critical point

Objectives

This MSP addresses several objectives under a broader BEMP goal of sustainable populations, which directed the agencies to: 1) develop a

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dynamic, structured framework for reducing NER supplemental feeding; 2) implement a phased reduction of animals on feed: a) Phase 1, to 5,000 elk and 500 bison, and b) Phase 2, elk and bison rely predominantly on native habitat; 3) maintain natural elk bull-to-cow ratios in park summer herd; and 4) enhance public outreach/education. The BEMP further stated that consideration criteria for implementing the 2nd phase of reduced feeding would include some or all of: 1) the level of forage production and availability on the National Elk Refuge, 2) desired herd sizes and age/sex ratios, 3) effective mitigation of bison and elk co-mingling with livestock on private lands , 4) winter distribution patterns of elk and bison, 5) prevalence of brucellosis, chronic wasting disease, and other wildlife diseases, and 6) public support. **In short, the overall objective of this plan is to provide a path for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives and public support.**

Strategies

Elk have been fed for some period during nearly every winter on the National Elk Refuge since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during a time of year when natural forage is typically most limited is powerful to both species, and their knowledge of its existence has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Attempting to modify this behavior on a large scale is unprecedented and will necessarily require investigation, constant evaluation, adaptive modifications to the approach when indicated, and repeated trials.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into the 3 broad categories of 1) timing and intensity of winter feeding, 2) timing and intensity of hunting, and 3) herd segment specific and overall harvest levels.

Measuring the success of MSP strategies will require knowledge of several bison and elk herd attributes. Because we are interested in reducing the intensity of elk and bison feeding throughout the entire winter season, which includes both the number of animals on feed and the duration of feeding, we will use measurements of elk-fed-days (EFD; the total number of elk fed per day per season derived from daily feedground estimates) and bison-fed-days (BFD; the total number of bison fed per day derived from daily feedground estimates) to evaluate feeding intensity. For example, if 5,000 elk were fed for 100 days during a given winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD. Average baseline feeding intensity during the post-BEMP to pre-MSP period from 2008-2016 was 487,838 EFD (range = 223,614-746,800), and 45,224 BFD (range = 26,035-82,124). Reductions in EFD and BFD compared to these baselines will represent progress in meeting feeding reduction objectives under the MSP. Reductions in EFD and BFD could be achieved through reducing the length of the feed season, reducing the number of elk and bison on feed, or some combination of both factors.

Initial success of MSP implementation will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP did not provide specific measurement criteria for the definition of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage" we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. These levels of reduction are consistent with elk and bison predominantly relying on free standing forage rather than supplemental feed.

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Similarly there are population-specific objectives derived from the BEMP and Phase 1 of the MSP for 5,000 elk wintering on NER and 500 bison wintering in the Jackson Hole area. Progress towards these objectives will be measured using annual classification counts and the average number of elk and bison counted during daily feedground estimates.

Chronic Wasting Disease. As of 2016, CWD has been detected within 40 miles of the Jackson Elk Herd (JEH) in moose, within 35 miles in deer, and within 175 miles in elk. Continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence will take place. Some aspects of CWD response planning could change based on implementation of WGFD's CWD management plan (WGFD 2016).

Winter Feeding. Currently, the initiation of supplemental winter feeding occurs when available forage drops to 300 lbs./acre along transects in areas with highly preferred grasses. This protocol will change to delay the initiation of feeding.

The strategy of delaying the start of supplemental feeding is to encourage elk and bison to use native winter range, especially those individuals that have not previously received a food reward on the Refuge. Over time, it's anticipated a cohort of animals will develop that are not conditioned to the Refuge supplemental feeding program, which will reduce herd concentrations and the risk of disease transmission.

To reduce supplemental feeding overall, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk and bison fed days, the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years of MSP implementation, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require focused mitigation measures.

As bison and elk behavioral responses are better understood, feeding delays will be extended to encourage a redistribution of elk and bison to native winter range. However other factors outside of the scope of this plan such as wolf numbers and distribution could reduce the effectiveness of this strategy.

Variables that influence feeding initiation date will be considered (Table 4, Fig. 10). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. And finally, the distribution of animals, particularly on private, livestock producing lands, would be considered prior to delaying feeding initiation date.

Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years.

In the early years of MSP implementation, the seasonal termination of feeding is expected to

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occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date as the MSP is implemented.

Harvest. Few options for manipulating elk hunting are currently available because the JEH is at or near the 11,000 WGFD objective. Proposed changes include allowing limited any elk permits, allowing a bow season near developments on the NER, delaying the elk season so it will better coincide with migration timing, and alternating areas that are closed and open to hunting over time to encourage animal movements or facilitate harvest.

Based on summer bull ratios in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded hunting opportunities are considered.

The proportion of the Jackson Elk Herd that winters on NER has increased in the past 2 decades. This trend is correlated with a decline in elk use of native winter range and an increase in the proportion of NER elk that occupy winter ranges immediately adjacent to the Refuge. If efforts to encourage increased use of native winter range are unsuccessful, agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. This will provide a level of harvest flexibility more commensurate with addressing changes in herd distribution.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution or discouraging bison from attempting to leave the NER via the south boundary into the town of Jackson.

The effectiveness of NER late-season harvest regimes is influenced by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could help reduce winter elk numbers on the Refuge. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st .

Private Lands Mitigation. Several strategies would be employed to mitigate likely changes in bison and elk distribution, including providing incentives for non-breeding cattle operations, increased fencing in limited areas to separate elk and bison from livestock feed lines, hazing elk and bison away from livestock feed lines, and purchasing private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal wildlife conflict technician positions supervised by WGFD.

Vegetation Restoration. Various approaches to restore the Kelly Hayfields in GRTE (4,500 acres) were initiated in 2008. Work will likely be complete in 2035. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and providing visitor opportunities to enjoy wildlife viewing within a natural setting. The restoration process involves removal of non-native vegetation, collecting and propagating native seeds and plants, as well as the seeding of native plants.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres are currently under restoration treatment and 3,265 acres remain non-native pasture. Maintenance of restored ecological conditions

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will require management efforts in perpetuity to keep non-native species from colonizing restored areas. The park will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Strategies Considered But Rejected

Strategies considered but rejected include fertility control in elk and bison, agency reduction of either elk or bison, and altering rations of supplemental feed. These strategies were rejected because they were not included in the BEMP preferred alternative and/or because there was not support for them by cooperating agencies.

Models and Monitoring

Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

A robust monitoring program will be necessary to track the effects of actions implemented under this plan. Critical monitoring components will include: 1) enhanced forage production and availability sampling; 2) measuring animal abundance and distribution including differences in some sex and age classes; 3) determining elk and bison fed days each feeding season; 4) estimating winter mortality; 5) brucellosis seroprevalence rates; and 6) CWD surveillance. In many cases, attribute baselines for the period preceding implementation of this plan have been developed for comparison after the plan is implemented.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Actions completed each year, the results of monitoring programs, and any proposed changes in management direction will be presented in an annual MSP update/report, completed by NER staff by the end of June.

Public Outreach/Education

De-emphasizing the supplemental feeding program will be a major paradigm shift especially for the residents of Jackson Hole and Teton County, but will also be of interest to others in Wyoming and across the nation familiar with the long history of feeding elk on the National Elk Refuge. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk and bison herd management methods. A detailed communication plan has been developed that identifies key messages and utilizes a variety of outreach methods, including print, video, and voice material, utilizing social media, and meetings with elected officials, state and local governments, agency and tribal partners, community organizations, stakeholders, and the general public.

Schedule

GPS collars were deployed on 30 adult cow elk in February 2016. Assuming adequate funding, , additional GPS collars will be deployed in winter 2017. Public outreach, private lands conflict mitigation and contacts, and enhanced forage monitoring will occur in fall 2016 through January 2017. Reductions in feed season length will begin in winter 2017.

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INTRODUCTION

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands. It included directives for forthcoming development of adaptive management practices to address several objectives in the plan, including a desired future condition of elk and bison relying predominantly on native forage. This MSP has been developed expressly for that purpose.

Bison and Elk Populations

While Jackson Hole is probably best known for the splendor and ruggedness of the Teton Range, the Jackson bison and elk herds rank among the top characterizing features of the valley. Both figure prominently in Jackson Hole's history and culture, although bison were absent from the valley for about 100 years between the mid-1800s and mid-1900s.

The JEH occupies approximately 8,000 km^2 in the upper Snake River watershed north of the town of Jackson (Fig. 1). Much of the herd is migratory, moving between distinct wintering and summer ranges. Primary wintering areas include the Buffalo Valley, lower elevations of the Gros Ventre River drainage, the NER, and areas adjacent to the NER on Bridger-Teton National Forest (BTNF) lands. Summering areas occur throughout the herd's range and for convenience are divided into five geographic regions that include GRTE, Yellowstone National Park (YNP), the Gros Ventre drainage, Teton Wilderness, and Southwest Boundary area, which includes private and public lands in the vicinity of GRTE's southwest boundary.

In the late 1800s, when elk populations all over North America were being extirpated, the residents of Jackson Hole protected elk from "tusk hunters" and large-scale commercial hunting operations. Elk are just as important to today's residents of the valley. Thousands of people each year have the opportunity to see elk at close range on the refuge while riding on horse-drawn sleighs. Thousands of pounds of shed elk antlers are sold at an annual antler auction each spring in the town square. Elk are important to backcountry users as well as to people that never leave the road. Jackson Hole is a popular destination for instate and out-of-state elk hunters. The draw of elk to visitors contributes significantly to the local economy.

Winter feeding of elk in Jackson Hole began in 1910 and was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. According to historical reports, before Euro-American settlement some Jackson elk wintered in the southern portion of Jackson Hole (present location of the NER town of Jackson) and may have used areas outside Jackson Hole, including the Green River and Wind River basins to the south and east, respectively, and the Snake River basin to the southwest in what is now eastern Idaho (Allred 1950; Anderson 1958; Blair 1987; Barnes 1912; Sheldon 1927). Radio-collar studies have documented small numbers of Jackson elk wintering in each of these areas in recent times as well (NER and GRTE, unpublished data). Over time, changes in land use and development in these areas, over hunting, and establishment of feedgrounds probably reduced the use of these areas by Jackson elk.

By the end of the 19th century the JEH was believed to be largely confined to Jackson Hole and the immediately surrounding area, where wintering conditions are often harsh. Significant numbers of elk died during several severe winters in the late 1800s and early 1900s> Primary reasons for these mortality events included the loss of available winter range in Jackson Hole from new ranching operations and a and

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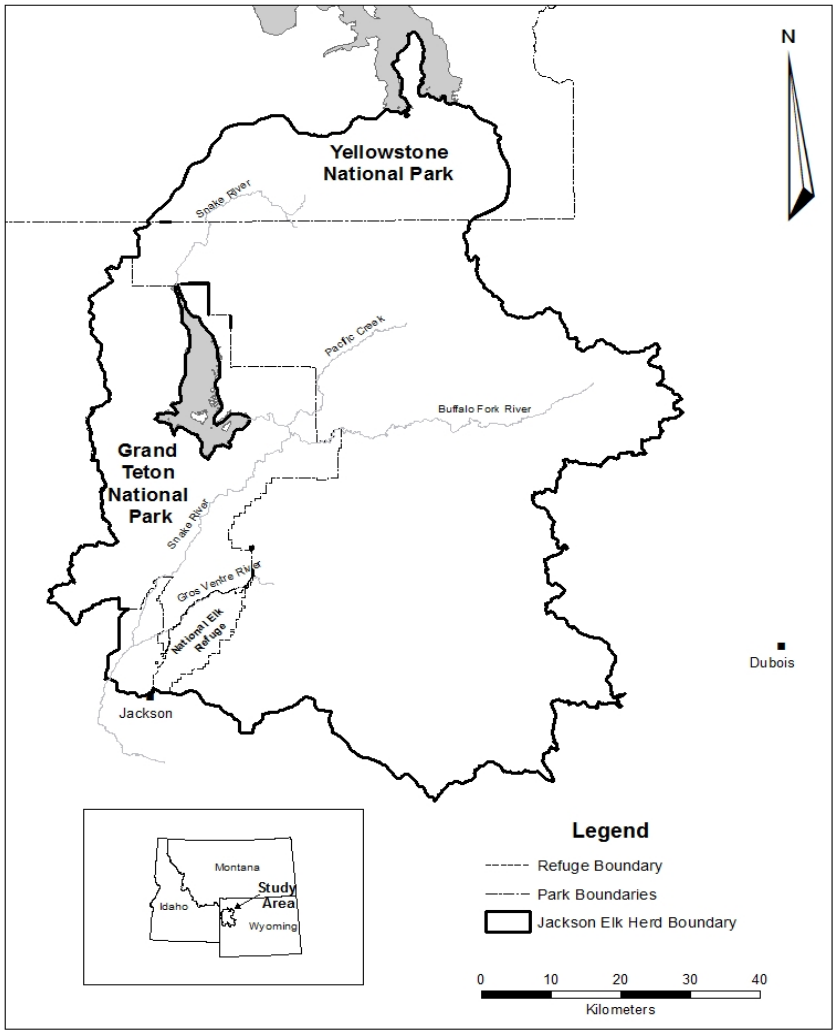


Figure 1. Jackson elk and bison herd ranges, including the National Elk Refuge, Grand Teton and Yellowstone National Parks, and Bridger-Teton National Forest. [include bison range, labels for continental divide and Bridger-Teton National Forest, and in Legend Jackson elk herd unit]. Also Gros Ventre drainage and state feedgrounds because they are referenced in text

expansion of Jackson. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, appropriated $45,000 for the purchase of lands and maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first winter census in the area was conducted in 1912 and showed about 20,000 elk residing in Jackson Hole and the

Hoback River drainage (the latter is not within the JEH's range).

Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding. In recent times the population has fluctuated near the herd objective of 11,000 that was adopted by the WGFD (Fig. 2).

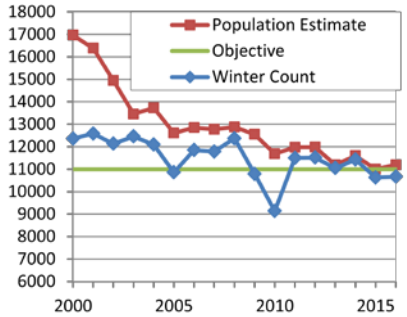


Figure 2. Winter Counts, population estimates, and herd objective for the Jackson elk herd, 2000-2016.

An iconic symbol of the American West, bison are also popular with visitors and residents. Because so few opportunities remain to see bison in the wild, viewing and photographing them in GRTE with the Teton Range in the background is a treasured opportunity for many of the valley's visitors. Similar to elk, there is also a high level of interest in bison hunting. Bison are of particular interest to nearby American Indian tribes and tribes in other parts of the United States because the animals are central to their culture and tradition.

Bison are native to Jackson Hole, as evidenced by the presence of prehistoric bison remains throughout the valley, but were extirpated outside Yellowstone National Park by the mid-1880s. In 1948, 20 bison from YNP were reintroduced to the 1,500-acre Jackson Hole Wildlife Park near Moran. The Jackson Hole Wildlife Park was a private, non-profit organization sponsored by the New York Zoological Society, the Jackson Hole Preserve, Inc., and the WGFD. A population of 15–30 bison was maintained in a large enclosure there until 1963, when brucellosis was discovered in the herd (likely transferred with the original 20 animals from YNP). At that time, all the adult animals were destroyed, but four vaccinated yearlings and five vaccinated calves were retained. In 1964 twelve certified brucellosis free bison from Theodore Roosevelt National Park were added to the herd. In 1968 the herd (down to 11 animals) escaped the confines of the wildlife park, and a year later the decision was made to allow them to range freely. The expansion of GRTE in 1950 had enveloped the Wildlife Park, and this allowed the bison to range freely and was consistent with National Park Service wildlife management policy. The herd remained small and wintered mostly in the Snake River bottoms in GRTE until 1975, when it followed the winter environmental gradient to the NER and began wintering there. The use of standing forage by bison on the NER was viewed as natural behavior thus acceptable to managers. In 1980, however, bison discovered and utilized supplemental feed provided to elk in winter, and they have continued to do so ever since.

The discovery of supplemental feed by bison has had several consequences, including a significant increase in the population's growth rate (Fig 3). Bison on the elk feedlines have at times disrupted feeding operations and displaced and injured elk. To minimize conflicts between bison and elk, managers have provided separate feedlines for bison since 1984. As the population has grown, separating elk and bison on feedlines has become increasingly difficult, and a variety of feeding strategies are employed to help reduce displacement of elk.

As the herd has grown it has maintained fairly stable movement patterns, wintering almost entirely on the NER and summering within GRTE and adjacent lands on the BTNF (Fig. 1).

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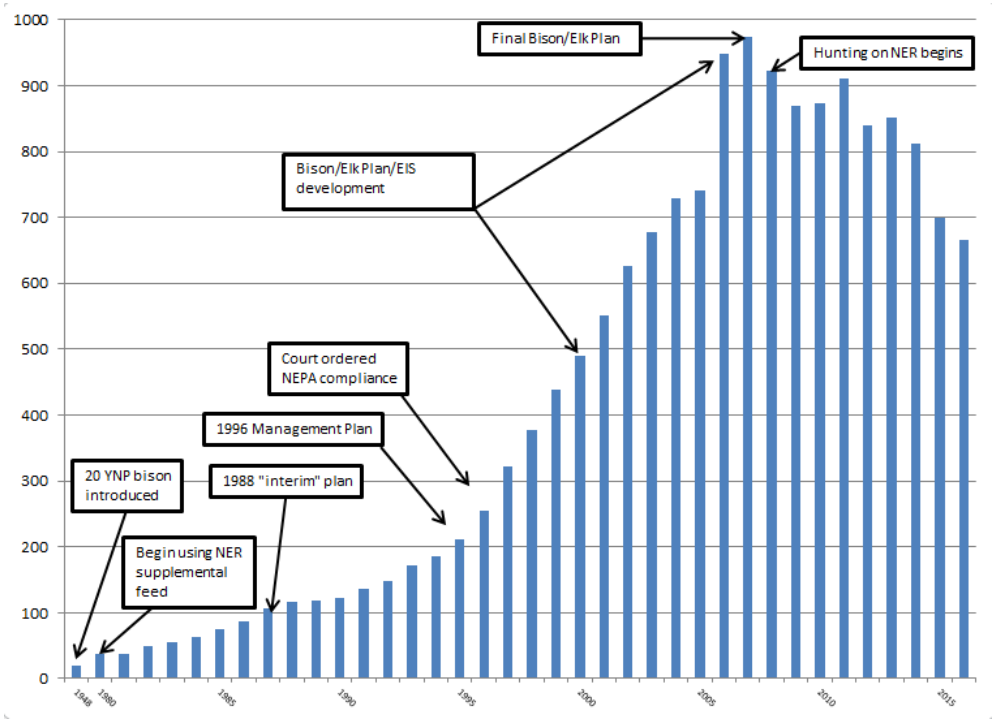


Figure 3. Population growth and planning history for the Jackson bison herd, 1948-2016.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands and thereby reducing availability of these habitats to other wildlife as well as unusually low winter mortality, which has affected predators and other species and has required intensive hunting programs.

Planning History

Jackson's bison and elk populations have been the subject of previous planning efforts. Elk management and research has been guided by the Jackson Hole Cooperative Elk Studies Group since it was established in 1958. The group consists of biologists and agency administrators from the NER, GRTE, YNP, BTNF, and WGFD, who meet at least annually to coordinate management of the population and its habitat. Coordination of bison management began soon after they started frequenting the NER in 1976 and using supplemental feed provided to elk in 1980 (Fig. 3). Release of an "Interim" plan that called for maintaining a herd of 90-110 bison while data were gathered for a long term plan occurred in 1988. It was followed by implementation of a sport hunt outside GRTE, administered by WGFD. This plan was halted after litigation in which the plan's violation of NEPA was successfully argued by plaintiffs.

In 1996, after considerable herd growth, a new long term management plan and environmental

assessment for the Jackson bison herd was released (Fig 3). This plan had strong support and called for maintaining a herd size of 350-400 bison, but it was shelved a year later when plaintiffs from the earlier litigation successfully argued that, because the plan failed to consider the effects of feeding elk on bison management, it also violated NEPA and was not sufficient. This led to development of the draft bison and elk management plan and environmental impact statement from 2000-2006 and release of the final plan in 2007 (Fig 3).

The 2007 Bison and Elk Management Plan (BEMP; USFWS 2007) considered six alternatives for bison and elk management focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The primary management scenarios presented in the alternatives included the status quo, terminating elk and bison hunting on the NER and the elk reduction program in GRTE, brucellosis vaccination options, restoring habitat, improving forage, and decreasing or phasing out supplemental winter feeding.

The final BEMP (USFWS 2007; www.fws.gov/bisonandelkplan) which set management direction for 15 years or until a subsequent plan is developed, proposed to maintain the state's elk herd objective of 11,000, establish a bison population objective of 500, restore habitat in the NER and GRTE, continue hunting bison and elk on the NER, continue the elk reduction program in GRTE in concert with the parks enabling legislation, allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available, and develop a dynamic framework of management actions which adaptively decrease the need for supplemental feeding on the NER. ***This Bison and Elk Management MSP was developed to address the latter and specifically addresses the criteria for a structured framework listed on page 5 of the Record of Decision*** **(Fig. 4).** It does not address other on-going bison and elk management actions already prescribed by the BEMP.

The BEMP scheduled the completion of the MSP for 2008. However, litigation challenging the BEMP in 2008 led to the decision to postpone its development until litigation was resolved. As of March 2015, two court rulings have upheld the 2007 BEMP and ROD. In a lawsuit against the BEMP and its author agencies (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2010), plaintiffs argued that the BEMP violated the National Wildlife Refuge System Improvement Act (National Wildlife Refuge System Improvement Act 1997) by disrupting the biological integrity of the Refuge, and that the plan and the accompanying EIS violated NEPA because they were insufficiently detailed to allow a reasonably complete discussion of mitigation. The crux of the plaintiff's argument was that the plan did not set a specific date for the cessation of supplemental feeding. In response, the agencies argued that the plan constituted a valid exercise of discretion and that it and the EIS were sufficiently detailed to satisfy the requirements of NEPA. In March 2010, the United States District Court for the District of Columbia sided in favor of the agencies in this case. In 2011, the plaintiffs appealed this ruling to the United States Court of Appeals for the District of Columbia Circuit. This Court affirmed the District Court ruling (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2011).

National Environmental Protection Act Compliance

The 2007 BEMP/EIS and ROD satisfied NEPA requirements for current bison and elk management through a detailed analysis of alternative management actions and their likely effect on the environment, and substantial involvement of the public in the process. This MSP does not duplicate or add to this process. It is designed to tier off of the BEMP as a dynamic implementation guide to one part of the preferred alternative outlined in the BEMP ROD. As such, references to NEPA covered in the BEMP

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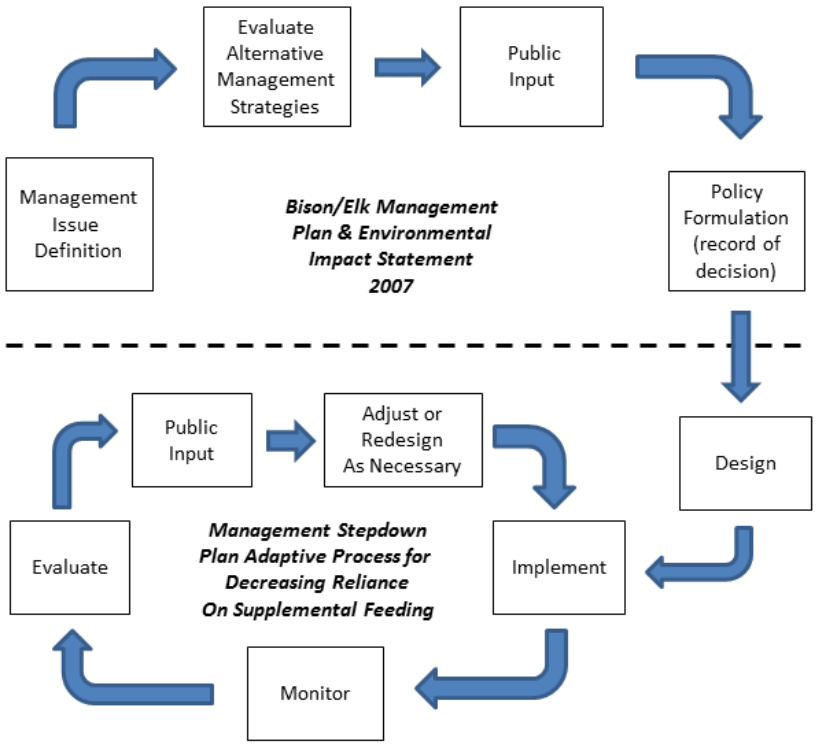


Figure 4. Management step down planning for supplemental feeding on the National Elk Refuge and its relationship to the 2007 Bison/Elk Management Plan and Environmental Assessment.

will be included where necessary in this document, and the discussion of any action that would require additional NEPA compliance will be explicitly stated as such in that context.

Management Step Down Planning

The use of adaptive management plans has gained popularity in natural resource management planning because, by definition, they allow modifications of strategy based on monitoring results and outcomes toward reaching specific goals or objectives. Four elements generally included in an adaptive management approach include: 1) well defined and mutually agreed upon objectives; 2) knowledge (including descriptive models) of the dynamics of the system being managed; 3) clearly articulated management actions and strategies; and 4) a monitoring program to evaluate responses of the system to management actions (Walters 1986).

This MSP utilizes adaptive management planning principles but is not intended to include all of the adaptive management planning elements outlined in the Department of Interior Adaptive Management Technical Guide (2007). This MSP is more accurately described as a "structured framework" of adaptive management actions that progressively transitions from supplemental winter feeding to greater reliance on free-standing forage (BEMP ROD p.5).

Table 1. 2007 Bison/Elk Management Plan Goals and Objectives (Step Down Plan objectives shaded)

Goal: Habitat Conservation

Objectives:

- Conserve important private lands.
- Increase forage production.
- Minimize non-native plants.
- Protect sagebrush grasslands.
- Restore willow, aspen, and cottonwood.
- Perpetuate natural mosaic of plant communities.

Goal: Sustainable Populations

Objectives (BEMP pages 135-136):

- Develop structured framework for reducing NER supplemental feeding.
- Phase reduction of animals on feed: 1) to 5,000 elk and 500 bison, and 2) elk and bison rely predominantly on native habitat.
- Maintain 35:100bull-to-cow ratios in park summer elk herd.
- Ensure a genetically viable bison herd with close to an even sex ratio.
- Enhance public outreach/education.

Goal: Elk and Bison Numbers

Objectives:

- Maintain state elk herd objective of 11,000.
- Maintain a genetically viable bison population of about 500 animals.

Goal: Disease Management

Objectives:

- Manage brucellosis transmission risk from elk and bison to livestock.
- Manage feeding to reduce brucellosis transmission among bison and elk.
- Educate hunters about wildlife disease human health hazards.

OBJECTIVES

The management direction and desired conditions stated in the BEMP called for the NER and GRTE staffs to work with others (agencies, partners, etc.) to "adaptively manage elk and bison in a manner that contributes to the State's herd objectives yet allows for the biotic integrity and environmental health of the resources to be sustained," so that the public can enjoy a variety of compatible wildlife-dependent recreational opportunities. Under the BEMP's 4 primary goals, 20 associated objectives were identified (Table 1). This MSP addresses four objectives under the goal of sustainable populations (Fig. 5).

The reduction of animals on feed at the NER was proposed to be spread over two phases. In Phase 1, the aim is to reduce the average number of elk on feed to 5,000 (while maintaining WGFD's 11,000 elk herd objective), and reduce the winter

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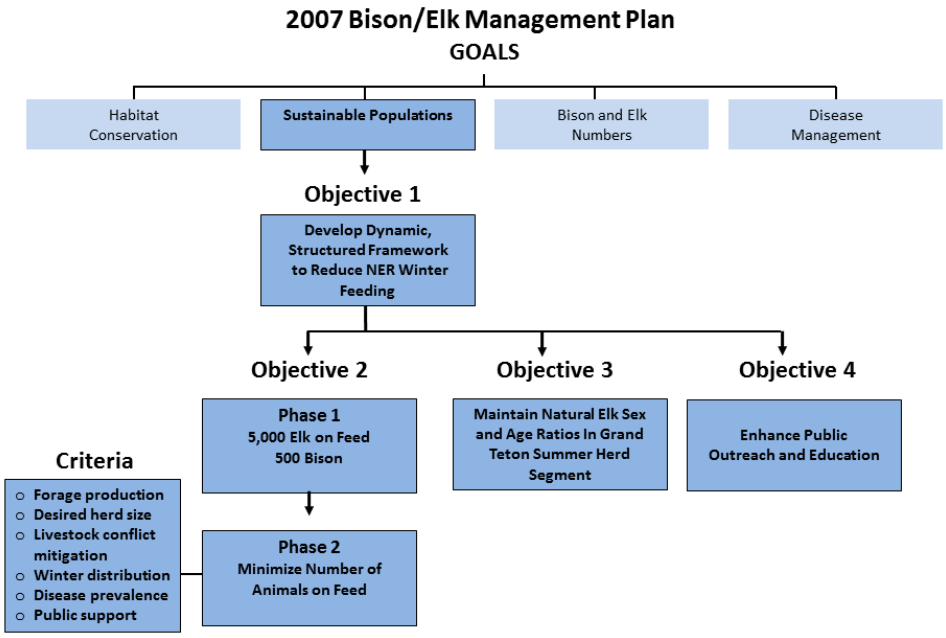


Figure 5. Relationship of MSP to the 2007 Bison/Elk Management plan goals, phasing of objectives, and consideration criteria for reducing the reliance of elk and bison on supplemental feed during Phase 2.

population of bison to the BEMP recommended, and WGFD adopted, objective of 500. In Phase 2, the overall objective is to reduce the reliance of bison and elk on supplemental feed (USFWS and USNPS 2007a). Desired conditions include animals relying predominantly on native habitat and cultivated forage on NER. Important consideration criteria for implementing Phase 2 will include: 1) the level of forage production and availability on the NER and adjacent winter ranges; 2) maintenance of desired herd sizes and age/sex ratios; 3) the ability to effectively mitigate bison and elk livestock conflicts; such as co-mingling on private lands during high risk disease transmission periods; 4) maintaining desirable winter distribution patterns of elk and bison; 5) the prevalence of brucellosis, chronic wasting disease, and other wildlife diseases; and 6) public support. In short, the overall objective of this plan is to outline a framework for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives.

This Plan focuses on management actions to initially achieve Phase 1 objectives. However, if successful, these actions will continue to be used to achieve the Phase 2 objective of reducing reliance on supplemental feeding while considering the six criteria listed above.

MANAGEMENT ACTIONS AND STRATEGIES

Background

The principal goal of reducing reliance on

supplemental feeding is to limit transmission of density dependent diseases in elk and bison while simultaneously minimizing winter mortality in elk. We will attempt to achieve this goal by experimentally reducing feed season length and closely monitoring elk and bison distribution and winter mortality.

Elk have been fed on the NER each year in all but 9 winters since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during winter months is powerful to both species, and their knowledge of NER feed grounds has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Because use of feed grounds is a learned behavior, decreasing feed season length will potentially reduce the likelihood of elk that winter on native range finding NER feed grounds. Over time this could result in a greater percentage of elk using native winter range relative to NER feed grounds. Because it is largely unprecedented, the concept of modifying this behavior on such a large scale is daunting and poses questions for which there are no immediate answers. In some cases, the likelihood a specific management strategy's success will only be able to be roughly estimated, and unanticipated results are likely. Closely monitoring forage availability, elk and bison distribution, and elk mortality will allow us to evaluate the effectiveness of management actions and adjust management actions as needed should unintended negative consequences arise.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into 3 broad categories: 1) timing and duration of winter feeding; 2) timing and intensity of hunting; and 3) herd segment specific and overall harvest levels.

Important Changes Since 2007

The BEMP was developed based on data collected and knowledge that existed up until its ROD. Since then, important changes have taken place, some of which are advantageous to this effort and some of which are not.

A primary change that will facilitate meeting objectives under this plan is the reduction of the bison population from nearly 1,200 animals in 2007 to about 675 during winter 2015-2016 (Fig. 3) through hunting programs administered by WGFD. Licensing changes enacted in 2014 included a reduction in the bison cow/calf license fee (from $416 to $263 for residents and $2522 to $1022 for non-residents) and eliminating the once-in-a-lifetime restriction on a successful bison hunter to only those that successfully harvested a bull. Continued progress toward the 500 animal herd objective will require sustained harvest success.

During the same period, the Jackson Elk Herd has declined from nearly 13,000 to its objective of 11,000, but because the proportion of the JEH that winters on NER has increased dramatically (Fig. 6), this will make achieving the Phase I objective of 5,000 elk on feed and any future elk population reductions more difficult. Preliminary analysis suggests that the increasing proportion of the JEH wintering on NER has been associated with 1) Declines in elk use of native winter range and movements of elk from State feed-grounds in the Gros Ventre drainage to NER.and 2) increasing numbers of elk that summer immediately adjacent to NER (Cole and Foley et al. 2015).

Refuge-wide herbaceous forage production averaged 14,387 (SD = 4,125) tons during 1998–2013. In recent years irrigation of approximately 3,600 acres has increased refuge-wide forage production by approximately 10% compared to what would have been produced with

Comment [CE4]: Alternative location for FAQ callout on why elk harvest cannot be increased to meet 5,000 elk objective

Comment [CE5]: Spelled feed-grounds or feed grounds or feed-grounds? Whatever we decide it should be consistent throughout the document.

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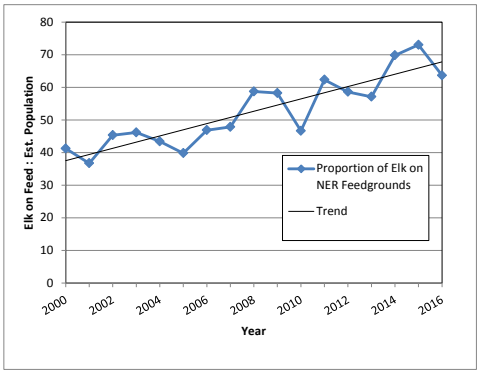


Figure 6. Increasing trend of National Elk Refuge elk on feed as a proportion of the Jackson Elk Herd estimated population size.

precipitation alone, and by 15% in the southern portion of NER which receives the greatest use by elk and bison.

Since 2007, the general awareness of climate change among the public has greatly increased. A strong, credible body of scientific evidence shows that climate change is occurring, is caused largely by human activities, and poses significant risks for a broad range of human and natural systems (National Academy of Science 2010). Ecological systems in the GYE are likely to be affected and associated changes may have implications for elk and bison management. Moderate term to long term effects of climate change in Jackson Hole will likely include increases in average temperature, a reduction in the duration and distribution of snow cover, an increase in the number of frost free days, increased wildfire frequency, and changes in plant community composition and structure including loss of forest and shrub cover and an increase in invasive plants (Riginos and Newcomb 2015). The net effect of these changes relative to the implementation of the MSP remains uncertain.

Current Management

Ongoing primary management actions on the NER include winter feeding, harvest, irrigation, and hazing. In GRTE, harvest of elk during the Elk Reduction Program takes place, when necessary, in collaboration with WGFD, and restoration of previously cultivated and irrigated sagebrush-grasslands is ongoing. Fundamental components of each of these will be briefly described below to provide a basis for comparison to MSP strategies that will follow.

Chronic Wasting Disease

Supplemental feeding has occurred in all but 9 winters on NER since 1912, and although this strategy minimizes winter elk mortality from starvation, contributes to Wyoming state elk herd objectives, eliminates commingling with livestock, and keep elk off adjacent roadways, elk occur at numbers and densities well in excess of carrying capacity (Smith et al. 2004, Lubow and Smith 2004). Considerable evidence suggests that Chronic Wasting Disease (CWD) transmission and prevalence are density dependent (Peters et al. 2000, Williams et al. 2002). Monello et al. (2014) found that elk densities of 15-110/km^2 (0.06 to 0.45/ac) in Rocky Mountain National Park were associated with 13% CWD prevalence, and they predicted elk population declines when CWD prevalence exceeded 13%. NER elk densities range from 77-16,850/km^2 (0.31-68/ac; NER unpublished data), which suggests that the introduction of CWD to NER elk would have significant negative population effects over time.

Winter Feeding

Initiation of feeding has the primary objectives of 1) minimizing elk winter mortality, focusing on calves since they are the most susceptible age class, and 2) minimizing comingling of elk with cattle on nearby adjacent private lands. Winter feeding begins when available forage reaches approximately 300 lbs/ac. Historic radio telemetry data and observations of elk movements indicate that when available forage declines below 300 lbs/ac., some elk leave NER for surrounding private lands. Therefore, the purpose of this feeding "trigger" is to keep elk on the NER and prevent them from searching for forage off the NER, which would increase the potential of comingling with cattle causing damage to private lands, and moving across

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Highway 89 where the risk of vehicles hitting elk is high. This trigger is not a warning that a significant nutritional deficit threshold has been reached. Available winter forage for elk and bison on the NER is largely determined by biomass of forage produced during the previous growing season, rate of forage consumption during fall and winter, and how snow conditions affect forage availability.

Index sites are used to sample forage biomass and determine when feeding should be initiated. These sites are selected annually to represent plant communities that are highly preferred by elk due to plant species composition and the persistence of green vegetation. Weekly sampling begins in late December to estimate available forage biomass at each index site. When average available forage across index sites is below 300 lbs/ac, biologists typically recommend that supplemental feeding be initiated.

During 1995–2013, the average initiation of winter feeding in NER occurred 28 January (range = 30 December–28 February), and feeding was terminated on 3 April (range = 20 March–20 April). Variation in feeding initiation and termination dates has been based on winter conditions and a desire to avoid elk-cattle comingling on nearby private lands. Coordination of winter feeding dates on the NER and WGFD-operated Gros Ventre drainage feedgrounds (Alkali, Patrol Cabin, and Fish Creek) occurs annually to help minimize movement of elk between these areas. This coordination will continue regardless of the management strategy employed. The relationship of recent elk numbers and objectives for NER and WGFD-operated feedgrounds and native range is shown in Table 2.

Bison discovered refuge feeding operations in 1980, and since that time they have been fed each year to help minimize disruption to elk feeding operations. Because bison displace elk from feedlines, NER staff attempt to feed most bison in the northernmost refuge feedground and provide a heavy feed ration, which helps keep them in this area. This strategy prevents bison from mingling with elk and also prevents bison from moving to areas where conflicts with humans are more likely.

Harvest

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Table 2. Annual distribution of wintering elk from the Jackson Elk Herd during February classification counts, 2011–2016, relative to the current objective.

	OBJECTIVE	2011	2012	2013	2014	2015	2016	mean
NER	5,000	7,746	7,360	6,285	8,296	8,390	7,290	7,561
Gros Ventre	3,500	2,775	3,265	2,982	2,326	1,162	1,667	2,362
Native Range[1]	2,500	982	894	1,784	801	913	1,711	1,180
Total	11,000	11,503	11,519	11,051	11,423	10,465	10,668	11,105

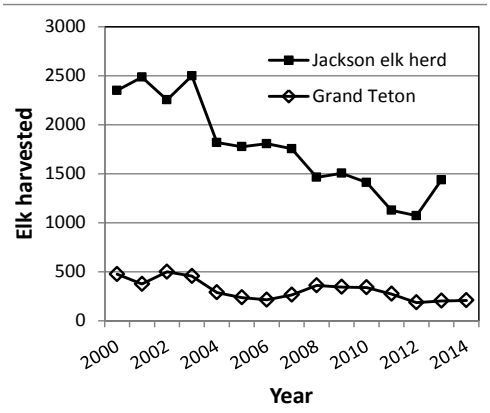


Figure 7. Estimated elk harvests for the Jackson Elk Herd and the amount of that harvest that occurs in Grand Teton National Park, 2000–2014.

Total hunter harvest of the JEH was gradually reduced over the last decade as the population neared objective (Fig. 7). Elk hunting on the NER (Hunt Area 77) typically begins in mid-October and ends in mid-December, with peak harvest in recent years occurring in late November to early December. From 2005 to 2015, 422 ± 102 (mean ± SD, range = 329-612) hunters harvested 196 ± 95 (range = 126-457) elk per year during the NER hunt.

The 1950 legislation that created GRTE provided for a controlled reduction of elk, when necessary, in specific portions of the park, primarily east of the Snake River. Elk reduction programs have taken place in the park each year since 1950 except two (1959 and 1960), when GRTE and WGFD officials agreed a reduction was not necessary (Figure 8). Season dates have varied over the years but recently have run from mid-October to early-December. The GRTE harvest accounts for about 25% of the JEH overall harvest, thus has been an important factor in regulating the population. Increased predation, likely a result of increases in grizzly bears and wolves over the last 20 years, has decreased the need for large harvests in GRTE.

Bison hunting begins 15 August and ends in early to mid-January. Most harvest occurs on the NER, with some additional harvest on private and BTNF lands. Since resuming the bison hunt in 2007, harvest has been 210 ± 45.5 (range 139-301) bison per year. This level of harvest has been sufficient to arrest the exponential growth of the population, reducing bison numbers from the peak in 2007 to about 700 animals in winter 2015 (Fig 3). Tribal bison harvest of up to 5 animals for ceremonial purposes was authorized in the BEMP. Translocation of wild bison to lands outside of Teton County is not currently permitted due to brucellosis concerns.

Bison hunting is not allowed in GRTE because of long standing NPS policy that prohibits most hunting in national parks. Bison quickly learned to take advantage of the safety of GRTE, which has made hunter harvest goals difficult to achieve. Many bison stay in GRTE during the hunting season, with only occasional short term movements to the NER, until severe winter conditions occur. In response, NER and WGFD managers have attempted to extend the hunt to late January while minimizing the conflict with the initiation of winter feeding. The unpredictable nature of winter conditions that time of year makes this challenging, and has (or could) result in the use of emergency season extensions or reductions.

Hazing

NER staff haze elk and bison to conserve winter forage, prevent year-round use of winter range, and in some cases to prevent elk and bison from moving to private lands or other areas where conflicts with humans are likely. Hazing using ATVs has proven most effective. The strategy is typically employed during 3 time periods: 1) in May to move elk and bison off NER that are lingering on NER winter range; 2) in July when some bison typically return to NER; and 3) in the period just prior to feeding initiation when elk and bison are most likely to leave NER for private lands. Hazing of elk and bison by WGFD staff also occurs on private lands adjacent to NER periodically throughout the year.

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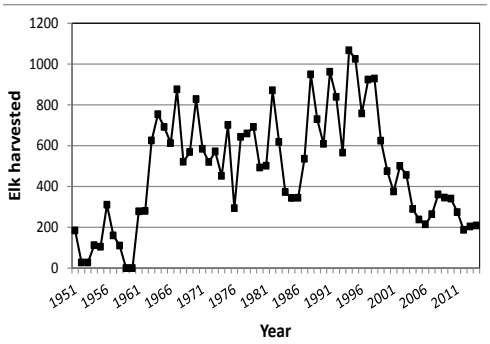


Figure 8. Elk harvest in Grand Teton National Park, 1950-2015.

Vegetation Restoration and Protection

The BEMP identified approximately 4,500 acres of previously irrigated and cultivated grasslands in GRTE in need of restoration to native sagebrush grasslands community. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. After 2 years of research and field studies, restoration efforts began in 2008. The restoration process involves several steps including: removal of non-native vegetation through repeated herbicide applications, collection and propagation of native grass, forb and shrub seeds and finally native seeding. Repeated herbicide treatments have been warranted prior to native seed planting as well as spot treatments of invasive weed species subsequent to native seeding. Substantial progress in this endeavor has been made since 2008, including 1,235 acres of previously cultivated lands under restoration treatment. Of the 1,235 acres undergoing treatment, 745 acres has been seeded with native grass, shrub, and select forb mixes, and 89 acres is considered fully restored. Two-hundred and seventy-five of these acres are currently fenced to reduce grazing pressure of early native vegetation establishment from bison and other ungulates. An additional 490 acres are targeted for native seeding in 2016 once removal of the invasive vegetation is successful. All treatments are monitored for native plant establishment and invasive plant infestations and treatments will be adjusted as necessary. Invasive plant treatments may have to continue indefinitely. GRTE will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Private Lands Mitigation

Fencing of hay stacks and livestock feedlines has been historically used to mitigate particularly difficult conflicts on private lands. Targeted fencing of golf course greens and sand traps fall through spring has also been successful in some situations for mitigating elk and bison presence and associated damage in these areas. It is important to note that the county has a "wildlife-friendly" fence policy and does not support extensive fencing that is impermeable to wildlife in residential areas.

Methods, Assumptions, and Constraints Common to All Strategies

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes, particularly population sizes. Measurements of the Jackson bison herd will be based on the annual mid-winter census and sex and age classification survey performed by NER, GRTE, and WGFD biologists. This survey occurs one day in February and includes ground counts of animals on feed at the NER and aerial counts of outlying bison across their winter ranges on the refuge, park, and Bridger-Teton National Forest.

Elk population estimates will also be based on mid-winter aerial and ground counts. However, the mid-winter counts are undertaken during a single survey period and do not necessarily represent either peak or cumulative abundance of elk on feed. Rather than basing progress toward the number of elk on feed for the entire season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in

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Table 3. Summary of potential Step Down Plan constraints.

Policy

- ESA[1] Lynx – limits on habitat impacts
- Greater Sage Grouse – core area protection
- 2007 BEMP/EIS (federal actions/lands)
  - No fertility control
  - No test and slaughter
  - Limited tribal ceremonial take
- Bison/elk hunt end date (Feb. 1st)
  - WGFD, brucellosis safety
- Carcass disposal (Feb. 15th)
  - WGFD, brucellosis safety
- Forest Service winter closure (Dec. 1st – April 30th)
- Easement limitation (NER boundary)

Winter Feeding

- Only during non-hunting periods

Harvest

- State regulations

Vegetation Restoration/Protection

- Bison/elk distribution
- Exotic plant species management

Private Lands

- Owner agreements

Social

- Hunter density (safety; hunt quality)
- Elk/bison winter mortality levels
- Public safety (ungulate/vehicle collisions)
- Disease
- Land-use conflicts (agricultural and residential)

Biological

- Disease (bison/elk/cattle commingling)
- Sage grouse habitat conflicts
- Fencing/wildlife conflicts
- Elk herd distribution
  - summer segment distribution goals

Funding

- Easement purchase
- Plan implementation

[1]Endangered Species Act

the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 elk were fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000.

We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both species on supplemental winter feeding.

Initial success of the MSP will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP does not provide specific measurement criteria to determine when the NER has successfully attained the objective of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage", we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. This level was chosen to define success because it indicates that elk and bison will predominately be foraging on free standing natural and cultivated plants on NER and adjacent winter ranges rather than on supplemental feed.

Several management constraints are common to the strategies discussed below (Table 3). Many law and policy constraints are applicable but we include here only those most pertinent. Endangered Species Act (16 USC 1531 et seq.) requirements for wolves, grizzly bears, lynx, and others apply. Lynx requirements for maintaining certain habitat types could limit methods used and areas considered for habitat improvements

in GRTE and the BTNF. Such improvements could increase elk and bison use of native winter range off the Refuge while simultaneously reducing use of feedlines. Similarly, compliance with the 2015 sage grouse amendment to the 1990 Bridger-Teton National Forest Land and Resource Management Plan and the Wyoming greater sage-grouse core area protection executive order (2011-5 and supplement 2013-3) could affect habitat manipulations. NEPA compliance conducted as part of the BEMP/EIS constrains what federal actions can be taken as a part of this plan. State regulations constrain late (winter) hunt and carcass disposal timing to protect against brucellosis contamination, since February-April represent the period bison and elk are most likely to transmit the disease. Restrictions on hunting timing also result from BTNF winter range closures, immediately east of the NER and elsewhere, December 1 to April 30. Additional details about these and other constraints will be included in discussions about specific strategies that follow.

Strategies

This section describes the management action this MSP proposes to implement. As such, it unveils the heart of management changes proposed to begin the process of transitioning to greater reliance of bison and elk on native forage during winter. Fundamentally, the strategies discussed in this plan represent an experiment designed to achieve Phase I objectives of 5,000 elk and 500 bison on NER and are a first step towards reducing reliance on supplemental feeding while meeting the sustainable population goals identified in the BEMP.

Initial strategies for achieving sustainable population goals identified in the BEMP (Table 1) are presented by the objectives below. The primary management actions available to the agencies to achieve Phase I objectives are modifications to winter feeding and hunting seasons. To a lesser extent, vegetation protection and restoration can be important, particularly for improving long-term ecological function and enhancing natural production of native forage. Private lands are also an integral component as changes in elk and bison distribution occur and new challenges develop. The likely consequences of implementing these strategies were evaluated in the BEMP. The most relevant of these are summarized in Appendix 1.

Objective: 1) *Implement a phased reduction of animals on NER feed to 5,000 elk and 500 bison, and, 2) influence elk and bison to rely predominantly on native habitat* (Table 1).

The first phase will be to reduce the number of elk on NER feed to approximately 5,000 and achieve a target population of about 500 bison. The second phase will be to adaptively manage bison and elk populations to achieve desired conditions, with animals relying predominately on available native habitat (NER, GRTE, and USFS lands) and cultivated forage (NER).

As previously mentioned, the concept of reducing winter feeding after more than 100 years of the practice, and the associated behavioral conditioning of elk and bison to its presence, represents a formidable challenge that must be approached cautiously and systematically. Efforts to scale back elk supplemental feeding operations in other parts of North America have been rare and fraught with controversy (Smith 2001). The strategies discussed below have been developed in this context, with appropriate feedback mechanisms through rigorous monitoring and frequent evaluation. Inability to meet this objective under the strategies presented here would trigger a thorough evaluation and consideration of more aggressive strategies when the BEMP is updated in 2022.

Comment [CE6]: Consider FAQ concerning why harvest cannot be increased to meet objectives and distribution changes are the only viable strategy

Chronic Wasting Disease

Since 1997, NER has cooperated with WGFD to conduct intensive surveillance for CWD in the JEH unit. GRTE has also collaborated with WGFD to collect samples from the ERP and from road-killed cervids. Although this effort indicates that CWD is not currently found in the JEH, continued surveillance at sample sizes sufficient to detect

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1% prevalence with 95% confidence annually will be critical to ensure a timely management response and limit the long-term population effects of the [USFWS and USNPS, 2007b]. Given that CWD has been detected within 40 miles of the JEH in moose, within 35 miles in deer, and within 175 miles in elk, this level of surveillance is warranted.

In 2016, the WGFD cooperated with federal agencies and other stakeholders to revise the 2006 Wyoming CWD Management Plan. The NER and USFWS Region 6 Wildlife Health Office staff participated in several meetings associated with this effort. The Wyoming CWD Plan lists several management responses for consideration if CWD be is detected on or adjacent to State or NER elk feedgrounds. Early detection of CWD in the JEH is essential to allow implementation of management responses.

The BEMP (2007) identifies the management response to the arrival of CWD as following the State of Wyoming CWD Plan in effect in 2007. The Wyoming CWD Plan was updated and significantly changed in 2016. In light of changes in the Wyoming State CWD Plan, and the results of CWD Studies completed since 2007, the NER management response to CWD will be reviewed and updated in a NER Disease Contingency Plan, as identified in the NER Comprehensive Conservation Plan (2016). The CWD section of the NER Disease Contingency Plan will remain consistent with the goals of the BEMP. The NER Disease Contingency Plan is scheduled to be completed in 2017.

Winter Feeding

Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the long run, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning animals to "expect" feed to be available later in the winter; this could build cohorts of animals that rely primarily on native winter range. To reduce supplemental feeding, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, which is the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding (Figure ?) and identify private land conflict areas that may require assistance with focused mitigation measures.

As bison and elk behavioral responses are better understood, and targeted mitigation on private lands is achieved as needed, feeding delays will be extended depending on several variables (Table 4, Fig. 9). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence on feeding initiation date, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Forage availability would also be affected by the numbers of elk and bison on the NER. And finally, the distribution of animals, particularly on private, livestock producing lands would be considered in determining feeding initiation date. A primary concern of manipulating feeding is elk winter mortality, particularly among calves. For example, research on unfed elk populations in Yellowstone National Park suggested average winter elk calf mortality of 28%, with the majority of cases caused by malnutrition (Singer et al. 1997). Similarly Smith and Anderson (1998) found unfed winter elk calf mortality of 29% compared to 11% for elk calves using feedgrounds. As food becomes limited in winter, calves are usually the first to experience nutritional deficit and winter

Comment [CE7]: The map that shows where elk and bison should not be could be placed in this section. This would be figure number? And subsequent figure numbers will need to be adjusted accordingly. Also the text does not currently reference the map?

Comment [CE8]: Consider FAQ on principal strategy of delaying feeding initiation here

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mortality because they are displaced by more dominant animals, they have limited fat reserves, and are more susceptible to cold temperatures than larger animals. Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years (Appendix 1).

In the early years of MSP implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date during the period of MSP implementation.

The MSP winter feeding strategy would include the establishment of additional key forage index sites and on-going measurements at those sites throughout the winter.

Harvest

Currently the JEH is at the Wyoming Game and Fish Commission established objective of 11,000 animals, which means there is less flexibility in manipulation of harvest regimes than there would be if the herd was above objective. Initially there would be little change in elk harvest programs on the NER, with the exception of allowing a limited number of any elk permits throughout the season, considering allowing bow hunting near developed areas (roads and buildings) and shifting the season about a week later (Table 4). Allowing a limited number of any elk permits would be consistent with providing sport hunting recreation on National Wildlife Refuges (NWRS Improvement Act; 1997) and the NER CCP [USFWS, 2015] and possibly encourage more hunters to participate in antlerless elk hunts. Monitoring programs and consideration of bull ratios in the GRTE summer segment (since most park bulls migrate to the NER) would help inform levels of proposed take. Bow hunting in areas currently closed to firearms will likely increase harvest by eliminating “no-hunt” areas which can become sanctuaries for large numbers of elk. Shifting the hunt one week later is consistent with later migrations and will improve harvest effectiveness (Fig. 9).

General elk harvest patterns in GRTE would continue to be based on need for harvest, summer segment population estimates, herd status relative to population objective, herd demographic parameters, herd-wide distribution of harvest, and mitigation for impacts on other resources and visitor activities.

Elk herd population objectives are reviewed every five years by the Wyoming Game and Fish Commission and adjusted as necessary. Agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. Lowering the population would help compensate for reduced use of traditional native winter range and increased growth of short-distance migrants which has led to significant increases of winter elk concentrations on the NER.

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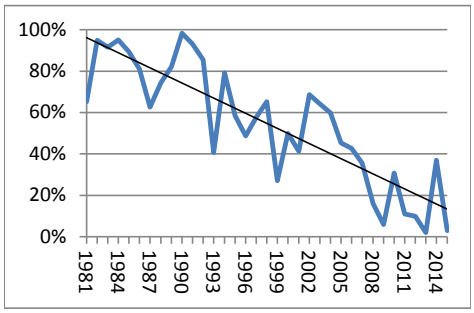


Figure 9. The percentage of elk that wintered on NER counted there on December 1, showing progressively later annual fall/winter arrival of elk to the NER during the past several decades.

The annual fall/winter arrival of elk to the NER during the past several decades has been occurring progressively later. This trend may necessitate extending the elk hunting season later into the year to achieve harvest objectives.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later end dates that are commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution. Special limited hunts designed to discourage bison from attempting to leave the NER via the south boundary into the town of Jackson will also be considered. If progress toward reaching the herd objective of 500 animals continues and the objective is reached, WGFD will adjust harvest quotas in the context of the objective, as necessary, to address population changes through time.

A cattle guard was installed on the Refuge Road near the east end of Broadway Avenue to help prevent bison and elk herds from entering the Town of Jackson. This will reduce the potential for dangerous human/wildlife interactions.

Currently, the effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives, but also that elk are sensitive to hunting pressure which can cause elk movements to areas that cause management issues for WGFD. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st in the future.

Annual herd-wide population estimates, elk summer herd segment estimates in GRTE and NER, temporal and spatial harvest patterns, and animal-fed-days would be monitored, and the resulting information would be used to inform ongoing evaluation of elk and bison management harvest programs (Figs. 9 and 10).

Hazing

No change in hazing practices is anticipated initially under this MSP framework.

Private Lands Mitigation

Delaying the onset of NER feeding is likely to result in changes in bison and elk distribution (Appendix 1). Some elk or bison may move to private lands in search of forage. Of greatest concern is the potential for elk or bison to commingle with cattle of cow/calf operations, where brucellosis transmission could have considerable consequences, such as requiring depopulation of the cattle herd.

Several strategies would be employed to mitigate potential problems (Table 4), including providing incentives for non-breeding cattle operations (because brucellosis transmission to slaughter-bound cattle is not economically important), increased fencing in some limited areas to separate elk/bison from livestock feed lines, haze elk/bison away from livestock feed lines and purchase private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal Wildlife Conflict Technician positions which are supervised by the

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WGFD. These Technicians are also critical to the success of an expanded monitoring program vital to the MSP (see Monitoring section below).

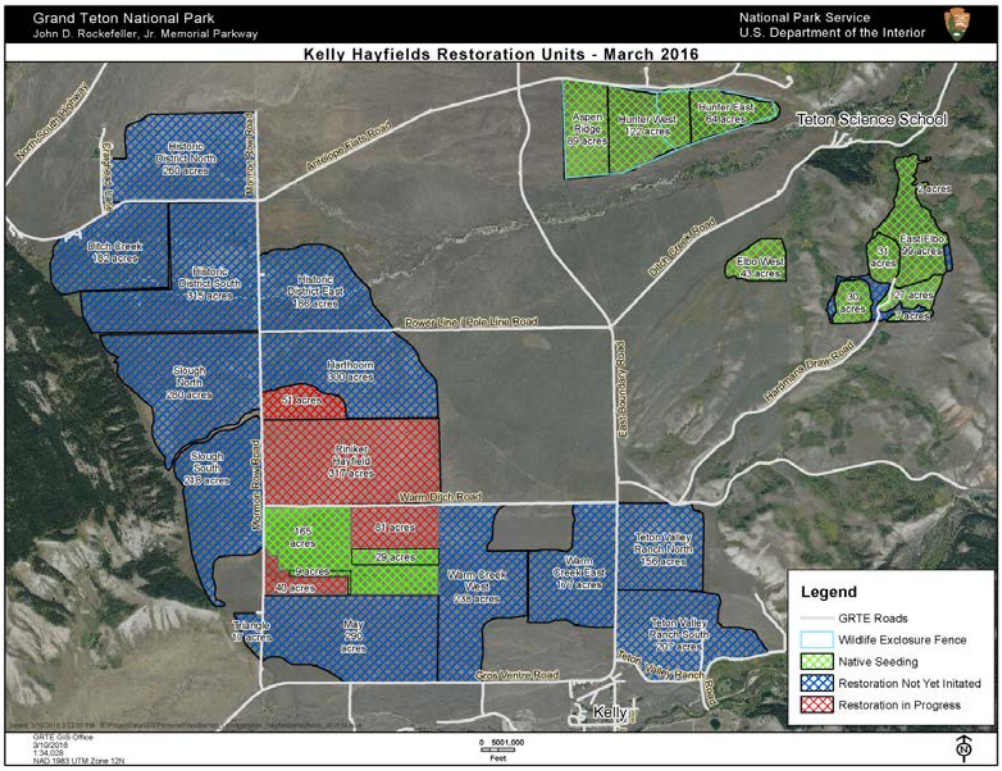


Figure 9. Units and status for the Kelly Hayfields ecological restoration effort in Grand Teton National Park, March 2016.

A database will be established to track non-agricultural conflicts on private lands to determine trends which will help evaluate the effectiveness of MSP mitigation efforts.

Preventing elk and especially bison from entering the Town of Jackson is essential in maximizing publicsafety and minimizing private property conflicts. Currently, bison are hazed northward when they drift south of Miller Butte. A cattle guard was installed on the Refuge Road just north of Broadway Avenue. This barrier is designed to prevent elk/bison from entering the Town of Jackson.

Vegetation Restoration/Protection

The varied approaches to restore the Kelly Hayfields in GRTE (4,500 acres) was initiated in 2008 following 2 years of research and field studies (Moeny 2008). The approach to ecological restoration includes serial treatments to 1) remove non-native species (e.g., herbicide application and prescribed burning); 2) seed native shrub, grass, and forb species; and 3) treat subsequent invasive plants by applying herbicides and, where appropriate, construct temporary fences to protect recently seeded pastures from colonization of non-native species and damage from large herbivores during early phases of restoration.

Of the 4,500 acres targeted for ecological

restoration in the Kelly Hayfields of GRTE, 1,235 acres within 7 pasture units are currently under restoration treatment and 3,265 acres remain non-native grass pasture (as of 2016; Figure 9). The non-native grass pastures are divided into 13 pasture treatment areas and are projected to be likely restored by 2035. As of 2016, approximately 745 acres are seeded with native vegetation, and 89 acres are considered fully restored. Maintenance of restored ecological conditions, however, will likely require management efforts in perpetuity to keep non-native species from colonizing restored areas. All 1,235 acres that are underway toward ecological restoration are being monitored for native plant establishment, invasive plant infestations, including cheatgrass spread. Park staff will continue to monitor and adaptively adjust treatments and restoration strategies according to our results.

Objective: *Maintain bull-to-cow ratios in park summer herd* (Table 1).

National Park Service management policy (NPS 2006) provides guidance for maintaining naturally regulated wildlife populations, free from the impacts of humans, to the greatest extent possible. The final BEMP identified a goal of maintaining park elk bull:cow ratios (a common way of expressing sex and age ratios in wild ungulate populations) near 35 adult bulls per 100 adult cows, based on estimates of what this ratio would be in a herd free from the effects of human harvest. The sex and age ratios of most North American elk populations are affected by sport hunting and herd managers generally maintain lower bull ratios.

Harvest

Based on summer bull ratios for elk in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded refuge hunting opportunities are considered.

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Table 4. Comparison of current and primary MSP components and parameters.			
Action	**Current Management**	**Management**	**Comment**
Winter Feeding:			
Feed	Pelleted alfalfa	Pelleted alfalfa	No change
Ration	Full ration average: 8-12 lbs/day/elk	No Change	No change, to minimize calf mortality. Note average daily ration over the entire feed season is lower than a full ration because feed rate is gradually increased at the beginning of the feed season and gradually reduced at the end to facilitate rumen acclimation
	20-22 lbs/day/bison	20 lbs/day/bison	
Start criteria:			
Available standing forage	300 lbs/acre, as measured at traditional key index sites	Generally later; index sites to be increased in number and distribution	Influencing factors: -time of season -forage availability -number of elk/bison on NER -elk/bison distribution
End criteria:			
Available forage	Based on a snow cover index and subjective estimate of when residual or new forage is adequate	Generally 1 week earlier than current management	Ongoing development of more objective criteria for future implementation ongoing
Monitoring:			
Animals on feed	Mid-winter census	Elk/bison fed days[1]	
Proportion of JEH on NER	Mid-winter census	Mid-winter census	
feed			
Calf mortality	2008-2015 Average: 3.3% (range 1.1-9.0%)	Potentially higher than current levels but less than native winter range	
Elk/bison distribution – collars	Almost no documented use of private lands during feeding operations	Unknown, but likely higher use of private lands than current management	
Elk Winter mortality (all age classes)	2008-2015 Average:	<=3%	
	1.2% (range 0.6-1.9%)		

Table 4. Comparison of current and primary MSP components and parameters.			
Action	**Current Management**	**Management**	**Comment**
Elk summer range segment Proportions for NER wintering elk	Approximately -40% GTNP North of Moose -35% South Snake River -10% Gros Ventre/Flat Creek -10% Teton Wilderness -5% Southern Yellowstone	Unknown, but will be monitored based on summer distribution of radio collared elk	Based on summer distribution of elk that were randomly radio collared on NER.
Harvest, National Elk Refuge elk:			
Frequency	Annual	Annual	
Begin Date	2nd week October	No Change	Modified as necessary
End Date	3nd week December	No Change	Modified as necessary
Structure	- 1 week initial drawing	- 1 week initial drawing	
	- 1 week left over 1st served	- 1 week left over 1st served	
	- partial week alternate	- partial week alternate	
	-daily 1st served alternates	- daily 1st served alternates	
Refuge permit types	- 1st week any elk	- Primarily antlerless only	
	- Antlerless only remainder of season	- limited any elk permits throughout season	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries		Consider expanding to allow bow hunting near developed areas	
Harvest, National Elk Refuge bison:			
Frequency	Annual	Annual	
Begin date	August 15th	August 15th	Modified as necessary
End date	2nd or 3rd week January	Consider later dates as appropriate	Modified as necessary
Hunting Season Structure	As per WGFD	As per WGFD	
Refuge permit types	Any bison or cow/calf per state license	Any bison or cow/calf per state license	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries	Limited to north of Nowlin Creek area	Consider escorted hunting in South Unit as needed	Guided hunts in South Unit when authorized
Harvest, Grand Teton NP elk:			
Frequency	As needed	As needed	
Begin Date	3rd week October	3rd week October	Modified as necessary
End Date	2nd week December	2nd week December	Modified as necessary
License types	Antlerless only	Antlerless only[2]	
Special regulations:	Cartridge limits	Cartridge limits	

Table 4. Comparison of current and primary MSP components and parameters.			
Action	**Current Management**	**Management**	**Comment**
	Bear spray required	Bear spray required	
	Hunter safety card required	Hunter safety card required	
Harvest, Bridger-Teton NF, Elk Hunt Area 80:			
Begin Date			
End Date		15-Dec	Would require change in winter closure dates
Harvest, Elk Hunt Area 78			
Structure			Changes at discretion of WGFD
License Types			
Private Lands Mitigation:			
Cattle commingling		Incentives for non-breeding operation	
Hay depredation		Increased fencing	
Landscape damage			
Easement acquisition			
Vegetation Restoration/ Protection: Elk Refuge			
Vegetation Restoration/ Protection: Grand Teton	Herbicide treatments, prescribed burning, native seed propagation and planting, and protection and maintenance of restored pastures	Same as Current Management for remaining non-native grasslands in Kelly Hayfields	
[1]Number elk and bison on feed per day, totaled by feeding season.			
[2]Any elk licenses could be offered if bull ratios in the park consistently exceed BEMP criteria.			

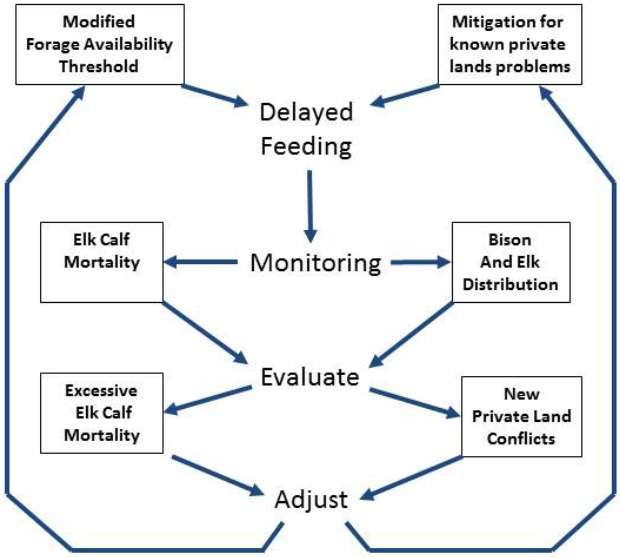


Figure 10. Framework for delayed feeding strategy under MSP.

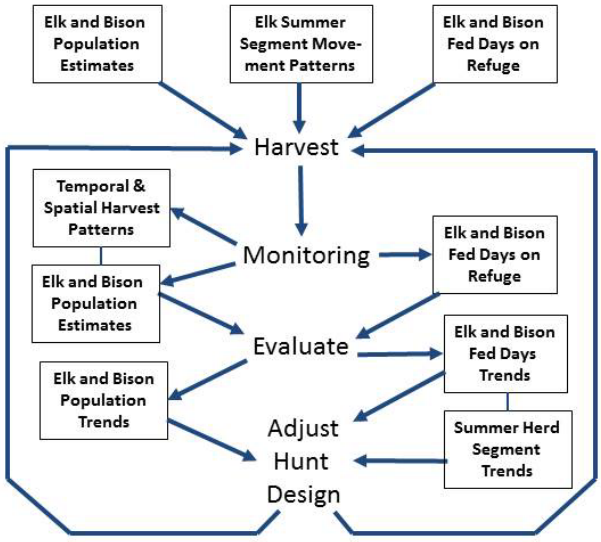


Figure 11. Framework for harvest strategy under MSP.

Strategies Considered But Rejected

The BEMP considered several additional strategies for elk and bison management that, for a variety of reasons, were not selected for implementation in the preferred alternative and Record of Decision. The agencies reconsidered a subset of these during the development of this MSP (Table 5). Since they were not part of the ROD, additional NEPA compliance would be necessary to incorporate any of them into this MSP, and thus they are not being considered at this time.

Table 5. Strategies considered but rejected.

Strategy Considered	Reason Rejected
Fertility control in elk	Judged not reasonable or feasible in BEMP, primarily due to major technical, social, and financial hurdles[1]. For MSP discussed primarily with regard to the difficult to harvest herd segment in Hunt Area 78 on private lands, where federal agencies have no jurisdiction.
Fertility control in bison	Impacts discussed at length in BEMP[2]. Not considered for MSP because current hunting programs appear effective at slowly moving the herd toward the 500 animal herd objective.
Agency reduction of bison or elk	Not considered necessary or desirable on federal lands because current hunting programs that utilize sport hunters are effective at meeting herd objectives.
Altering rations of supplemental feed	Rejected as a strategy because reducing daily feed ration below 8 lbs/elk would be enough feed to encourage elk to remain on NER but would result in unacceptably high elk calf mortality rates.
Private Lands Hunting Coordinator	The WGFD contacted private landowners and ranchers in the Spring Gulch area and discussed this concept to enhance elk harvest of short distance migrants. Generally, landowner interest was low.

MODELS OF SYSTEM DYNAMICS

Models provide a simplified representation of the biological system being managed. We will use modeling to quantify the effects of our management actions on 2 key responses of interest, elk distribution and winter elk calf mortality. There are a suite of possible factors that affect the proportion of elk on NER feedgrounds versus native winter range. Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

An increase in calf elk winter mortality is a potential result of reduced feed season length. Several factors influence winter calf elk survival on NER (Fig. 13). Models will be used to assess the effects of available forage on winter calf elk survival (Appendix 4). Over time this will allow us to assess the effects of our principal management strategy (reducing feed season length) relative to winter elk calf survival.

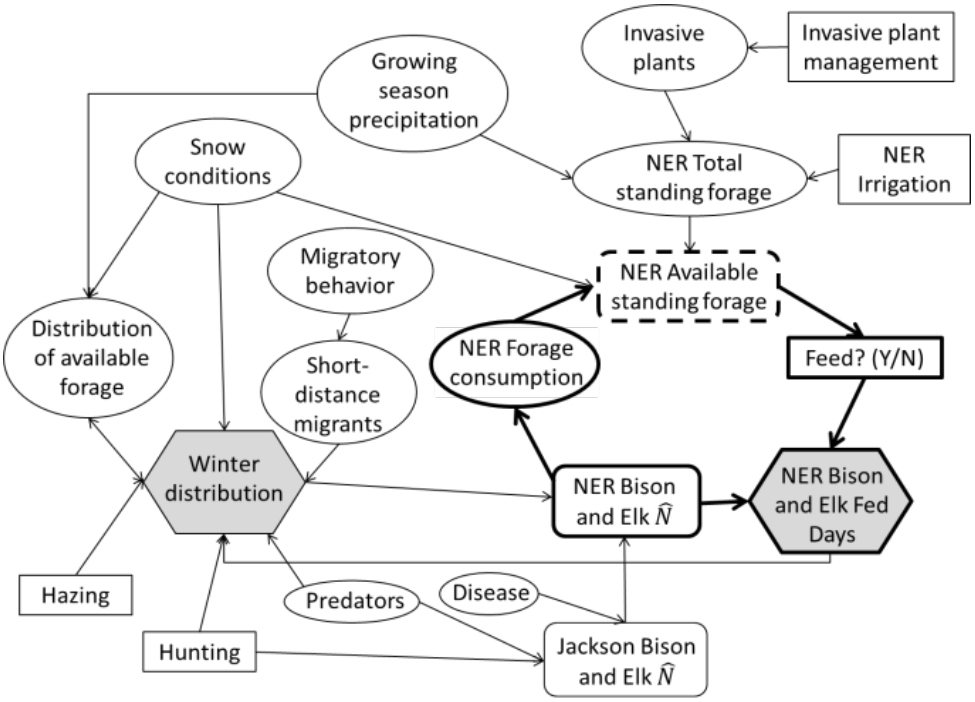


Figure 12. Diagram depicting the factors that potentially influence outcomes identified in the Bison and Elk Management Plan (BEMP; USFWS 2007a). Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

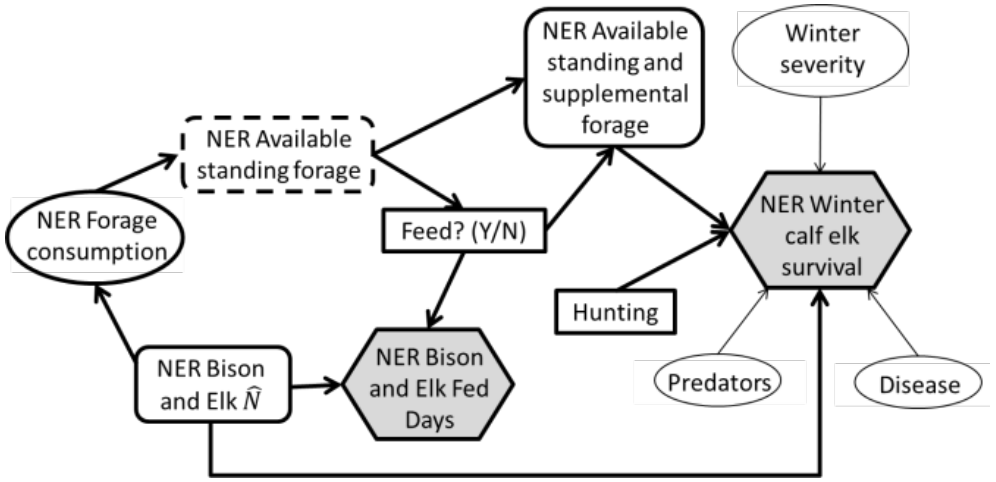


Figure 13. Diagram depicting the factors that potentially influence bison and elk fed days on the National Elk Refuge and winter calf elk survival. Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

MONITORING

Feeding Initiation Monitoring

NER uses weekly field estimates of the amount of forage available to elk to determine feeding initiation date. Currently measurements are taken at key index sites representing areas preferred by elk on NER (see supplemental materials at end of this section). These methods will be enhanced by 1) increasing the number of sampled sites to better represent the total amount of forage available to elk on the southern half of NER; 2) increasing the precision of estimates at each site by increasing the number of observers; and 3) extending the monitoring period later in the winter to assess the relationship between available forage and elk and bison distribution.

To better represent the total amount of forage available on the southern half of NER, a subsample of current key index sites will be retained to facilitate comparison with historic data, but additional random sample sites stratified by elk habitat preference will be added. Historic elk distribution mapping and elk GPS collar data (NER unpublished data) suggest that the areas most preferred by elk on southern NER are associated with moderate to high forage production and green vegetation. Because the distribution of forage production and greenness characteristics vary annually based on irrigation and precipitation patterns, we will annually map areas preferred and not preferred by elk and sample sites will be randomly selected within each of these mapped categories. At least 3 historic key index sites, 3 random sites in areas preferred by elk, and 3 sites in areas not preferred by elk will be sampled each week from late December through the initiation of supplemental feeding.

Currently the NER biologist is the only person trained in the techniques used to estimate available forage (see supplemental materials). At least 2 additional personnel will be trained in these techniques. This will provide a backup in the event of future personnel changes and will facilitate error estimates of the available forage measurements at each site.

Currently NER and WYGFD biologists monitor available forage conditions at least weekly from late December until average available forage at key index sites nears the threshold level of 300 lbs. per acre and feeding is initiated. The principal MSP strategy is to delay the initiation of supplemental feeding after average forage production reaches the 300 lbs/ac level at key index sites. Therefore the monitoring period will be extended to include this period of delayed feeding.

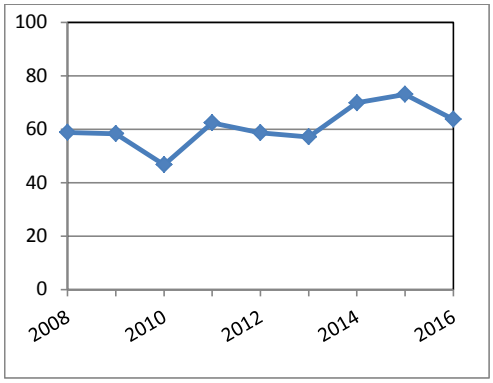


Figure 14. Proportion of the Jackson Elk Herd that was classified on NER feedgrounds in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

Proportion of Elk Wintering on NER

A principal MSP goal is to reduce the number of elk wintering on NER. Our strategy will be to effect redistribution of elk to native winter range from NER over time via shortening the duration of the feed season, and thus slowly conditioning elk to seek food elsewhere. As feeding periods are shortened, the probability of younger elk age classes discovering NER feedgrounds will be reduced, and, hypothetically, that proportion of the JEH that utilizes NER feedgrounds will decline over time. We will measure this effect by examining changes in the winter distribution of the JEH. WGFD annual trend/classification count data provide a multi-year baseline data set to measure changes in the winter distribution of the JEH and categorizes observations by location. In each year, we will calculate the proportion of total classified elk in the JEH that are classified on NER feedgrounds. We will compare the 3-year running average post MSP implementation to the pre-implementation baseline. The pretreatment baseline will be comprised of data from 2008 2016, a time period that represents BEMP implementation prior to MSP actions (Figure 13).

Elk Fed Days and Bison Fed Days

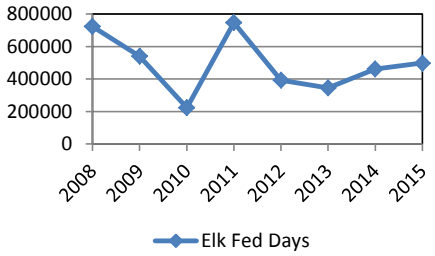
The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. We further assume the variables elk-fed-days (EFD) and bison-fed-days (BFD) are a proxy for these conditions. EFD and BFD will be calculated annually for each species based on the following formulas:

EFD= ∑ Total elk counted on feed during daily feedground counts for duration of feed season

BFD= ∑ Total bison counted on feed during daily feedground counts for duration of feed season

Because EFD and BFD are influenced by feed season length and the number of animals on feed, the MSP strategy of delaying the initiation of supplemental feeding will inherently reduce the number of EFD and BFD through a reduction in average feed season length. We believe that EFD will be further reduced by encouraging a greater proportion of the JEH to winter on native winter range, thereby reducing the number of elk occupying NER feedgrounds. We will evaluate changes in EFD and BFD by comparing the 3-year running average post MSP implementation compared to mean EFD and BFD from 2008–2015. The running average is an appropriate comparison because it will help

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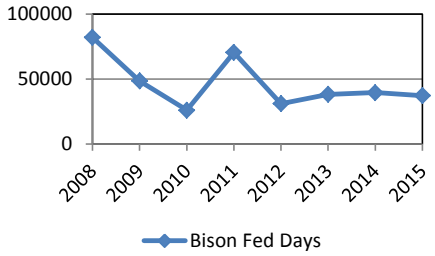


Figure 15. Elk Fed Days (EFD) and Bison Fed Days (BFD) in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the Management Step Down Plan (2008-2015). These values represent the pretreatment baseline which will be compared to the 3-year running average EFD and BFD post MSP implementation.

account for wide annual variation in EFD and BFD associated with winter severity (Figure 15)

Elk Winter Mortality Monitoring

NER has used consistent methods to monitor winter elk mortality since 1982. Each winter NER biologists and other refuge staff conduct a survey of all non-hunting related winter elk mortalities that occur on NER from November through April. Mortalities are tallied by age/sex class and percent mortality is calculated using the corresponding number of elk classified on NER feedgrounds as the denominator. We will continue to monitor elk winter mortality using the same methods post-MSP implementation, which will allow trend comparisons to the pre MSP baseline (Figure 15). Under the MSP framework, we believe the 3-year running averages for total and calf winter elk mortality will be within the range of variation exhibited by the pre MSP baseline. Historic monitoring suggests that calf and total mortality are sensitive to winter severity and disease outbreaks, and that winter mortality occasionally exceeds >3% total mortality and >10% calf mortality. Post-MSP mortality in excess of these levels may warrant shortening the feeding initiation delay in subsequent years.

Elk Collaring

One of the MSP's principal strategies is to shorten the length of the feed season to encourage elk use of native winter range, but we anticipate that this strategy will also result in an increase in elk conflicts on surrounding private land in the town of Jackson and the Spring Gulch areas, potentially including large groups of elk. To quantify this effect and provide real-time information to WGFD and NER managers to facilitate a response, we propose maintaining a sample of 50 GPS-collared elk that winter on NER throughout the MSP implementation period. Forty-five elk represents approximately 0.5% (1 in 200) of the NER winter elk population. This sample size will not be sufficient to detect all elk movements from NER to surrounding private lands, particularly movements by small groups of mature bull elk, but it will be sufficient to detect and quantify significant movements of cow/calf/yearling elk groups compared to pre-MSP baseline data.

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NER has elk GPS-collar data available from the 2008-2013, which represents the post-BEMP, pre-MSP baseline period. We hypothesize that elk movements from NER to surrounding private lands will increase during the MSP implementation period compared to the pre-treatment baseline. This will be tested by comparing the number of incidents that elk left NER for surrounding private lands (per elk/per year), and the proportion of elk GPS fixes on NER versus private lands during time periods of interest. The principal time period of interest is late December–March because this represents the period after the NER elk hunting season, and prior to, and during, NER feeding operations. This is the season when changes to the NER feeding program would be most likely to result in elk distribution changes.

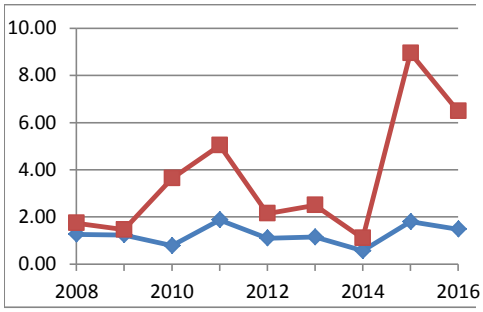


Figure 16. Total (blue) and calf (red) elk winter mortality (%) on NER in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

Thirty adult cow elk were captured on NER feedgrounds in February 2016 and Telonics Iridium GPS collars were deployed with a 90 minute fix interval. Collars will be deployed on up to 50 additional adult cow elk in February-March 2017. Given 83% annual survival for adult cow elk in the JEH (Cole and Foley et al. 2015) and 3-year collar life, approximately 10 additional elk will need to be collared each year in winter 2018 and 2019 to maintain the 50 elk desired sample size over the life of the MSP implementation period.

Ancillary data that will be collected and analyzed during the elk capture and collar data analysis process includes brucellosis seroprevalence, pregnancy rate, and elk summer range determination for comparison to the findings of Cole and Foley et al. (2015).

Disease

The primary purpose of limiting reliance on supplemental feeding is to reduce the prevalence of endemic elk and bison diseases and mitigate transmission risk associated with the introduction of novel diseases. We hypothesize that brucellosis seroprevalence will decline post MSP implementation. There are no recent brucellosis seroprevalence data for elk on the NER, but >50 elk will be captured during elk collaring operations in winter 2016, and each elk will be tested for brucellosis exposure. The 2016 Brucellosis seroprevalence rate will be the pre-treatment baseline to evaluate post MSP change. Chronic wasting disease (CWD) has been monitored in the JEH since 1997, and since 2008 it has been monitored with sufficient sample size to detect 1% prevalence with 95% confidence. No CWD positive cases have been detected in the JEH, which given the long term persistence of the disease, provides overwhelming evidence that CWD is not currently endemic to the JEH. However, most evidence suggests that the distribution of CWD is increasing and that its introduction to the JEH is inevitable. Early detection is critical to ensure a management response, and therefore ongoing monitoring at sample sizes sufficient to detect 1% CWD prevalence with 95% confidence is necessary. CWD is sampled by testing tissues collected primarily from hunter harvested elk, and past experience suggests that 2 full time technicians working from September-December are necessary to ensure minimum sample size. Typical costs associated with 2 technicians are $32,000 per year.

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Data Collected for Modeling

Table 6. Variables to be used in models to explain elk winter distribution in the Jackson Elk Herd and elk calf mortality on NER.

VARIABLE	SOURCE	Elk Winter Distribution Model	Elk Calf Mortality Model
Proportion Jackson Elk Herd on NER Feedgrounds	WGFD/NER Jackson Elk Herd February Classification Count	Yes	No
Proportion Jackson Elk Herd from South Snake River summer segment	Determined from elk GPS collar data for elk captured on NER	Yes	No
Number of wolf packs in the Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated total wolf numbers in Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated number of wolves using NER in winter	NER observations	Yes	Yes
Total NER herbaceous forage biomass	NER forage production survey data	Yes	Yes
Snow Water Equivalent	NOAA snowtell site data	Yes	Yes
NER Winter elk Mortality (calf)	NER winter elk mortality survey	No	Yes
Snow Depth	NOAA Snowtell sites and NER measurements	Yes	Yes
Available Forage	NER and GTNP monitoring in winter months	Yes	Yes
NER Elk and Bison Fed Days	NER feeding records and daily feedground estimates of elk and bison	Yes	Yes
NER Feeding Start Date	NER feeding records	Yes	Yes
Gros Ventre Feeding Start date	WGFD feeding records	Yes	No
Elk Hunting Pressure by Hunt Area	Estimated number of hunter days from WGFD completion reports	Yes	Yes

To facilitate modeling, we will collect data on the following associated variables (Table 6). The table lists variables and how they relate to our efforts to use modeling to explain changes in elk distribution and elk calf mortality relative to our principal action of reducing feed season length.

EVALUATION/FUTURE MANAGEMENT

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Consequently, we anticipate that the strategies outlined in this plan will be in place for a minimum of 5 years, after which an initial evaluation of the program will be made. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented at an annual management MSP update/report, completed by NER staff by the end of March for the previous year.

Consistent with objectives outlined in the BEMP, the long-term goal of this plan is reduce the reliance of bison and elk on intensive supplemental feeding, using adaptive management principles through a structured framework of management actions, to achieve a desired condition of animals relying predominately on native habitat on NER, GRTE, and USFS lands, and on NER cultivated forage. But because there is no precedent for what this plan proposes, there are few responses to proposed management actions that can be predicted to a degree of certainty commensurate with establishing definable thresholds or other objective criteria for success in the short term.

Factors that will be considered in evaluating the success of the program will include the trend of EFD and BFD, type and frequency of private lands conflicts, the proportion of the JEH wintering on the NER, presence or absence of CWD and other infectious diseases, elk and bison population size and distribution, elk calf winter mortality, and public support. These are complex, dynamic, and interwoven components that, together with the MSP, make up the framework for decreasing reliance on supplemental feeding. As such, the effects of changing biological, social, and political conditions on these components will be part of the evaluation process.

In the context of this larger framework, however, we believe evaluation of the trend in EFD and BFD will be most important after the first 5 years of MSP implementation. The direction and magnitude of the trend observed will provide a preliminary basis for evaluation and decisions about continued management actions. Initial success with reduced feeding will be associated with a declining trend in EFD and BFD, with greater magnitudes indicating higher degrees of success. However, determinations of overall program success will necessarily include evaluation of all system components. For example, gains in reduced feeding come could be accompanied by an increase in private land conflicts, which would affect overall success determinations. While the overriding strategy will be to decrease feeding as aggressively as possible while gauging effects on other system components, overall measures of program success through time will necessarily involve evaluating a matrix of effects. These evaluations will be included in annual MSP reports.

As proposed and new management strategies are implemented and evaluated under this plan, at some point in the future it may become apparent that meeting reduced feeding goals will not possible without reducing elk and/or bison population objectives. Population objectives for both herds are set by Wyoming Game and Fish Commission and are evaluated regularly by WGFD personnel, including public review through annual season setting meetings. The BEMP supported the State herd objectives of 500 bison and 11,000 elk, and thus due to NEPA requirements any further consideration of reduced herd sizes by the NER or GRTE are beyond the scope of this plan. However, Wyoming Game and Fish Commission changes to Jackson bison or elk herd objectives are not constrained by the BEMP.

Comment [CE9]: Consider FAQ callout "**Why is the MSP vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?"**

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Investigating the potential effects of climate change on elk and bison management will also be important in the long-term. During implementation of this plan, we will collect a variety of data that could be drawn upon for this purpose.

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PUBLIC OUTREACH AND EDUCATION

The practice of winter feeding is inexorably woven into the historic fabric of Jackson Hole. Elk are identified with the rich and unique legacy for which Jackson Hole is known around the world. De-emphasizing the supplemental feeding program will be a major paradigm shift for the residents of Jackson Hole, Teton County, and the State of Wyoming.

An effective Public Outreach and Education program is essential for effective MSP implementation. The practice of feeding elk evokes passionate responses from those that oppose and those that support this practice. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk/bison herd management methods.

A detailed communication plan to guide outreach and education efforts can be found in Appendix 3.

SCHEDULE

Table 7. Proposed implementation schedule for the MSP.

Action	Date
Public outreach and education	November 2016
Initiate private lands conflicts mitigation contacts/actions	January, 2017
Implement enhanced forage monitoring	January, 2017
Initiate changes in supplemental feeding protocol	January/February 2017
GPS Collar 30-40 elk (Iridium platform)	March 2017
Monitoring/Evaluation/Annual Report	June 2017

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BUDGET

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

	Year				
Agency / Activity	**1**	**2**	**3**	**4**	**5**
National Elk Refuge:					
Monitoring:					
Seasonal Biological Technician (0.5 FTE, GS-7)	$24,000	$25,000	$26,000	$27,000	$28,000
Bison/elk fed days					
Mid-winter census					
Elk summer herd segment distribution[1]					
Expanded standing forage estimates[1]					
Chronic Wasting Disease, 2 seasonal bio.-techs	$32,000	$32,000	$32,000	$32,000	$32,000
Winter bison/elk distribution					
Irrigation					
50 Elk radio telemetry collars; Iridium Platform	$115,000	$25,000	$25,000	$25,000	$25,000
Bison barrier maintenance at NER south entrance	$500	$500	$500	$500	$500
Step Down Management Plan annual reporting	$2,000	$2,000	$2,000	$2,000	$2,000
Private lands:					
Easements / Leases (Private Foundations)	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000
Conflict mitigation technicians (WGFD)	$91,000	$91,000	$91,000	$91,000	$91,000
Hazing (helicopter)	$6,000	$6,000	$6,000	$6,000	$6,000
Vegetation restoration/protection[1]					
Public Outreach and Education	$11,000	$1,000	$1,000	$1,000	$1,000
Subtotal					
Grand Teton National Park:					
Monitoring:					
Summer elk classification/distribution	$10,000	$11,000	$12,000	$13,000	$14,000
Collaborative elk monitoring (GRTE portion)	$5,000	$5,000	$5,000	$5,000	$5,000
Vegetation Restoration/Protection					
Monitoring	$16,000	$16,000	$18,000	$18,000	$12,000
Temporary bison fencing	$24,000				
Temporary fence maintenance	$6,000	$8,000	$8,000	$4,000	
Hayfields restoration	$84,000	$70,000	$70,000	$31,000	
Exotic plant mitigation	$50,000	$52,000	$46,000	$32,000	$16,000
Elk Reduction Program (subject to annual review)					
Hunter harvest evaluation	$1,500	$1,500	$1,500	$1,500	$1,500
Harvest age distribution	$2,000	$2,000	$2,000	$2,000	$2,000
CWD monitoring (0.15 FTE, GS-6)	$7,000	$7,000	$7,000	$7,000	$7,000
Law Enforcement and Visitor Protection (0.15 FTE for 20 LE and support staff; supplies, and permitting)[3]	Unknown				

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
Subtotal					
Wyoming Game and Fish Department:[2]					
Subtotal					
Grand Total					

[1]See detail in Appendix

[2] Dependent on size of elk reduction program; current annual expenditures are approx. $295,000 for 0.15 FTE for 20 LE and support staff; supplies, and permitting.

[3]Through Interagency Agreement

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APPENDIX ?? Frequently Asked Questions

Q1: Why is the MSP vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?

A1: This is the first time that the strategy of delaying feed season initiation has been employed to reduce reliance on supplemental feeding. There is uncertainty regarding the effects of this strategy on elk and bison distribution and elk winter mortality, and therefore it is important to maintain flexibility in plan implementation to avoid significant unintended negative consequences. Unintended negative consequences the MSP seeks to avoid include 1) elk or bison moving to areas where they damage property, risk human safety, or commingle with livestock, and 2) elk winter mortality levels significantly higher than baseline levels.

Q2: Why were reductions to the Jackson Elk Herd and Jackson Bison Herd population objectives not considered as a strategy to reduce reliance on supplemental feeding?

A2: The BEMP has clear population objectives of 5,000 elk wintering on NER and 500 wintering bison. Modifying those population objectives would require additional NEPA analysis. The BEMP also agreed to support State elk herd objectives. The WGFD completed a public process in 2016 to set the population objective for the overall Jackson Elk Herd, and that objective remains unchanged at 11,000 elk.

Q3: The BEMP has an objective of 5,000 elk wintering on NER. Why has that objective not been achieved through increased elk harvest?

A3: The overall Jackson Elk Herd population has declined and is currently close to the 11,000 elk objective, but the number of elk wintering on NER has been well above the 5,000 elk objective since implementation of the BEMP in 2007 (Mean =7,100 elk). When the analysis was conducted for the BEMP, elk winter distribution data suggested that 5,000 elk could winter on NER while still maintaining 11,000 elk in the Jackson Elk Herd overall. However, the proportion of the Jackson Elk Herd that winters on NER has increased significantly over time, and based on current elk distribution it is no longer possible to winter 5,000 elk on NER and maintain 11,000 elk in the overall Jackson Elk Herd. Although increasing elk harvest above current levels would likely allow us to achieve the 5,000 elk objective for NER, it would also reduce the overall Jackson Elk Herd population below the 11,000 objective. If increasing elk harvest in not plausible, the only other option to meet the 5,000 elk objective on NER is to change winter elk distribution, which is the principal strategy of the MSP.

Q4: Why is your principal strategy to delay the start of the feed season?

A4: By delaying the start of the supplemental feed season we decrease the probability that elk that use native winter range or state feed grounds will discover NER feed grounds. Because elk use of feed grounds is a learned behavior, over time this could increase the proportion of elk that winter on native winter range, reduce the number of elk that move from the Gros Ventre drainage to NER, and decrease the NER wintering elk population. The resulting shift in elk distribution would allow us to achieve the

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5,000 elk objective for NER. Because 5,000 elk and 500 bison is close to the estimated carrying capacity of NER habitat, less feeding will be necessary at these population levels.

Q5: Will delaying the start of the feed season result in elk starvation?

A5: Our goal is to delay elk feeding a sufficient amount of time to affect elk distribution without causing an increase in elk mortality.

APPENDIX 1. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007).

Comment [CE10]: If the Frequently Asked Questions section will go in the Appendix, then subsequent appendix numbers will have to be changed

Populations

- Jackson elk herd objective of 11,000 would be maintained.
- New Jackson bison herd objective of 500 established.

Winter Feeding

- Supplemental feeding could be delayed or could occur earlier compared to current practices.
- Changes [to feeding program could] include alterations in the timing of feeding and providing supplemental feed in fewer years.
- Ration or pellet composition might need to be changed.
- Supplemental feeding would be initiated according to established criteria, including pre-winter forage production, assessments of forage utilization (done jointly by WGFD and NER personnel), elk condition and movements, and potentially on the January 1 index of winter severity calculations for elk (Farnes, Heydon, and Hansen 1999).
- Mechanical means could be used to increase forage access for elk after snow crusting events.
- Changes in the refuge supplemental feeding program could begin to affect elk nutrition (negligible adverse effect on NER elk from lower nutrition).
- Displacement of elk by bison during competition for standing forage would decrease as the bison herd is reduced.
- Aggressive social interactions involving competition for food among elk and bison would increase overall as feeding periods are reduced.

Winter Distribution

- Elk densities on the NER would decline due to more reliance on standing forage and wider distribution.
- Elk use of lands surrounding the NER would increase, including:
    - USFS lands east of the NER
    - Gros Ventre feedgrounds possibly
    - Southern GRTE
    - State feedgrounds south of the NER
- Most of winter distribution shift would involve elk in the Yellowstone, Teton Wilderness, and Gros Ventre segments.
- As ungulate numbers decreased and supplemental feeding was reduced, competition and aggressive social interactions on the refuge would also be reduced.
- Elk and bison distribution would increase as the animals relied more on native winter range.
- Fewer animals would be present on the refuge.

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Mortality

- As supplemental feeding is reduced, natural factors such as climate and native forage availability would have a greater influence on numbers, movements, distribution, and mortality.
- More elk would be subject to natural factors affecting mortality, including loss of body condition, predation, and starvation.
- Increased mortality on and off the refuge would mainly affect older elk and calves, and some prime bulls entering the winter energetically stressed due to rut activities.
- Late winter calf ratios could decrease as a result of higher winter calf mortality
- Average winter mortality on the refuge would increase from 1%–2% annually to an estimated 1%–5%.
- Overall, a higher total winter mortality rate of approximately 5% could be expected.

Disease

- Reductions in supplemental feeding or elk numbers would reduce the potential for impacts due to tuberculosis, septicemic pasturelosis, and CWD.
- The health and sustainability of the Jackson elk herd would be increased gradually as supplemental feeding was reduced and there was greater reliance on standing forage and wider ungulate distribution.
- Health and sustainability of the Jackson elk herd would be enhanced in the long term.
- Wider distribution of elk would result in moderate reductions in both the prevalence and potential transmission of brucellosis, as well as potential for spread of diseases not yet in the population.

Private Lands

- The agencies would work closely with the WGFD and landowners, including livestock producers, to coordinate actions that would prevent conflicts due to elk dispersal and to defray costs of managing potential conflicts. Preventing access to food/hay rewards on private lands would be vital for effective management.
- Private land conservation easements within NER boundaries would promote wider distribution.

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APPENDIX 2. Monitoring Supplemental Materials: Feeding Initiation Methods

At each sample site, 10 subplots will be measured at every 5 steps along the random bearing determined for each site. At each subplot a 13.27" diameter metal sampling ring will be placed on the ground. The amount of forage available to elk within the sampling ring (dry weight in grams) will be visually estimated. The 13.27" diameter subplot allows easy conversion from grams to lbs. per acre (each gram is equivalent to 100 lbs. per acre). During annual forage production sampling, refuge biologist Eric Cole has made approximately 1,000 of these visual estimates per year for 17 years, and 33% of Cole's estimates have been verified by clipping and weighing. Therefore, Cole will be the principal estimator, but additional personnel will be trained in these techniques to provide redundancy in the event of personnel changes, and to increase the number of observers to facilitate estimation of error.

Estimating available forage within the sample ring at each subplot is relatively straightforward when snow cover is limited, but estimating how much of the forage is accessible to elk when snow is dense, deep and crusted can be subjective. To decrease the subjectivity of the estimation process, if the area under the sample ring is covered with snow, only forage that can be exposed with a gloved hand will be included in the estimate of available forage. Forage that is fouled with manure and/or flush with the ground due to trampling and/or encrusted in ice will not be included in the estimate of available forage. At each subplot the estimate of available forage (dry weight g) will be converted to an equivalent lbs./acre value (1 gram=100 lbs./acre). The arithmetic mean of available forage (lbs./acre) for the 10 subplots provides an estimate of available forage for each index site. There are 3 sample site categories: 1) Historic Key Index Sites that have been used since 2007, 2) New randomly selected sites within areas preferred by elk, and 3) New randomly selected sites in areas not preferred by elk. Historic key index sites were not randomly selected, but were instead selected to represent areas most preferred by elk on the south end of NER. These were the sites used to determine when supplemental feeding would be initiated from 2007 until the implementation of the MSP. To facilitate comparison with pre-MSP data, we will continue to use mean lbs. per acre across historic key index sites to determine the 300 lbs. per acre threshold. However, post MSP implementation we will delay feeding initiation by 2 weeks once the 300 lbs./acre level has been reached. We will concurrently sample at randomly selected sites stratified on an annual basis between areas highly preferred and not highly preferred by elk. This will enable us to quantify the relationship between mean forage availability at historic key index sites and random sites over time.

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APPENDIX 3. Communication Plan

Communication Goals

Prior to the MSP's Implementation

- Utilize a variety of outreach methods to inform the public on the goals and timing of the MSP implementation and possible effects on wintering herds.
- Utilize a variety of outreach methods to inform the public on public comment opportunities.
- Identify and coordinate key messages and outreach with USFWS regional and national offices, State and federal agency partners, non-profits, elected officials, and other identified audiences.

During the MSP's Implementation

- Continue to utilize a variety of outreach methods to describe current management actions as well as measurable and noticeable changes on the landscape, in animal behavior, or in animal health.
- Provide a comprehensive overview of the MSP by providing links and references to previous outreach and background information.

Communication Objectives

- Work with current media contacts to promote news of the MSP via print, radio, Web, and social media platforms.
- Utilize new media and social media tools to provide information on why the MSP was developed, what public comment opportunities exist, and how the plan is being implemented.
- Plan, coordinate, and execute public meetings to allow for public comment and questions on the plan.
- Develop and provide methods for the public to submit written comments on the MSP.
- Monitor print media on Refuge elk and bison management to see how the Step own Plan objectives and reactions are being portrayed to the public.

Current Outreach Resources

- National Elk Refuge web site
- National Elk Refuge news release list
- (approximately 300 contacts)
- National Elk Refuge Twitter site (1,039 followers)
- Bison and Elk Management Plan web site (http://www.fws.gov/bisonandelkplan/)
- Space for an 11" x 17" poster in the Visitor Center on Refuge management topics
- Display panels in the Visitor Center theater for temporary displays

Available Supporting Outreach Resources

- USFWS Mountain–Prairie External Affairs staff
- USFWS Mountain–Prairie web site, including the
- "Top Stories" feature
- USFWS Mountain–Prairie Twitter site USFWS Mountain-Prairie Region Facebook page
- USFWS National Wildlife Refuge System

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- Facebook page
- USFWS Facebook page

Previous Outreach Efforts

- NER routinely writes and disseminates news releases on Refuge management activities, including the Comprehensive Conservation Plan, supplemental feeding, herd health monitoring, and forage production.
- Post the above news stories as Content.
- Management System (CMS) articles.
- Post CMS news story promos so they prominently appear on the home page, linking readers to the articles.
- Send out Twitter messages linking viewers back to the news stories.
- Prepare, upload and provide links to Adobe PDF versions of news stories with additional photos where additional images are available and/or help understand or visualize the content.
- Utilized the Conservation link on the web Content
- Management System to post information about the Bison and Elk Management Plan and the draft Comprehensive Conservation Plan.
- Retained and provided a link to the original Bison and Elk Management web page (http://www.fws.gov/bisonandelkplan/) that was developed during the planning process. The web site includes links to the Final Plan/EIS, Record of Decision, Federal Register Notice of Availability for both the Record of Decision and Final Plan/EIS, associated news releases, public meeting highlights, and other related documents. Note: the National Elk Refuge does not manage the site.

Additional Outreach Opportunities

- Public meetings in Jackson and other identified locations.
- Service produced video; video could be posted to the National Elk Refuge's multimedia web page, or USFWS Mountain–Prairie home page "Top Video" feature.
- Live radio interview on KHOL (Jackson, WY radio)
- Wyoming Public Radio interview with Refuge management staff
- Interviews with local print media sources
- Updates at community leader meetings such as Rotary Club, Jackson Hole Chamber of Commerce board meetings, and interagency breakfast meetings (with Federal agencies and local elected officials).

Target Audiences

Internal

- Regional and National USFWS Leadership
- Refuge permanent staff
- Refuge seasonal staff
- Refuge volunteers

External

- Congressional representatives
- State of Wyoming leadership
- Federal agency partners, particularly Grand Teton National Park and the Bridger–Teton National

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Forest
- Wyoming Game & Fish Department
- Other NER partners, including county and town agencies and local nonprofit organizations
- Local elected officials
- Private landowners in proximity to the National
- Elk Refuge or neighboring Federal lands
- Tribes
- Local and state media
- Local public

Key Outreach Topics

- Overview of BEMP objectives
- Strategy to change elk/bison behavior
- Threat of disease
- Natural mortality rates
- Anticipated winter distribution changes for bison/elk
- Mitigate negative effects on private lands
- Change elk behavior and distribution while avoiding increased mortality.
- Explain the historic reasons a supplemental feeding program began and why it was continued.
- Explain the NER's limited large ungulate carrying capacity and the disproportionate impact of bison on available forage; 3 elk = 1 bison.

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APPENDIX 4. Models

Elk winter distribution model

The proportion of the JEH that winter on the NER will be linked to factors hypothesized to influence elk winter distribution using a generalized linear mixed effects model (GLMM). A GLMM can account for a proportional response variable (i.e., constrained to the interval 0–1) using a log link and binomially-distributed errors. A GLMM also includes fixed and random effects, with the latter capturing residual model variance otherwise not explained by fixed effects. Year will be including as a random effect, providing several benefits. First, we don't assume years are independent and comprise all of the factor levels of interest. Instead, the effect of year is treated as a random variable, with individual year effects realizations of that distribution. This allows inference to non-sampled factor levels, i.e. years, by estimating a latent population-level proportion of elk expected to winter on the NER regardless of fixed effect influences. Thus, the random year effect can be considered a latent variable describing elk behavior manifested as observed winter distribution. Second, because year effects are not treated as independent, estimated effects of year on the proportion of JEH elk wintering on the NER are dependent on all factor levels, leading to greater precision when estimating individual year effects (Kéry 2010).

The full GLMM incorporating fixed effects for each factor identified as influencing elk winter distribution is:

$$P_t = \beta_{0(t)} + \beta_1 * AFI_t + \beta_2 * SDM_t + \beta_3 * WP_t + \beta_4 * GSP_t + \beta_5 * SWE_t + \varepsilon_t$$

where the random intercept and residual model variance are

$B_{0(t)} \sim N(\mu_{\beta_0}, \sigma^2_{\beta_0})$, and

$\varepsilon_t \sim N(0, \sigma^2)$, respectively.

Fixed effects include 1) per capita available forage at initiation of winter feeding (*AFI*) , 2) proportion of the JEH that are short-distance migrants (*SDM*), 3) number of wolf packs present on JEH native winter range (*WP*), 4) growing season (May–August) precipitation for the Wyoming Snake Drainage climate division (*GSP*; a proxy for available forage on native winter range), and 5) snow water equivalent on 1 January at Thumb Divide (*SWE*; a proxy for early winter severity).

Elk calf winter survival and forage deficits

The Forage Accounting Model of Hobbs et al. (2003) has as an output weekly available forage biomass for the NER (sum of predictions for 30 × 30 m cells). These predictions account for snow conditions using a proxy of SWE and decrement total available biomass by 35% to account for unpalatable plants within the total estimate.

While calf survival is a function of multiple factors the primary management action influencing calf survival is supplemental winter feeding. Current winter feeding initiation criteria lead to calf survival generally higher than in unfed populations. Proposed feeding initiation criteria will result in later initiation of supplemental feed, which will be most influential to calf survival. There is currently little

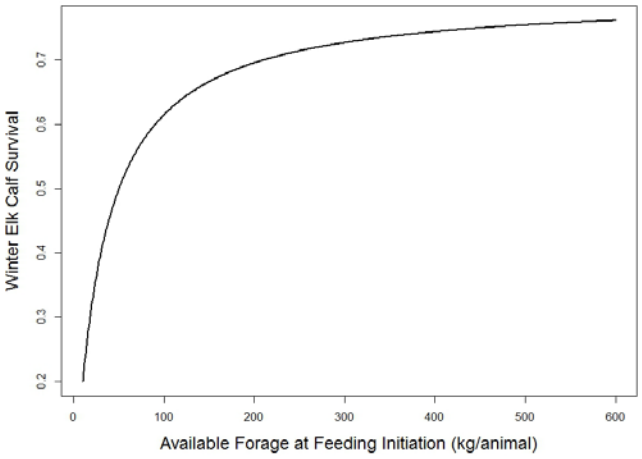
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understanding regarding the relationship between initiation of winter feeding and calf survival, except that current feeding initiation criteria result in high calf survival. We believe a threshold level of available forage at initiation of winter feeding exists such that winter calf survival reaches an asymptote. Below this threshold, calf survival is hypothesized to decline quickly with reductions in available forage at winter feeding initiation. Available forage at the initiation of winter feeding will be related to on elk calf winter survival using a saturating function (i.e., Holling type-II functional response; Fig. 6) by

$$S_t = \frac{aAFI_t}{b + AFI_t}.$$

The parameters *a* and *b* determine how calf survival is related to available forage. Maximum calf survival is *a*, and *b* represents the value of available forage to an individual when survival is 50% of *a* (Hilborn and Mangel 1997).

Although this approach doesn't capture forage deficits *per se*, it does provide a potentially sensitive proxy for this concept. It is assumed that a forage deficit for calves would occur at a point on the curve of the relationship between calf survival and available forage at initiation of supplemental feeding. Modeling the response of winter calf elk survival to changes in feeding initiation criteria facilitates our ability to maximize the influence of feeding initiation criteria on winter distribution while minimizing the likelihood of a large mortality event.



Hypothesized relationship between winter survival of elk calves and per capita available forage at initiation of winter feeding on the National Elk Refuge.

September 2016 Draft

BISON AND ELK MANAGEMENT STEP DOWN PLAN

A Structured Framework for Reducing Reliance on Supplemental Winter Feeding

National Elk Refuge
Grand Teton National Park

DRAFT

September, 2016

BISON AND ELK
MANAGEMENT STEP DOWN PLAN

For the

National Elk Refuge,
Grand Teton National Park,
John D. Rockefeller, Jr. Memorial Parkway

Teton County, Wyoming

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Appendix I. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section

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EXECUTIVE SUMMARY

Overview

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands, focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The final plan directed the NER and GRTE (in conjunction with the Wyoming Game and Fish Department: WGFD) to maintain the state's elk herd objective of 11,000; establish a bison population objective of 500; restore habitat on the NER and in GRTE; continue hunting bison and elk on the NER; continue the elk reduction program, when necessary, in GRTE; allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available; and develop a dynamic, structured framework and Step Down Management Plan for decreasing the need for supplemental feeding on the NER. ***This Bison and Elk Management Step Down Plan (MSP) was developed to specifically addresses the criteria for a structured framework referenced in the Record of Decision.***

Background

Winter feeding of elk in Jackson was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. The loss of available winter range in Jackson Hole due to new ranching operations and a growing town resulted in significant numbers of elk dying during several severe winters in the late 1800s and early 1900s. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, established the National Elk Refuge. Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding.

Bison were extirpated outside Yellowstone National Park (YNP) by the mid-1880s but in 1948 were reintroduced to Jackson Hole when 20 bison from YNP were released near Moran, Wyoming. The herd remained small until discovering elk feedlines in 1980, when the population began sustained population growth. Bison and elk that winter on the NER are migratory and occupy summer ranges predominantly to the north.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER (Boyce 1989), high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases (Murie 1951, Franson and Smith 1988, Samuel et al. 1991), which is currently demonstrated by the high level of brucellosis in the elk and bison herds (Cross et al. 2010, Kamath et al. 2016). It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands (Smith et al. 2004), thereby reducing other wildlife associated with woody vegetation.

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. The potential risk of catastrophic disease outbreaks and the need to mitigate this threat is a vital component in achieving the BEMP Sustainable Populations Goal.

Objectives

This MSP addresses several objectives under a broader BEMP goal of sustainable populations, which directed the agencies to: 1) develop a

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dynamic, structured framework for reducing NER supplemental feeding; 2) implement a phased reduction of animals on feed: a) Phase 1, to 5,000 elk and 500 bison, and b) Phase 2, elk and bison rely predominantly on native habitat; 3) maintain natural elk bull-to-cow ratios in park summer herd; and 4) enhance public outreach/education. The BEMP further stated that consideration criteria for implementing the 2nd phase of reduced feeding would include some or all of: 1) the level of forage production and availability on the National Elk Refuge, 2) desired herd sizes and age/sex ratios, 3) effective mitigation of bison and elk co-mingling with livestock on private lands , 4) winter distribution patterns of elk and bison, 5) prevalence of brucellosis, chronic wasting disease, and other wildlife diseases, and 6) public support. **In short, the overall objective of this plan is to provide a path for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives and public support.**

Strategies

Elk have been fed for some period during nearly every winter on the National Elk Refuge since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during a time of year when natural forage is typically most limited is powerful to both species, and their knowledge of its existence has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Attempting to modify this behavior on a large scale is unprecedented and will necessarily require investigation, constant evaluation, adaptive modifications to the approach when indicated, and repeated trials.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into the 3 broad categories of 1) timing and intensity of winter feeding, 2) timing and intensity of hunting, and 3) herd segment specific and overall harvest levels.

Measuring the success of MSP strategies will require knowledge of several bison and elk herd attributes. Because we are interested in reducing the intensity of elk and bison feeding throughout the entire winter season, which includes both the number of animals on feed and the duration of feeding, we will use measurements of elk-fed-days (EFD; the total number of elk fed per day per season derived from daily feedground estimates) and bison-fed-days (BFD; the total number of bison fed per day derived from daily feedground estimates) to evaluate feeding intensity. For example, if 5,000 elk were fed for 100 days during a given winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD. Average baseline feeding intensity during the post-BEMP to pre-MSP period from 2008-2016 was 487,838 EFD (range = 223,614-746,800), and 45,224 BFD (range = 26,035-82,124). Reductions in EFD and BFD compared to these baselines will represent progress in meeting feeding reduction objectives under the MSP. Reductions in EFD and BFD could be achieved through reducing the length of the feed season, reducing the number of elk and bison on feed, or some combination of both factors.

Initial success of MSP implementation will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP did not provide specific measurement criteria for the definition of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage" we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. These levels of reduction are consistent with elk and bison predominantly relying on free standing forage rather than supplemental feed.

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Similarly there are population-specific objectives derived from the BEMP and Phase 1 of the MSP for 5,000 elk wintering on NER and 500 bison wintering in the Jackson Hole area. Progress towards these objectives will be measured using annual classification counts and the average number of elk and bison counted during daily feedground estimates.

Chronic Wasting Disease. As of 2016, CWD has been detected within 40 miles of the Jackson Elk Herd (JEH) in moose, within 35 miles in deer, and within 175 miles in elk. Continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence will take place. Some aspects of CWD response planning could change based on implementation of WGFD's CWD management plan (WGFD 2016).

Winter Feeding. Currently, the initiation of supplemental winter feeding occurs when available forage drops to 300 lbs./acre along transects in areas with highly preferred grasses. This protocol will change to delay the initiation of feeding.

The strategy of delaying the start of supplemental feeding is to encourage elk and bison to use native winter range, especially those individuals that have not previously received a food reward on the Refuge. Over time, it's anticipated a cohort of animals will develop that are not conditioned to the Refuge supplemental feeding program, which will reduce herd concentrations and the risk of disease transmission.

To reduce supplemental feeding overall, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk and bison fed days, the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years of MSP implementation, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require focused mitigation measures.

As bison and elk behavioral responses are better understood, feeding delays will be extended to encourage a redistribution of elk and bison to native winter range. However other factors outside of the scope of this plan such as wolf numbers and distribution could reduce the effectiveness of this strategy.

Variables that influence feeding initiation date will be considered (Table 4, Fig. 10). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. And finally, the distribution of animals, particularly on private, livestock producing lands, would be considered prior to delaying feeding initiation date.

Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years.

In the early years of MSP implementation, the seasonal termination of feeding is expected to

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occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date as the MSP is implemented.

Harvest. Few options for manipulating elk hunting are currently available because the JEH is at or near the 11,000 WGFD objective. Proposed changes include allowing limited any elk permits, allowing a bow season near developments on the NER, delaying the elk season so it will better coincide with migration timing, and alternating areas that are closed and open to hunting over time to encourage animal movements or facilitate harvest.

Based on summer bull ratios in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded hunting opportunities are considered.

The proportion of the Jackson Elk Herd that winters on NER has increased in the past 2 decades. This trend is correlated with a decline in elk use of native winter range and an increase in the proportion of NER elk that occupy winter ranges immediately adjacent to the Refuge. If efforts to encourage increased use of native winter range are unsuccessful, agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. This will provide a level of harvest flexibility more commensurate with addressing changes in herd distribution.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution or discouraging bison from attempting to leave the NER via the south boundary into the town of Jackson.

The effectiveness of NER late-season harvest regimes is influenced by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could help reduce winter elk numbers on the Refuge. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st .

Private Lands Mitigation. Several strategies would be employed to mitigate likely changes in bison and elk distribution, including providing incentives for non-breeding cattle operations, increased fencing in limited areas to separate elk and bison from livestock feed lines, hazing elk and bison away from livestock feed lines, and purchasing private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal wildlife conflict technician positions supervised by WGFD.

Vegetation Restoration. Various approaches to restore the Kelly Hayfields in GRTE (4,500 acres) were initiated in 2008. Work will likely be complete in 2035. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and providing visitor opportunities to enjoy wildlife viewing within a natural setting. The restoration process involves removal of non-native vegetation, collecting and propagating native seeds and plants, as well as the seeding of native plants.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres are currently under restoration treatment and 3,265 acres remain non-native pasture. Maintenance of restored ecological conditions

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will require management efforts in perpetuity to keep non-native species from colonizing restored areas. The park will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Strategies Considered But Rejected

Strategies considered but rejected include fertility control in elk and bison, agency reduction of either elk or bison, and altering rations of supplemental feed. These strategies were rejected because they were not included in the BEMP preferred alternative and/or because there was not support for them by cooperating agencies.

Models and Monitoring

Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

A robust monitoring program will be necessary to track the effects of actions implemented under this plan. Critical monitoring components will include: 1) enhanced forage production and availability sampling; 2) measuring animal abundance and distribution including differences in some sex and age classes; 3) determining elk and bison fed days each feeding season; 4) estimating winter mortality; 5) brucellosis seroprevalence rates; and 6) CWD surveillance. In many cases, attribute baselines for the period preceding implementation of this plan have been developed for comparison after the plan is implemented.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Actions completed each year, the results of monitoring programs, and any proposed changes in management direction will be presented in an annual MSP update/report, completed by NER staff by the end of June.

Public Outreach/Education

De-emphasizing the supplemental feeding program will be a major paradigm shift especially for the residents of Jackson Hole and Teton County, but will also be of interest to others in Wyoming and across the nation familiar with the long history of feeding elk on the National Elk Refuge. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk and bison herd management methods. A detailed communication plan has been developed that identifies key messages and utilizes a variety of outreach methods, including print, video, and voice material, utilizing social media, and meetings with elected officials, state and local governments, agency and tribal partners, community organizations, stakeholders, and the general public.

Schedule

GPS collars were deployed on 30 adult cow elk in February 2016. Assuming adequate funding, , additional GPS collars will be deployed in winter 2017. Public outreach, private lands conflict mitigation and contacts, and enhanced forage monitoring will occur in fall 2016 through January 2017. Reductions in feed season length will begin in winter 2017.

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INTRODUCTION

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands. It included directives for forthcoming development of adaptive management practices to address several objectives in the plan, including a desired future condition of elk and bison relying predominantly on native forage. This MSP has been developed expressly for that purpose.

Bison and Elk Populations

While Jackson Hole is probably best known for the splendor and ruggedness of the Teton Range, the Jackson bison and elk herds rank among the top characterizing features of the valley. Both figure prominently in Jackson Hole's history and culture, although bison were absent from the valley for about 100 years between the mid-1800s and mid-1900s.

The JEH occupies approximately 8,000 km^2 in the upper Snake River watershed north of the town of Jackson (Fig. 1). Much of the herd is migratory, moving between distinct wintering and summer ranges. Primary wintering areas include the Buffalo Valley, lower elevations of the Gros Ventre River drainage, the NER, and areas adjacent to the NER on Bridger-Teton National Forest (BTNF) lands. Summering areas occur throughout the herd's range and for convenience are divided into five geographic regions that include GRTE, Yellowstone National Park (YNP), the Gros Ventre drainage, Teton Wilderness, and Southwest Boundary area, which includes private and public lands in the vicinity of GRTE's southwest boundary.

In the late 1800s, when elk populations all over North America were being extirpated, the residents of Jackson Hole protected elk from "tusk hunters" and large-scale commercial hunting operations. Elk are just as important to today's residents of the valley. Thousands of people each year have the opportunity to see elk at close range on the refuge while riding on horse-drawn sleighs. Thousands of pounds of shed elk antlers are sold at an annual antler auction each spring in the town square. Elk are important to backcountry users as well as to people that never leave the road. Jackson Hole is a popular destination for instate and out-of-state elk hunters. The draw of elk to visitors contributes significantly to the local economy.

Winter feeding of elk in Jackson Hole began in 1910 and was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. According to historical reports, before Euro-American settlement some Jackson elk wintered in the southern portion of Jackson Hole (present location of the NER town of Jackson) and may have used areas outside Jackson Hole, including the Green River and Wind River basins to the south and east, respectively, and the Snake River basin to the southwest in what is now eastern Idaho (Allred 1950; Anderson 1958; Blair 1987; Barnes 1912; Sheldon 1927). Radio-collar studies have documented small numbers of Jackson elk wintering in each of these areas in recent times as well (NER and GRTE, unpublished data). Over time, changes in land use and development in these areas, over hunting, and establishment of feedgrounds probably reduced the use of these areas by Jackson elk.

By the end of the 19th century the JEH was believed to be largely confined to Jackson Hole and the immediately surrounding area, where wintering conditions are often harsh. Significant numbers of elk died during several severe winters in the late 1800s and early 1900s> Primary reasons for these mortality events included the loss of available winter range in Jackson Hole from new ranching operations and a and

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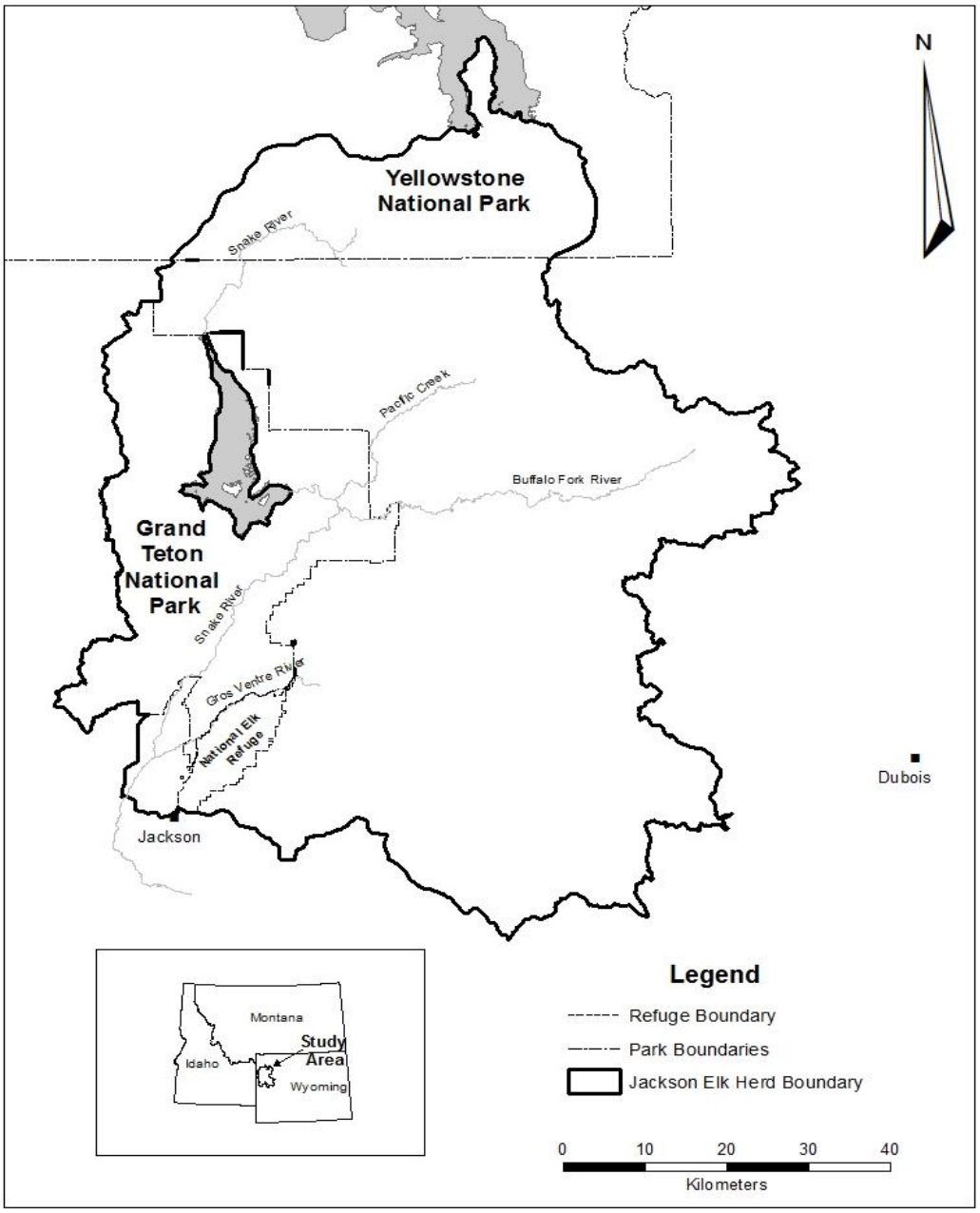


Figure 1. Jackson elk and bison herd ranges, including the National Elk Refuge, Grand Teton and Yellowstone National Parks, and Bridger-Teton National Forest. [include bison range, labels for continental divide and Bridger-Teton National Forest, and in Legend Jackson elk herd unit]. Also Gros Ventre drainage and state feedgrounds because they are referenced in text

expansion of Jackson. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, appropriated $45,000 for the purchase of lands and maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first winter census in the area was conducted in 1912 and showed about 20,000 elk residing in Jackson Hole and the

Hoback River drainage (the latter is not within the JEH's range).

Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding. In recent times the population has fluctuated near the herd objective of 11,000 that was adopted by the WGFD (Fig. 2).

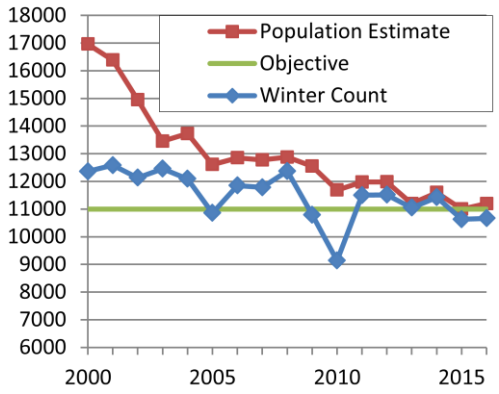


Figure 2. Winter Counts, population estimates, and herd objective for the Jackson elk herd, 2000-2016.

An iconic symbol of the American West, bison are also popular with visitors and residents. Because so few opportunities remain to see bison in the wild, viewing and photographing them in GRTE with the Teton Range in the background is a treasured opportunity for many of the valley's visitors. Similar to elk, there is also a high level of interest in bison hunting. Bison are of particular interest to nearby American Indian tribes and tribes in other parts of the United States because the animals are central to their culture and tradition.

Bison are native to Jackson Hole, as evidenced by the presence of prehistoric bison remains throughout the valley, but were extirpated outside Yellowstone National Park by the mid-1880s. In 1948, 20 bison from YNP were reintroduced to the 1,500-acre Jackson Hole Wildlife Park near Moran. The Jackson Hole Wildlife Park was a private, non-profit organization sponsored by the New York Zoological Society, the Jackson Hole Preserve, Inc., and the WGFD. A population of 15–30 bison was maintained in a large enclosure there until 1963, when brucellosis was discovered in the herd (likely transferred with the original 20 animals from YNP). At that time, all the adult animals were destroyed, but four vaccinated yearlings and five vaccinated calves were retained. In 1964 twelve certified brucellosis free bison from Theodore Roosevelt National Park were added to the herd. In 1968 the herd (down to 11 animals) escaped the confines of the wildlife park, and a year later the decision was made to allow them to range freely. The expansion of GRTE in 1950 had enveloped the Wildlife Park, and this allowed the bison to range freely and was consistent with National Park Service wildlife management policy. The herd remained small and wintered mostly in the Snake River bottoms in GRTE until 1975, when it followed the winter environmental gradient to the NER and began wintering there. The use of standing forage by bison on the NER was viewed as natural behavior thus acceptable to managers. In 1980, however, bison discovered and utilized supplemental feed provided to elk in winter, and they have continued to do so ever since.

The discovery of supplemental feed by bison has had several consequences, including a significant increase in the population's growth rate (Fig 3). Bison on the elk feedlines have at times disrupted feeding operations and displaced and injured elk. To minimize conflicts between bison and elk, managers have provided separate feedlines for bison since 1984. As the population has grown, separating elk and bison on feedlines has become increasingly difficult, and a variety of feeding strategies are employed to help reduce displacement of elk.

As the herd has grown it has maintained fairly stable movement patterns, wintering almost entirely on the NER and summering within GRTE and adjacent lands on the BTNF (Fig. 1).

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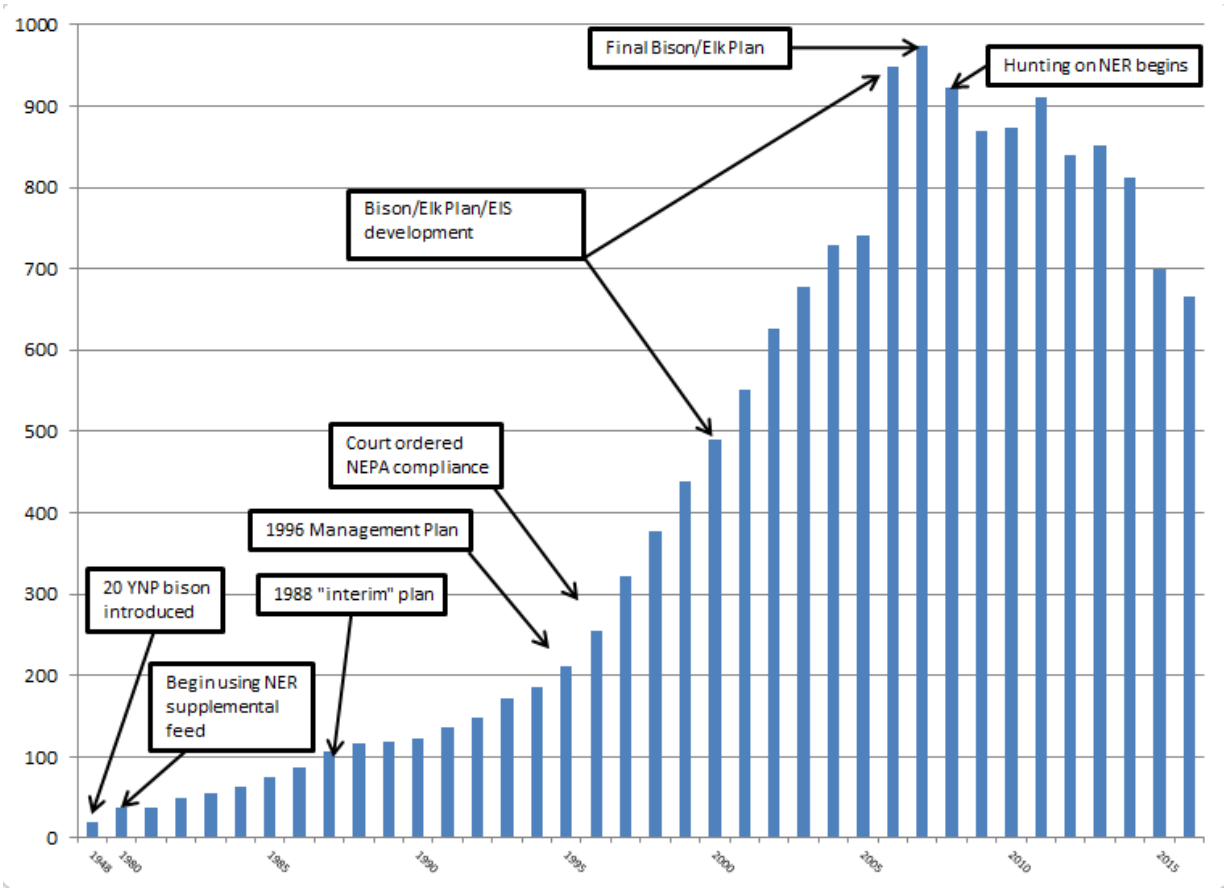


Figure 3. Population growth and planning history for the Jackson bison herd, 1948-2016.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands and thereby reducing availability of these habitats to other wildlife as well as unusually low winter mortality, which has affected predators and other species and has required intensive hunting programs.

Planning History

Jackson's bison and elk populations have been the subject of previous planning efforts. Elk management and research has been guided by the Jackson Hole Cooperative Elk Studies Group since it was established in 1958. The group consists of biologists and agency administrators from the NER, GRTE, YNP, BTNF, and WGFD, who meet at least annually to coordinate management of the population and its habitat. Coordination of bison management began soon after they started frequenting the NER in 1976 and using supplemental feed provided to elk in 1980 (Fig. 3). Release of an "Interim" plan that called for maintaining a herd of 90-110 bison while data were gathered for a long term plan occurred in 1988. It was followed by implementation of a sport hunt outside GRTE, administered by WGFD. This plan was halted after litigation in which the plan's violation of NEPA was successfully argued by plaintiffs.

In 1996, after considerable herd growth, a new long term management plan and environmental

assessment for the Jackson bison herd was released (Fig 3). This plan had strong support and called for maintaining a herd size of 350-400 bison, but it was shelved a year later when plaintiffs from the earlier litigation successfully argued that, because the plan failed to consider the effects of feeding elk on bison management, it also violated NEPA and was not sufficient. This led to development of the draft bison and elk management plan and environmental impact statement from 2000-2006 and release of the final plan in 2007 (Fig 3).

The 2007 Bison and Elk Management Plan (BEMP; USFWS 2007) considered six alternatives for bison and elk management focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The primary management scenarios presented in the alternatives included the status quo, terminating elk and bison hunting on the NER and the elk reduction program in GRTE, brucellosis vaccination options, restoring habitat, improving forage, and decreasing or phasing out supplemental winter feeding.

The final BEMP (USFWS 2007; www.fws.gov/bisonandelkplan) which set management direction for 15 years or until a subsequent plan is developed, proposed to maintain the state's elk herd objective of 11,000, establish a bison population objective of 500, restore habitat in the NER and GRTE, continue hunting bison and elk on the NER, continue the elk reduction program in GRTE in concert with the parks enabling legislation, allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available, and develop a dynamic framework of management actions which adaptively decrease the need for supplemental feeding on the NER. ***This Bison and Elk Management MSP was developed to address the latter and specifically addresses the criteria for a structured framework listed on page 5 of the Record of Decision*** **(Fig. 4).** It does not address other on-going bison and elk management actions already prescribed by the BEMP.

The BEMP scheduled the completion of the MSP for 2008. However, litigation challenging the BEMP in 2008 led to the decision to postpone its development until litigation was resolved. As of March 2015, two court rulings have upheld the 2007 BEMP and ROD. In a lawsuit against the BEMP and its author agencies (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2010), plaintiffs argued that the BEMP violated the National Wildlife Refuge System Improvement Act (National Wildlife Refuge System Improvement Act 1997) by disrupting the biological integrity of the Refuge, and that the plan and the accompanying EIS violated NEPA because they were insufficiently detailed to allow a reasonably complete discussion of mitigation. The crux of the plaintiff's argument was that the plan did not set a specific date for the cessation of supplemental feeding. In response, the agencies argued that the plan constituted a valid exercise of discretion and that it and the EIS were sufficiently detailed to satisfy the requirements of NEPA. In March 2010, the United States District Court for the District of Columbia sided in favor of the agencies in this case. In 2011, the plaintiffs appealed this ruling to the United States Court of Appeals for the District of Columbia Circuit. This Court affirmed the District Court ruling (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2011).

National Environmental Protection Act Compliance

The 2007 BEMP/EIS and ROD satisfied NEPA requirements for current bison and elk management through a detailed analysis of alternative management actions and their likely effect on the environment, and substantial involvement of the public in the process. This MSP does not duplicate or add to this process. It is designed to tier off of the BEMP as a dynamic implementation guide to one part of the preferred alternative outlined in the BEMP ROD. As such, references to NEPA covered in the BEMP

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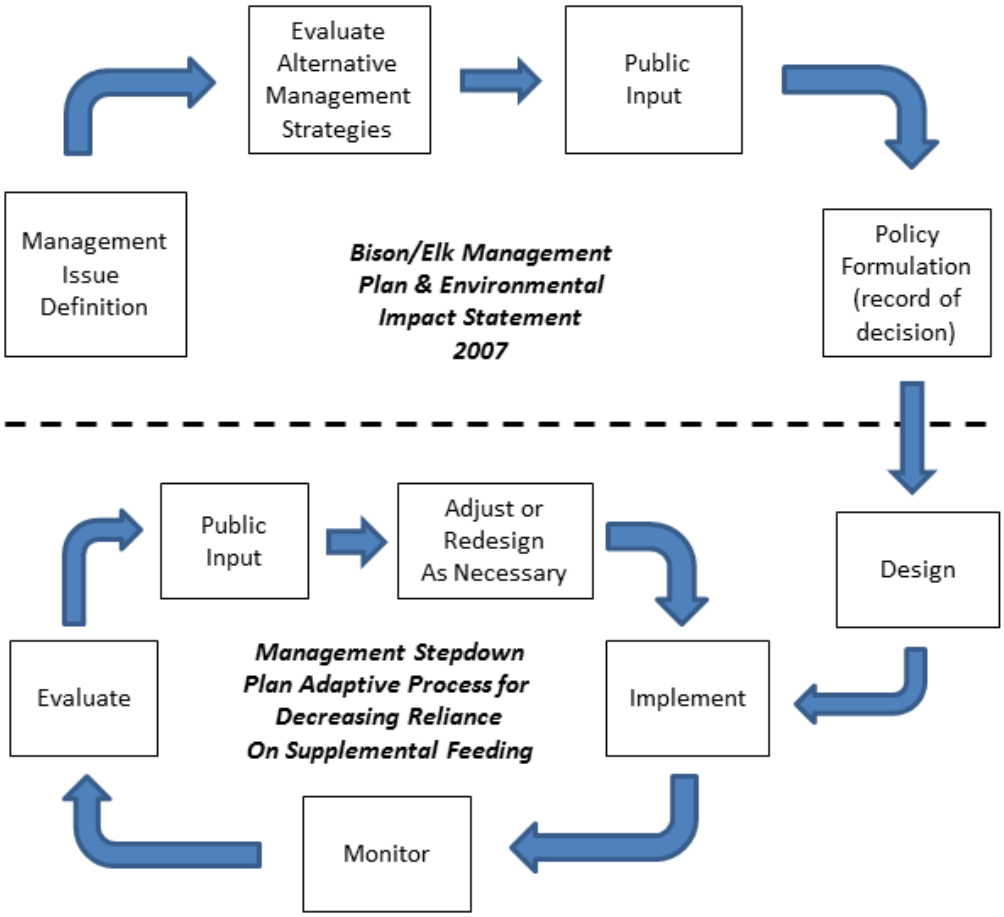


Figure 4. Management step down planning for supplemental feeding on the National Elk Refuge and its relationship to the 2007 Bison/Elk Management Plan and Environmental Assessment.

will be included where necessary in this document, and the discussion of any action that would require additional NEPA compliance will be explicitly stated as such in that context.

Management Step Down Planning

The use of adaptive management plans has gained popularity in natural resource management planning because, by definition, they allow modifications of strategy based on monitoring results and outcomes toward reaching specific goals or objectives. Four elements generally included in an adaptive management approach include: 1) well defined and mutually agreed upon objectives; 2) knowledge (including descriptive models) of the dynamics of the system being managed; 3) clearly articulated management actions and strategies; and 4) a monitoring program to evaluate responses of the system to management actions (Walters 1986).

This MSP utilizes adaptive management planning principles but is not intended to include all of the adaptive management planning elements outlined in the Department of Interior Adaptive Management Technical Guide (2007). This MSP is more accurately described as a "structured framework" of adaptive management actions that progressively transitions from supplemental winter feeding to greater reliance on free-standing forage (BEMP ROD p.5).

Table 1. 2007 Bison/Elk Management Plan Goals and Objectives (Step Down Plan objectives shaded)

Goal: Habitat Conservation

Objectives:

- Conserve important private lands.
- Increase forage production.
- Minimize non-native plants.
- Protect sagebrush grasslands.
- Restore willow, aspen, and cottonwood.
- Perpetuate natural mosaic of plant communities.

Goal: Sustainable Populations

Objectives (BEMP pages 135-136):

- Develop structured framework for reducing NER supplemental feeding.
- Phase reduction of animals on feed: 1) to 5,000 elk and 500 bison, and 2) elk and bison rely predominantly on native habitat.
- Maintain 35:100bull-to-cow ratios in park summer elk herd.
- Ensure a genetically viable bison herd with close to an even sex ratio.
- Enhance public outreach/education.

Goal: Elk and Bison Numbers

Objectives:

- Maintain state elk herd objective of 11,000.
- Maintain a genetically viable bison population of about 500 animals.

Goal: Disease Management

Objectives:

- Manage brucellosis transmission risk from elk and bison to livestock.
- Manage feeding to reduce brucellosis transmission among bison and elk.
- Educate hunters about wildlife disease human health hazards.

OBJECTIVES

The management direction and desired conditions stated in the BEMP called for the NER and GRTE staffs to work with others (agencies, partners, etc.) to "adaptively manage elk and bison in a manner that contributes to the State's herd objectives yet allows for the biotic integrity and environmental health of the resources to be sustained," so that the public can enjoy a variety of compatible wildlife-dependent recreational opportunities. Under the BEMP's 4 primary goals, 20 associated objectives were identified (Table 1). This MSP addresses four objectives under the goal of sustainable populations (Fig. 5).

The reduction of animals on feed at the NER was proposed to be spread over two phases. In Phase 1, the aim is to reduce the average number of elk on feed to 5,000 (while maintaining WGFD's 11,000 elk herd objective), and reduce the winter

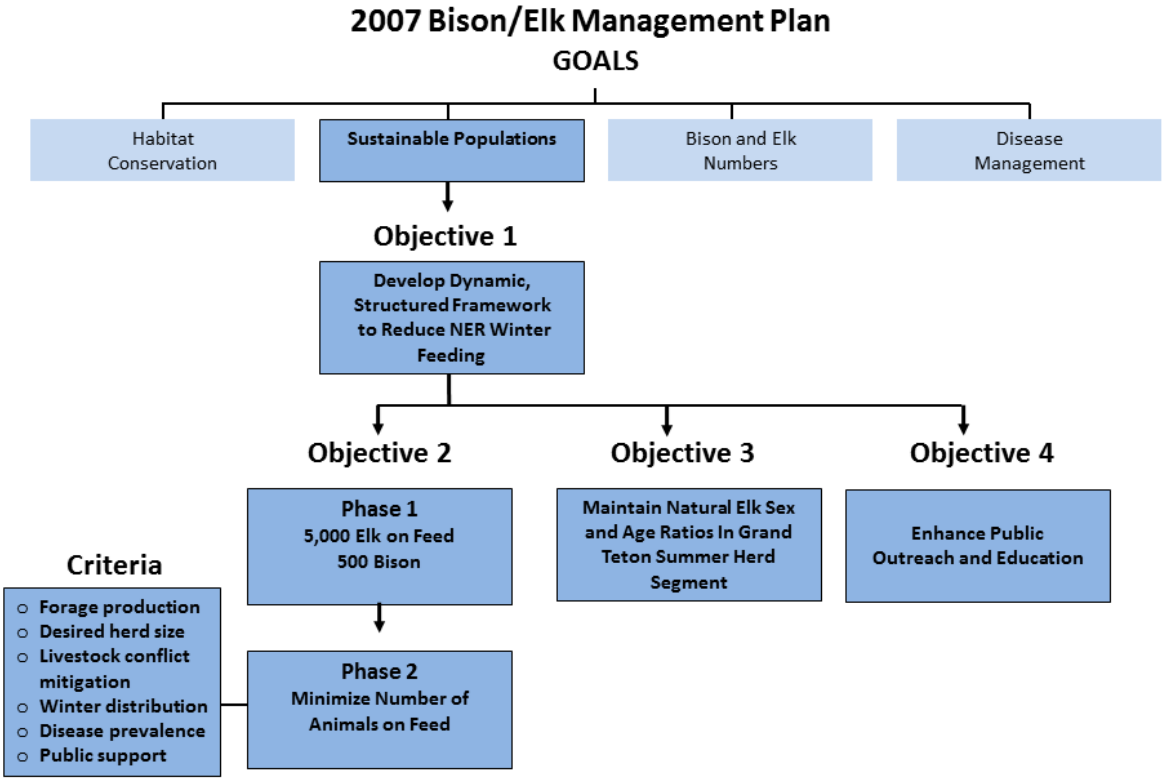


Figure 5. Relationship of MSP to the 2007 Bison/Elk Management plan goals, phasing of objectives, and consideration criteria for reducing the reliance of elk and bison on supplemental feed during Phase 2.

population of bison to the BEMP recommended, and WGFD adopted, objective of 500. In Phase 2, the overall objective is to reduce the reliance of bison and elk on supplemental feed (USFWS and USNPS 2007a). Desired conditions include animals relying predominantly on native habitat and cultivated forage on NER. Important consideration criteria for implementing Phase 2 will include: 1) the level of forage production and availability on the NER and adjacent winter ranges; 2) maintenance of desired herd sizes and age/sex ratios; 3) the ability to effectively mitigate bison and elk livestock conflicts; such as co-mingling on private lands during high risk disease transmission periods; 4) maintaining desirable winter distribution patterns of elk and bison; 5) the prevalence of brucellosis, chronic wasting disease, and other wildlife diseases; and 6) public support. In short, the overall objective of this plan is to outline a framework for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives.

This Plan focuses on management actions to initially achieve Phase 1 objectives. However, if successful, these actions will continue to be used to achieve the Phase 2 objective of reducing reliance on supplemental feeding while considering the six criteria listed above.

MANAGEMENT ACTIONS AND STRATEGIES

Background

The principal goal of reducing reliance on

supplemental feeding is to limit transmission of density dependent diseases in elk and bison while simultaneously minimizing winter mortality in elk. We will attempt to achieve this goal by experimentally reducing feed season length and closely monitoring elk and bison distribution and winter mortality.

Elk have been fed on the NER each year in all but 9 winters since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during winter months is powerful to both species, and their knowledge of NER feed grounds has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Because use of feed grounds is a learned behavior, decreasing feed season length will potentially reduce the likelihood of elk that winter on native range finding NER feed grounds. Over time this could result in a greater percentage of elk using native winter range relative to NER feed grounds. Because it is largely unprecedented, the concept of modifying this behavior on such a large scale is daunting and poses questions for which there are no immediate answers. In some cases, the likelihood a specific management strategy's success will only be able to be roughly estimated, and unanticipated results are likely. Closely monitoring forage availability, elk and bison distribution, and elk mortality will allow us to evaluate the effectiveness of management actions and adjust management actions as needed should unintended negative consequences arise.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into 3 broad categories: 1) timing and duration of winter feeding; 2) timing and intensity of hunting; and 3) herd segment specific and overall harvest levels.

Important Changes Since 2007

The BEMP was developed based on data collected and knowledge that existed up until its ROD. Since then, important changes have taken place, some of which are advantageous to this effort and some of which are not.

A primary change that will facilitate meeting objectives under this plan is the reduction of the bison population from nearly 1,200 animals in 2007 to about 675 during winter 2015-2016 (Fig. 3) through hunting programs administered by WGFD. Licensing changes enacted in 2014 included a reduction in the bison cow/calf license fee (from $416 to $263 for residents and $2522 to $1022 for non-residents) and eliminating the once-in-a-lifetime restriction on a successful bison hunter to only those that successfully harvested a bull. Continued progress toward the 500 animal herd objective will require sustained harvest success.

During the same period, the Jackson Elk Herd has declined from nearly 13,000 to its objective of 11,000, but because the proportion of the JEH that winters on NER has increased dramatically (Fig. 6), this will make achieving the Phase I objective of 5,000 elk on feed and any future elk population reductions more difficult. Preliminary analysis suggests that the increasing proportion of the JEH wintering on NER has been associated with 1) Declines in elk use of native winter range and movements of elk from State feed-grounds in the Gros Ventre drainage to NER.and 2) increasing numbers of elk that summer immediately adjacent to NER (Cole and Foley et al. 2015).

Refuge-wide herbaceous forage production averaged 14,387 (SD = 4,125) tons during 1998–2013. In recent years irrigation of approximately 3,600 acres has increased refuge-wide forage production by approximately 10% compared to what would have been produced with

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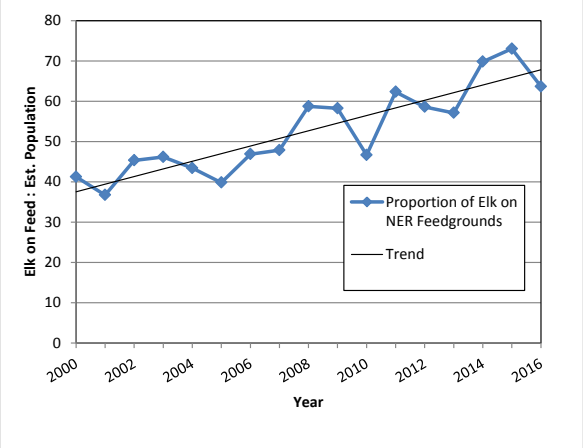


Figure 6. Increasing trend of National Elk Refuge elk on feed as a proportion of the Jackson Elk Herd estimated population size.

precipitation alone, and by 15% in the southern portion of NER which receives the greatest use by elk and bison.

Since 2007, the general awareness of climate change among the public has greatly increased. A strong, credible body of scientific evidence shows that climate change is occurring, is caused largely by human activities, and poses significant risks for a broad range of human and natural systems (National Academy of Science 2010). Ecological systems in the GYE are likely to be affected and associated changes may have implications for elk and bison management. Moderate term to long term effects of climate change in Jackson Hole will likely include increases in average temperature, a reduction in the duration and distribution of snow cover, an increase in the number of frost free days, increased wildfire frequency, and changes in plant community composition and structure including loss of forest and shrub cover and an increase in invasive plants (Riginos and Newcomb 2015). The net effect of these changes relative to the implementation of the MSP remains uncertain.

Current Management

Ongoing primary management actions on the NER include winter feeding, harvest, irrigation, and hazing. In GRTE, harvest of elk during the Elk Reduction Program takes place, when necessary, in collaboration with WGFD, and restoration of previously cultivated and irrigated sagebrush-grasslands is ongoing. Fundamental components of each of these will be briefly described below to provide a basis for comparison to MSP strategies that will follow.

Chronic Wasting Disease

Supplemental feeding has occurred in all but 9 winters on NER since 1912, and although this strategy minimizes winter elk mortality from starvation, contributes to Wyoming state elk herd objectives, eliminates commingling with livestock, and keep elk off adjacent roadways, elk occur at numbers and densities well in excess of carrying capacity (Smith et al. 2004, Lubow and Smith 2004). Considerable evidence suggests that Chronic Wasting Disease (CWD) transmission and prevalence are density dependent (Peters et al. 2000, Williams et al. 2002). Monello et al. (2014) found that elk densities of 15-110/km^2 (0.06 to 0.45/ac) in Rocky Mountain National Park were associated with 13% CWD prevalence, and they predicted elk population declines when CWD prevalence exceeded 13%. NER elk densities range from 77-16,850/km^2 (0.31-68/ac; NER unpublished data), which suggests that the introduction of CWD to NER elk would have significant negative population effects over time.

Winter Feeding

Initiation of feeding has the primary objectives of 1) minimizing elk winter mortality, focusing on calves since they are the most susceptible age class, and 2) minimizing comingling of elk with cattle on nearby adjacent private lands. Winter feeding begins when available forage reaches approximately 300 lbs/ac. Historic radio telemetry data and observations of elk movements indicate that when available forage declines below 300 lbs/ac., some elk leave NER for surrounding private lands. Therefore, the purpose of this feeding "trigger" is to keep elk on the NER and prevent them from searching for forage off the NER, which would increase the potential of comingling with cattle causing damage to private lands, and moving across

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Highway 89 where the risk of vehicles hitting elk is high. This trigger is not a warning that a significant nutritional deficit threshold has been reached. Available winter forage for elk and bison on the NER is largely determined by biomass of forage produced during the previous growing season, rate of forage consumption during fall and winter, and how snow conditions affect forage availability.

Index sites are used to sample forage biomass and determine when feeding should be initiated. These sites are selected annually to represent plant communities that are highly preferred by elk due to plant species composition and the persistence of green vegetation. Weekly sampling begins in late December to estimate available forage biomass at each index site. When average available forage across index sites is below 300 lbs/ac, biologists typically recommend that supplemental feeding be initiated.

During 1995–2013, the average initiation of winter feeding in NER occurred 28 January (range = 30 December–28 February), and feeding was terminated on 3 April (range = 20 March–20 April). Variation in feeding initiation and termination dates has been based on winter conditions and a desire to avoid elk-cattle comingling on nearby private lands. Coordination of winter feeding dates on the NER and WGFD-operated Gros Ventre drainage feedgrounds (Alkali, Patrol Cabin, and Fish Creek) occurs annually to help minimize movement of elk between these areas. This coordination will continue regardless of the management strategy employed. The relationship of recent elk numbers and objectives for NER and WGFD-operated feedgrounds and native range is shown in Table 2.

Bison discovered refuge feeding operations in 1980, and since that time they have been fed each year to help minimize disruption to elk feeding operations. Because bison displace elk from feedlines, NER staff attempt to feed most bison in the northernmost refuge feedground and provide a heavy feed ration, which helps keep them in this area. This strategy prevents bison from mingling with elk and also prevents bison from moving to areas where conflicts with humans are more likely.

Harvest

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Table 2. Annual distribution of wintering elk from the Jackson Elk Herd during February classification counts, 2011–2016, relative to the current objective.

	OBJECTIVE	2011	2012	2013	2014	2015	2016	mean
NER	5,000	7,746	7,360	6,285	8,296	8,390	7,290	7,561
Gros Ventre	3,500	2,775	3,265	2,982	2,326	1,162	1,667	2,362
Native Range[1]	2,500	982	894	1,784	801	913	1,711	1,180
Total	11,000	11,503	11,519	11,051	11,423	10,465	10,668	11,105

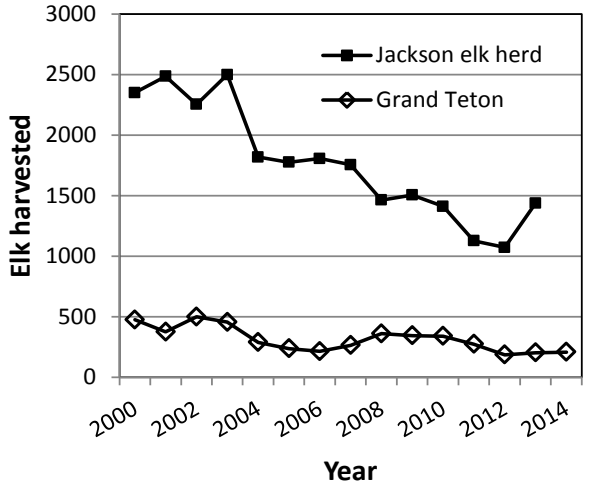


Figure 7. Estimated elk harvests for the Jackson Elk Herd and the amount of that harvest that occurs in Grand Teton National Park, 2000–2014.

Total hunter harvest of the JEH was gradually reduced over the last decade as the population neared objective (Fig. 7). Elk hunting on the NER (Hunt Area 77) typically begins in mid-October and ends in mid-December, with peak harvest in recent years occurring in late November to early December. From 2005 to 2015, 422 ± 102 (mean ± SD, range = 329-612) hunters harvested 196 ± 95 (range = 126-457) elk per year during the NER hunt.

The 1950 legislation that created GRTE provided for a controlled reduction of elk, when necessary, in specific portions of the park, primarily east of the Snake River. Elk reduction programs have taken place in the park each year since 1950 except two (1959 and 1960), when GRTE and WGFD officials agreed a reduction was not necessary (Figure 8). Season dates have varied over the years but recently have run from mid-October to early-December. The GRTE harvest accounts for about 25% of the JEH overall harvest, thus has been an important factor in regulating the population. Increased predation, likely a result of increases in grizzly bears and wolves over the last 20 years, has decreased the need for large harvests in GRTE.

Bison hunting begins 15 August and ends in early to mid-January. Most harvest occurs on the NER, with some additional harvest on private and BTNF lands. Since resuming the bison hunt in 2007, harvest has been 210 ± 45.5 (range 139-301) bison per year. This level of harvest has been sufficient to arrest the exponential growth of the population, reducing bison numbers from the peak in 2007 to about 700 animals in winter 2015 (Fig 3). Tribal bison harvest of up to 5 animals for ceremonial purposes was authorized in the BEMP. Translocation of wild bison to lands outside of Teton County is not currently permitted due to brucellosis concerns.

Bison hunting is not allowed in GRTE because of long standing NPS policy that prohibits most hunting in national parks. Bison quickly learned to take advantage of the safety of GRTE, which has made hunter harvest goals difficult to achieve. Many bison stay in GRTE during the hunting season, with only occasional short term movements to the NER, until severe winter conditions occur. In response, NER and WGFD managers have attempted to extend the hunt to late January while minimizing the conflict with the initiation of winter feeding. The unpredictable nature of winter conditions that time of year makes this challenging, and has (or could) result in the use of emergency season extensions or reductions.

Hazing

NER staff haze elk and bison to conserve winter forage, prevent year-round use of winter range, and in some cases to prevent elk and bison from moving to private lands or other areas where conflicts with humans are likely. Hazing using ATVs has proven most effective. The strategy is typically employed during 3 time periods: 1) in May to move elk and bison off NER that are lingering on NER winter range; 2) in July when some bison typically return to NER; and 3) in the period just prior to feeding initiation when elk and bison are most likely to leave NER for private lands. Hazing of elk and bison by WGFD staff also occurs on private lands adjacent to NER periodically throughout the year.

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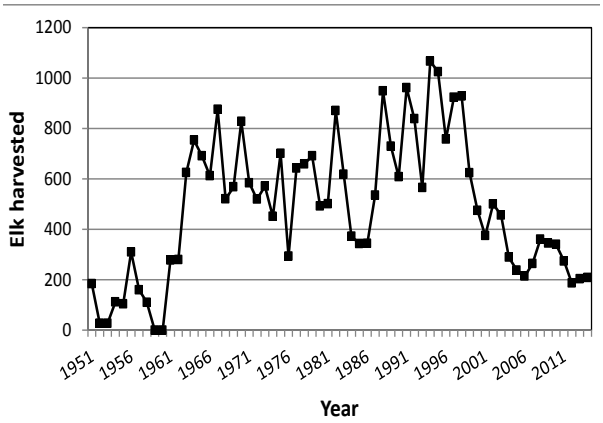


Figure 8. Elk harvest in Grand Teton National Park, 1950-2015.

Vegetation Restoration and Protection

The BEMP identified approximately 4,500 acres of previously irrigated and cultivated grasslands in GRTE in need of restoration to native sagebrush grasslands community. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. After 2 years of research and field studies, restoration efforts began in 2008. The restoration process involves several steps including: removal of non-native vegetation through repeated herbicide applications, collection and propagation of native grass, forb and shrub seeds and finally native seeding. Repeated herbicide treatments have been warranted prior to native seed planting as well as spot treatments of invasive weed species subsequent to native seeding. Substantial progress in this endeavor has been made since 2008, including 1,235 acres of previously cultivated lands under restoration treatment. Of the 1,235 acres undergoing treatment, 745 acres has been seeded with native grass, shrub, and select forb mixes, and 89 acres is considered fully restored. Two-hundred and seventy-five of these acres are currently fenced to reduce grazing pressure of early native vegetation establishment from bison and other ungulates. An additional 490 acres are targeted for native seeding in 2016 once removal of the invasive vegetation is successful. All treatments are monitored for native plant establishment and invasive plant infestations and treatments will be adjusted as necessary. Invasive plant treatments may have to continue indefinitely. GRTE will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Private Lands Mitigation

Fencing of hay stacks and livestock feedlines has been historically used to mitigate particularly difficult conflicts on private lands. Targeted fencing of golf course greens and sand traps fall through spring has also been successful in some situations for mitigating elk and bison presence and associated damage in these areas. It is important to note that the county has a "wildlife-friendly" fence policy and does not support extensive fencing that is impermeable to wildlife in residential areas.

Methods, Assumptions, and Constraints Common to All Strategies

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes, particularly population sizes. Measurements of the Jackson bison herd will be based on the annual mid-winter census and sex and age classification survey performed by NER, GRTE, and WGFD biologists. This survey occurs one day in February and includes ground counts of animals on feed at the NER and aerial counts of outlying bison across their winter ranges on the refuge, park, and Bridger-Teton National Forest.

Elk population estimates will also be based on mid-winter aerial and ground counts. However, the mid-winter counts are undertaken during a single survey period and do not necessarily represent either peak or cumulative abundance of elk on feed. Rather than basing progress toward the number of elk on feed for the entire season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in

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Table 3. Summary of potential Step Down Plan constraints.

Policy

- ESA[1] Lynx – limits on habitat impacts
- Greater Sage Grouse – core area protection
- 2007 BEMP/EIS (federal actions/lands)
  - No fertility control
  - No test and slaughter
  - Limited tribal ceremonial take
- Bison/elk hunt end date (Feb. 1st)
  - WGFD, brucellosis safety
- Carcass disposal (Feb. 15th)
  - WGFD, brucellosis safety
- Forest Service winter closure (Dec. 1st – April 30th)
- Easement limitation (NER boundary)

Winter Feeding

- Only during non-hunting periods

Harvest

- State regulations

Vegetation Restoration/Protection

- Bison/elk distribution
- Exotic plant species management

Private Lands

- Owner agreements

Social

- Hunter density (safety; hunt quality)
- Elk/bison winter mortality levels
- Public safety (ungulate/vehicle collisions)
- Disease
- Land-use conflicts (agricultural and residential)

Biological

- Disease (bison/elk/cattle commingling)
- Sage grouse habitat conflicts
- Fencing/wildlife conflicts
- Elk herd distribution
  - summer segment distribution goals

Funding

- Easement purchase
- Plan implementation

[1]Endangered Species Act

the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 elk were fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000.

We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both species on supplemental winter feeding.

Initial success of the MSP will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP does not provide specific measurement criteria to determine when the NER has successfully attained the objective of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage", we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. This level was chosen to define success because it indicates that elk and bison will predominately be foraging on free standing natural and cultivated plants on NER and adjacent winter ranges rather than on supplemental feed.

Several management constraints are common to the strategies discussed below (Table 3). Many law and policy constraints are applicable but we include here only those most pertinent. Endangered Species Act (16 USC 1531 et seq.) requirements for wolves, grizzly bears, lynx, and others apply. Lynx requirements for maintaining certain habitat types could limit methods used and areas considered for habitat improvements

in GRTE and the BTNF. Such improvements could increase elk and bison use of native winter range off the Refuge while simultaneously reducing use of feedlines. Similarly, compliance with the 2015 sage grouse amendment to the 1990 Bridger-Teton National Forest Land and Resource Management Plan and the Wyoming greater sage-grouse core area protection executive order (2011-5 and supplement 2013-3) could affect habitat manipulations. NEPA compliance conducted as part of the BEMP/EIS constrains what federal actions can be taken as a part of this plan. State regulations constrain late (winter) hunt and carcass disposal timing to protect against brucellosis contamination, since February-April represent the period bison and elk are most likely to transmit the disease. Restrictions on hunting timing also result from BTNF winter range closures, immediately east of the NER and elsewhere, December 1 to April 30. Additional details about these and other constraints will be included in discussions about specific strategies that follow.

Strategies

This section describes the management action this MSP proposes to implement. As such, it unveils the heart of management changes proposed to begin the process of transitioning to greater reliance of bison and elk on native forage during winter. Fundamentally, the strategies discussed in this plan represent an experiment designed to achieve Phase I objectives of 5,000 elk and 500 bison on NER and are a first step towards reducing reliance on supplemental feeding while meeting the sustainable population goals identified in the BEMP.

Initial strategies for achieving sustainable population goals identified in the BEMP (Table 1) are presented by the objectives below. The primary management actions available to the agencies to achieve Phase I objectives are modifications to winter feeding and hunting seasons. To a lesser extent, vegetation protection and restoration can be important, particularly for improving long-term ecological function and enhancing natural production of native forage. Private lands are also an integral component as changes in elk and bison distribution occur and new challenges develop. The likely consequences of implementing these strategies were evaluated in the BEMP. The most relevant of these are summarized in Appendix 1.

Objective: 1) *Implement a phased reduction of animals on NER feed to 5,000 elk and 500 bison, and, 2) influence elk and bison to rely predominantly on native habitat* (Table 1).

The first phase will be to reduce the number of elk on NER feed to approximately 5,000 and achieve a target population of about 500 bison. The second phase will be to adaptively manage bison and elk populations to achieve desired conditions, with animals relying predominately on available native habitat (NER, GRTE, and USFS lands) and cultivated forage (NER).

As previously mentioned, the concept of reducing winter feeding after more than 100 years of the practice, and the associated behavioral conditioning of elk and bison to its presence, represents a formidable challenge that must be approached cautiously and systematically. Efforts to scale back elk supplemental feeding operations in other parts of North America have been rare and fraught with controversy (Smith 2001). The strategies discussed below have been developed in this context, with appropriate feedback mechanisms through rigorous monitoring and frequent evaluation. Inability to meet this objective under the strategies presented here would trigger a thorough evaluation and consideration of more aggressive strategies when the BEMP is updated in 2022.

Chronic Wasting Disease

Since 1997, NER has cooperated with WGFD to conduct intensive surveillance for CWD in the JEH unit. GRTE has also collaborated with WGFD to collect samples from the ERP and from road-killed cervids. Although this effort indicates that CWD is not currently found in the JEH, continued surveillance at sample sizes sufficient to detect

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1% prevalence with 95% confidence annually will be critical to ensure a timely management response and limit the long-term population effects of the [USFWS and USNPS, 2007b]. Given that CWD has been detected within 40 miles of the JEH in moose, within 35 miles in deer, and within 175 miles in elk, this level of surveillance is warranted.

In 2016, the WGFD cooperated with federal agencies and other stakeholders to revise the 2006 Wyoming CWD Management Plan. The NER and USFWS Region 6 Wildlife Health Office staff participated in several meetings associated with this effort. The Wyoming CWD Plan lists several management responses for consideration if CWD be is detected on or adjacent to State or NER elk feedgrounds. Early detection of CWD in the JEH is essential to allow implementation of management responses.

The BEMP (2007) identifies the management response to the arrival of CWD as following the State of Wyoming CWD Plan in effect in 2007. The Wyoming CWD Plan was updated and significantly changed in 2016. In light of changes in the Wyoming State CWD Plan, and the results of CWD Studies completed since 2007, the NER management response to CWD will be reviewed and updated in a NER Disease Contingency Plan, as identified in the NER Comprehensive Conservation Plan (2016). The CWD section of the NER Disease Contingency Plan will remain consistent with the goals of the BEMP. The NER Disease Contingency Plan is scheduled to be completed in 2017.

Winter Feeding

Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the long run, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning animals to "expect" feed to be available later in the winter; this could build cohorts of animals that rely primarily on native winter range. To reduce supplemental feeding, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, which is the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding (Figure ?) and identify private land conflict areas that may require assistance with focused mitigation measures.

As bison and elk behavioral responses are better understood, and targeted mitigation on private lands is achieved as needed, feeding delays will be extended depending on several variables (Table 4, Fig. 9). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence on feeding initiation date, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Forage availability would also be affected by the numbers of elk and bison on the NER. And finally, the distribution of animals, particularly on private, livestock producing lands would be considered in determining feeding initiation date.
A primary concern of manipulating feeding is elk winter mortality, particularly among calves. For example, research on unfed elk populations in Yellowstone National Park suggested average winter elk calf mortality of 28%, with the majority of cases caused by malnutrition (Singer et al. 1997). Similarly Smith and Anderson (1998) found unfed winter elk calf mortality of 29% compared to 11% for elk calves using feedgrounds. As food becomes limited in winter, calves are usually the first to experience nutritional deficit and winter

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mortality because they are displaced by more dominant animals, they have limited fat reserves, and are more susceptible to cold temperatures than larger animals. Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years (Appendix 1).

In the early years of MSP implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date during the period of MSP implementation.

The MSP winter feeding strategy would include the establishment of additional key forage index sites and on-going measurements at those sites throughout the winter.

Harvest

Currently the JEH is at the Wyoming Game and Fish Commission established objective of 11,000 animals, which means there is less flexibility in manipulation of harvest regimes than there would be if the herd was above objective. Initially there would be little change in elk harvest programs on the NER, with the exception of allowing a limited number of any elk permits throughout the season, considering allowing bow hunting near developed areas (roads and buildings) and shifting the season about a week later (Table 4). Allowing a limited number of any elk permits would be consistent with providing sport hunting recreation on National Wildlife Refuges (NWRS Improvement Act; 1997) and the NER CCP [USFWS, 2015] and possibly encourage more hunters to participate in antlerless elk hunts. Monitoring programs and consideration of bull ratios in the GRTE summer segment (since most park bulls migrate to the NER) would help inform levels of proposed take. Bow hunting in areas currently closed to firearms will likely increase harvest by eliminating “no-hunt” areas which can become sanctuaries for large numbers of elk. Shifting the hunt one week later is consistent with later migrations and will improve harvest effectiveness (Fig. 9).

General elk harvest patterns in GRTE would continue to be based on need for harvest, summer segment population estimates, herd status relative to population objective, herd demographic parameters, herd-wide distribution of harvest, and mitigation for impacts on other resources and visitor activities.

Elk herd population objectives are reviewed every five years by the Wyoming Game and Fish Commission and adjusted as necessary. Agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. Lowering the population would help compensate for reduced use of traditional native winter range and increased growth of short-distance migrants which has led to significant increases of winter elk concentrations on the NER.

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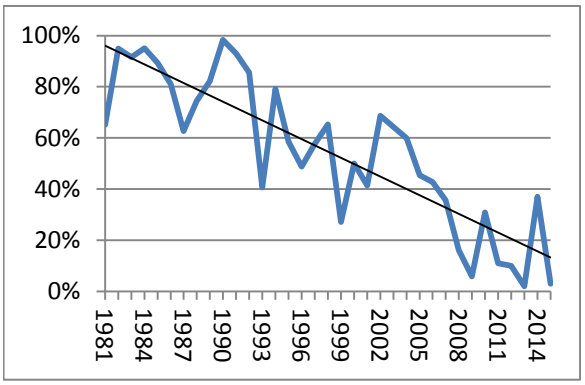


Figure 9. The percentage of elk that wintered on NER counted there on December 1, showing progressively later annual fall/winter arrival of elk to the NER during the past several decades.

The annual fall/winter arrival of elk to the NER during the past several decades has been occurring progressively later. This trend may necessitate extending the elk hunting season later into the year to achieve harvest objectives.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later end dates that are commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution. Special limited hunts designed to discourage bison from attempting to leave the NER via the south boundary into the town of Jackson will also be considered. If progress toward reaching the herd objective of 500 animals continues and the objective is reached, WGFD will adjust harvest quotas in the context of the objective, as necessary, to address population changes through time.

A cattle guard was installed on the Refuge Road near the east end of Broadway Avenue to help prevent bison and elk herds from entering the Town of Jackson. This will reduce the potential for dangerous human/wildlife interactions.

Currently, the effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives, but also that elk are sensitive to hunting pressure which can cause elk movements to areas that cause management issues for WGFD. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st in the future.

Annual herd-wide population estimates, elk summer herd segment estimates in GRTE and NER, temporal and spatial harvest patterns, and animal-fed-days would be monitored, and the resulting information would be used to inform ongoing evaluation of elk and bison management harvest programs (Figs. 9 and 10).

Hazing

No change in hazing practices is anticipated initially under this MSP framework.

Private Lands Mitigation

Delaying the onset of NER feeding is likely to result in changes in bison and elk distribution (Appendix 1). Some elk or bison may move to private lands in search of forage. Of greatest concern is the potential for elk or bison to commingle with cattle of cow/calf operations, where brucellosis transmission could have considerable consequences, such as requiring depopulation of the cattle herd.

Several strategies would be employed to mitigate potential problems (Table 4), including providing incentives for non-breeding cattle operations (because brucellosis transmission to slaughter-bound cattle is not economically important), increased fencing in some limited areas to separate elk/bison from livestock feed lines, haze elk/bison away from livestock feed lines and purchase private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal Wildlife Conflict Technician positions which are supervised by the

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WGFD. These Technicians are also critical to the success of an expanded monitoring program vital to the MSP (see Monitoring section below).

Vegetation Restoration/Protection

The varied approaches to restore the Kelly

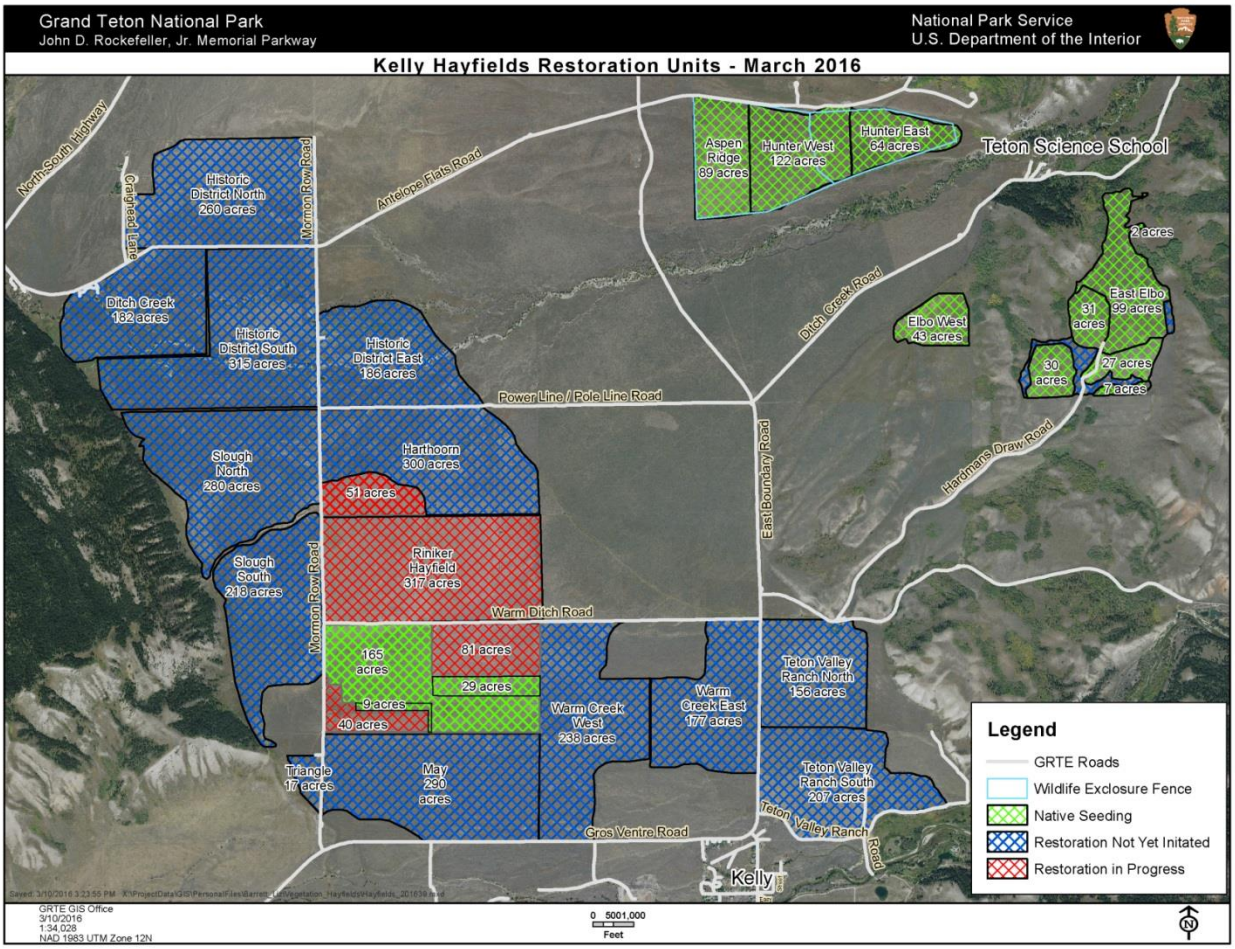


Figure 9. Units and status for the Kelly Hayfields ecological restoration effort in Grand Teton National Park, March 2016.

A database will be established to track non-agricultural conflicts on private lands to determine trends which will help evaluate the effectiveness of MSP mitigation efforts.

Preventing elk and especially bison from entering the Town of Jackson is essential in maximizing publicsafety and minimizing private property conflicts. Currently, bison are hazed northward when they drift south of Miller Butte. A cattle guard was installed on the Refuge Road just north of Broadway Avenue. This barrier is designed to prevent elk/bison from entering the Town of Jackson.

Hayfields in GRTE (4,500 acres) was initiated in 2008 following 2 years of research and field studies (Moeny 2008). The approach to ecological restoration includes serial treatments to 1) remove non-native species (e.g., herbicide application and prescribed burning); 2) seed native shrub, grass, and forb species; and 3) treat subsequent invasive plants by applying herbicides and, where appropriate, construct temporary fences to protect recently seeded pastures from colonization of non-native species and damage from large herbivores during early phases of restoration.

Of the 4,500 acres targeted for ecological

restoration in the Kelly Hayfields of GRTE, 1,235 acres within 7 pasture units are currently under restoration treatment and 3,265 acres remain non-native grass pasture (as of 2016; Figure 9). The non-native grass pastures are divided into 13 pasture treatment areas and are projected to be likely restored by 2035. As of 2016, approximately 745 acres are seeded with native vegetation, and 89 acres are considered fully restored. Maintenance of restored ecological conditions, however, will likely require management efforts in perpetuity to keep non-native species from colonizing restored areas. All 1,235 acres that are underway toward ecological restoration are being monitored for native plant establishment, invasive plant infestations, including cheatgrass spread. Park staff will continue to monitor and adaptively adjust treatments and restoration strategies according to our results.

Objective: *Maintain bull-to-cow ratios in park summer herd* (Table 1).

National Park Service management policy (NPS 2006) provides guidance for maintaining naturally regulated wildlife populations, free from the impacts of humans, to the greatest extent possible. The final BEMP identified a goal of maintaining park elk bull:cow ratios (a common way of expressing sex and age ratios in wild ungulate populations) near 35 adult bulls per 100 adult cows, based on estimates of what this ratio would be in a herd free from the effects of human harvest. The sex and age ratios of most North American elk populations are affected by sport hunting and herd managers generally maintain lower bull ratios.

Harvest

Based on summer bull ratios for elk in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded refuge hunting opportunities are considered.

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Table 4. Comparison of current and primary MSP components and parameters.

Action	Current Management	Management	Comment
Winter Feeding:			
Feed	Pelleted alfalfa	Pelleted alfalfa	No change
Ration	Full ration average: 8-12 lbs/day/elk	No Change	No change, to minimize calf mortality. Note average daily ration over the entire feed season is lower than a full ration because feed rate is gradually increased at the beginning of the feed season and gradually reduced at the end to facilitate rumen acclimation
	20-22 lbs/day/bison	20 lbs/day/bison	
Start criteria:			
Available standing forage	300 lbs/acre, as measured at traditional key index sites	Generally later; index sites to be increased in number and distribution	Influencing factors: -time of season -forage availability -number of elk/bison on NER -elk/bison distribution
End criteria:			
Available forage	Based on a snow cover index and subjective estimate of when residual or new forage is adequate	Generally 1 week earlier than current management	Ongoing development of more objective criteria for future implementation ongoing
Monitoring:			
Animals on feed	Mid-winter census	Elk/bison fed days[1]	
Proportion of JEH on NER	Mid-winter census	Mid-winter census	
feed			
Calf mortality	2008-2015 Average: 3.3% (range 1.1-9.0%)	Potentially higher than current levels but less than native winter range	
Elk/bison distribution – collars	Almost no documented use of private lands during feeding operations	Unknown, but likely higher use of private lands than current management	
Elk Winter mortality (all age classes)	2008-2015 Average:	<=3%	
	1.2% (range 0.6-1.9%)		

Table 4. Comparison of current and primary MSP components and parameters.

Action	Current Management	Management	Comment
Elk summer range segment Proportions for NER wintering elk	Approximately -40% GTNP North of Moose -35% South Snake River -10% Gros Ventre/Flat Creek -10% Teton Wilderness -5% Southern Yellowstone	Unknown, but will be monitored based on summer distribution of radio collared elk	Based on summer distribution of elk that were randomly radio collared on NER.
Harvest, National Elk Refuge elk:			
Frequency	Annual	Annual	
Begin Date	2nd week October	No Change	Modified as necessary
End Date	3nd week December	No Change	Modified as necessary
Structure	- 1 week initial drawing	- 1 week initial drawing	
	- 1 week left over 1st served	- 1 week left over 1st served	
	- partial week alternate	- partial week alternate	
	-daily 1st served alternates	- daily 1st served alternates	
Refuge permit types	- 1st week any elk	- Primarily antlerless only	
	- Antlerless only remainder of season	- limited any elk permits throughout season	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries		Consider expanding to allow bow hunting near developed areas	
Harvest, National Elk Refuge bison:			
Frequency	Annual	Annual	
Begin date	August 15th	August 15th	Modified as necessary
End date	2nd or 3rd week January	Consider later dates as appropriate	Modified as necessary
Hunting Season Structure	As per WGFD	As per WGFD	
Refuge permit types	Any bison or cow/calf per state license	Any bison or cow/calf per state license	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries	Limited to north of Nowlin Creek area	Consider escorted hunting in South Unit as needed	Guided hunts in South Unit when authorized
Harvest, Grand Teton NP elk:			
Frequency	As needed	As needed	
Begin Date	3rd week October	3rd week October	Modified as necessary
End Date	2nd week December	2nd week December	Modified as necessary
License types	Antlerless only	Antlerless only[2]	
Special regulations:	Cartridge limits	Cartridge limits	

Table 4. Comparison of current and primary MSP components and parameters.

Action	Current Management	Management	Comment
	Bear spray required	Bear spray required	
	Hunter safety card required	Hunter safety card required	
Harvest, Bridger-Teton NF, Elk Hunt Area 80:			
Begin Date			
End Date		15-Dec	Would require change in winter closure dates
Harvest, Elk Hunt Area 78			
Structure			Changes at discretion of WGFD
License Types			
Private Lands Mitigation:			
Cattle commingling		Incentives for non-breeding operation	
Hay depredation		Increased fencing	
Landscape damage			
Easement acquisition			
Vegetation Restoration/ Protection: Elk Refuge			
Vegetation Restoration/ Protection: Grand Teton	Herbicide treatments, prescribed burning, native seed propagation and planting, and protection and maintenance of restored pastures	Same as Current Management for remaining non-native grasslands in Kelly Hayfields	

[1]Number elk and bison on feed per day, totaled by feeding season.

[2]Any elk licenses could be offered if bull ratios in the park consistently exceed BEMP criteria.

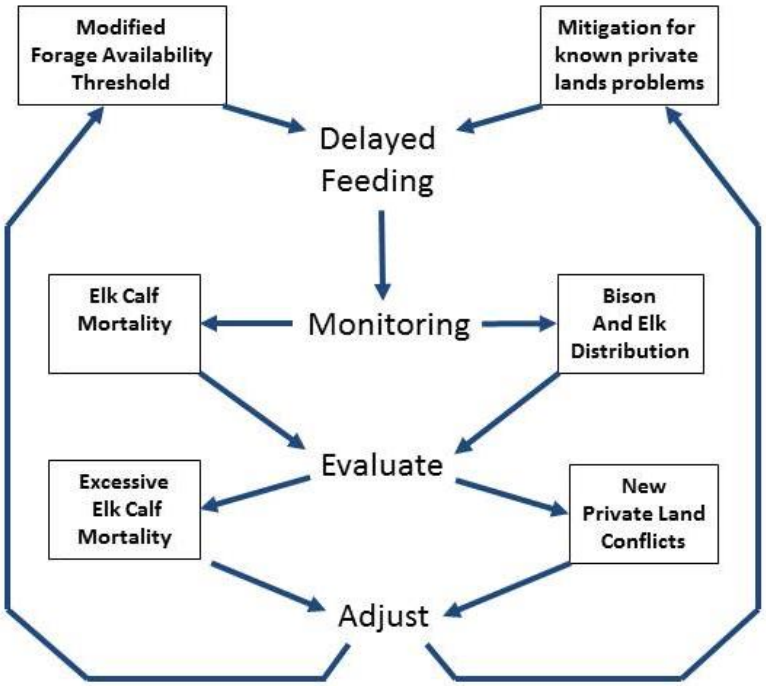


Figure 10. Framework for delayed feeding strategy under MSP.

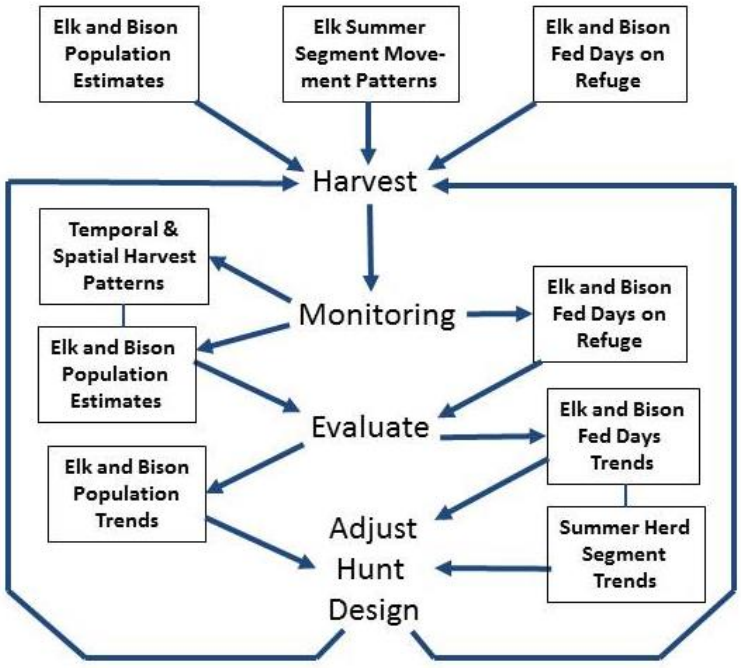


Figure 11. Framework for harvest strategy under MSP.

Strategies Considered But Rejected

The BEMP considered several additional strategies for elk and bison management that, for a variety of reasons, were not selected for implementation in the preferred alternative and Record of Decision. The agencies reconsidered a subset of these during the development of this MSP (Table 5). Since they were not part of the ROD, additional NEPA compliance would be necessary to incorporate any of them into this MSP, and thus they are not being considered at this time.

Table 5. Strategies considered but rejected.

Strategy Considered	Reason Rejected
Fertility control in elk	Judged not reasonable or feasible in BEMP, primarily due to major technical, social, and financial hurdles[1]. For MSP discussed primarily with regard to the difficult to harvest herd segment in Hunt Area 78 on private lands, where federal agencies have no jurisdiction.
Fertility control in bison	Impacts discussed at length in BEMP[2]. Not considered for MSP because current hunting programs appear effective at slowly moving the herd toward the 500 animal herd objective.
Agency reduction of bison or elk	Not considered necessary or desirable on federal lands because current hunting programs that utilize sport hunters are effective at meeting herd objectives.
Altering rations of supplemental feed	Rejected as a strategy because reducing daily feed ration below 8 lbs/elk would be enough feed to encourage elk to remain on NER but would result in unacceptably high elk calf mortality rates.
Private Lands Hunting Coordinator	The WGFD contacted private landowners and ranchers in the Spring Gulch area and discussed this concept to enhance elk harvest of short distance migrants. Generally, landowner interest was low.

MODELS OF SYSTEM DYNAMICS

Models provide a simplified representation of the biological system being managed. We will use modeling to quantify the effects of our management actions on 2 key responses of interest, elk distribution and winter elk calf mortality. There are a suite of possible factors that affect the proportion of elk on NER feedgrounds versus native winter range. Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

An increase in calf elk winter mortality is a potential result of reduced feed season length. Several factors influence winter calf elk survival on NER (Fig. 13). Models will be used to assess the effects of available forage on winter calf elk survival (Appendix 4). Over time this will allow us to assess the effects of our principal management strategy (reducing feed season length) relative to winter elk calf survival.

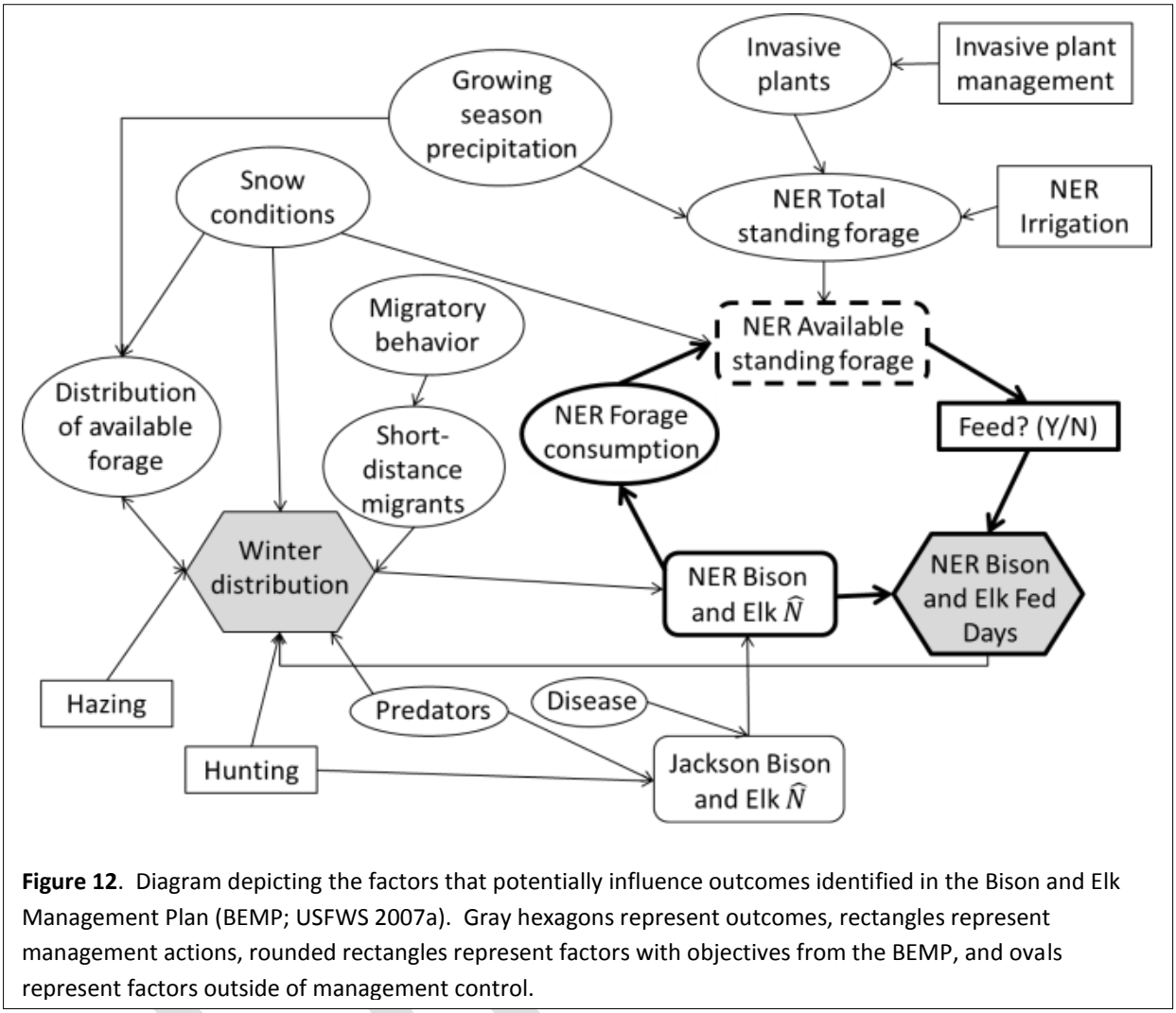


Figure 12. Diagram depicting the factors that potentially influence outcomes identified in the Bison and Elk Management Plan (BEMP; USFWS 2007a). Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

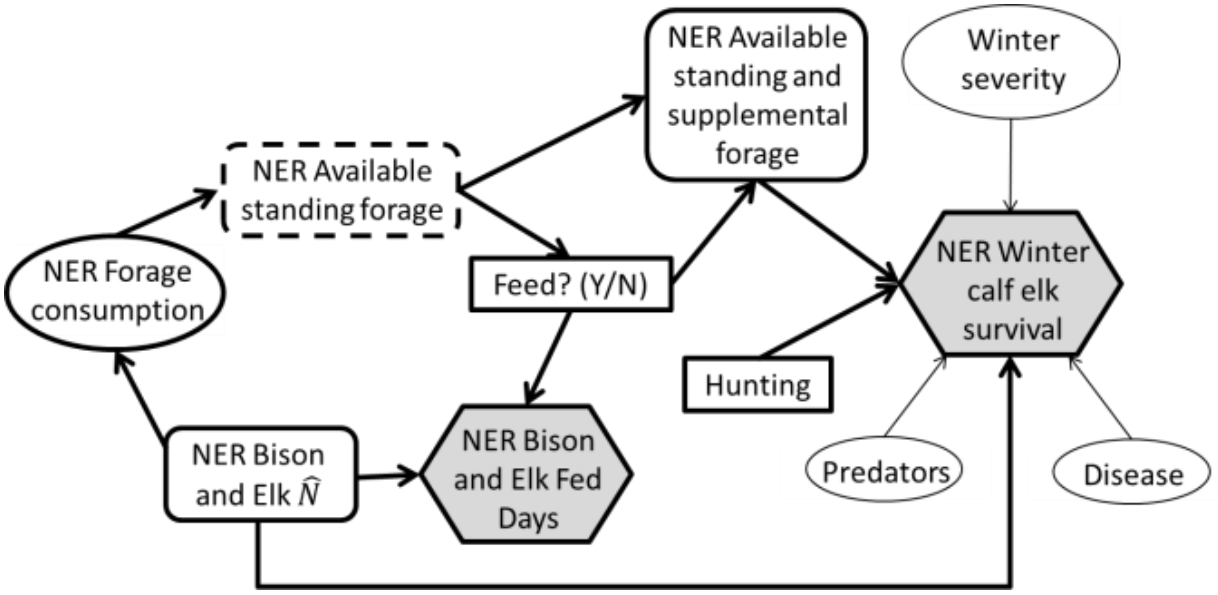


Figure 13. Diagram depicting the factors that potentially influence bison and elk fed days on the National Elk Refuge and winter calf elk survival. Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

MONITORING

Feeding Initiation Monitoring

NER uses weekly field estimates of the amount of forage available to elk to determine feeding initiation date. Currently measurements are taken at key index sites representing areas preferred by elk on NER (see supplemental materials at end of this section). These methods will be enhanced by 1) increasing the number of sampled sites to better represent the total amount of forage available to elk on the southern half of NER; 2) increasing the precision of estimates at each site by increasing the number of observers; and 3) extending the monitoring period later in the winter to assess the relationship between available forage and elk and bison distribution.

To better represent the total amount of forage available on the southern half of NER, a subsample of current key index sites will be retained to facilitate comparison with historic data, but additional random sample sites stratified by elk habitat preference will be added. Historic elk distribution mapping and elk GPS collar data (NER unpublished data) suggest that the areas most preferred by elk on southern NER are associated with moderate to high forage production and green vegetation. Because the distribution of forage production and greenness characteristics vary annually based on irrigation and precipitation patterns, we will annually map areas preferred and not preferred by elk and sample sites will be randomly selected within each of these mapped categories. At least 3 historic key index sites, 3 random sites in areas preferred by elk, and 3 sites in areas not preferred by elk will be sampled each week from late December through the initiation of supplemental feeding.

Currently the NER biologist is the only person trained in the techniques used to estimate available forage (see supplemental materials). At least 2 additional personnel will be trained in these techniques. This will provide a backup in the event of future personnel changes and will facilitate error estimates of the available forage measurements at each site.

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Currently NER and WYGFD biologists monitor available forage conditions at least weekly from late December until average available forage at key index sites nears the threshold level of 300 lbs. per acre and feeding is initiated. The principal MSP strategy is to delay the initiation of supplemental feeding after average forage production reaches the 300 lbs/ac level at key index sites. Therefore the monitoring period will be extended to include this period of delayed feeding.

Proportion of Elk Wintering on NER

A principal MSP goal is to reduce the number of elk wintering on NER. Our strategy will be to effect redistribution of elk to native winter range from NER over time via shortening the duration of the feed season, and thus slowly conditioning elk to seek food elsewhere. As feeding periods are shortened, the probability of younger elk age classes discovering NER feedgrounds will be reduced, and, hypothetically, that proportion of the JEH that utilizes NER feedgrounds will decline over time. We will measure this effect by examining changes in the winter distribution of the JEH. WGFD annual trend/classification count data provide a multi-year baseline data set to measure changes in the winter distribution of the JEH and categorizes observations by location. In each year, we will calculate the proportion of total classified elk in the JEH that are classified on NER feedgrounds. We will compare the 3-year running average post MSP implementation to the pre-implementation baseline. The pretreatment baseline will be comprised of data from 2008 2016, a time period that represents BEMP implementation prior to MSP actions (Figure 13).

Elk Fed Days and Bison Fed Days

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. We further assume the variables elk-fed-days (EFD) and bison-fed-days (BFD) are a proxy for these conditions. EFD and BFD will be calculated annually for each species based on the following formulas:

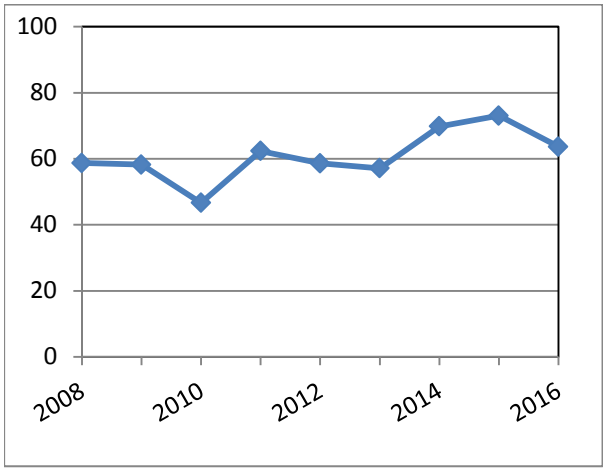


Figure 14. Proportion of the Jackson Elk Herd that was classified on NER feedgrounds in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

EFD= ∑ Total elk counted on feed during daily feedground counts for duration of feed season

BFD= ∑ Total bison counted on feed during daily feedground counts for duration of feed season

Because EFD and BFD are influenced by feed season length and the number of animals on feed, the MSP strategy of delaying the initiation of supplemental feeding will inherently reduce the number of EFD and BFD through a reduction in average feed season length. We believe that EFD will be further reduced by encouraging a greater proportion of the JEH to winter on native winter range, thereby reducing the number of elk occupying NER feedgrounds. We will evaluate changes in EFD and BFD by comparing the 3-year running average post MSP implementation compared to mean EFD and BFD from 2008–2015. The running average is an appropriate comparison because it will help

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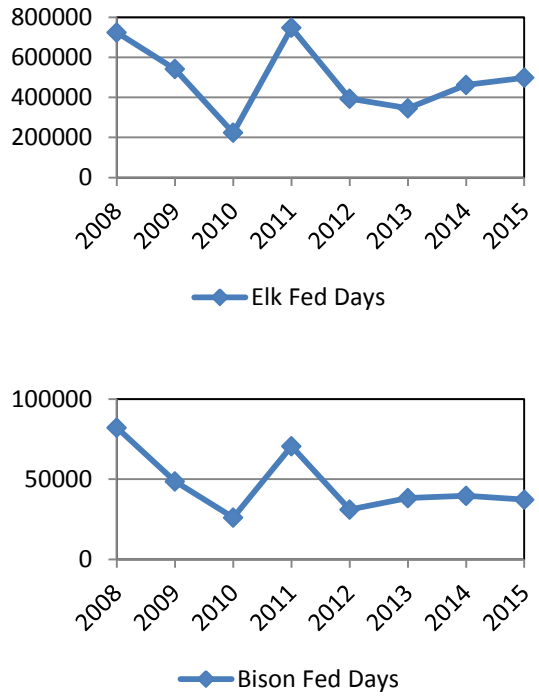


Figure 15. Elk Fed Days (EFD) and Bison Fed Days (BFD) in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the Management Step Down Plan (2008-2015). These values represent the pretreatment baseline which will be compared to the 3-year running average EFD and BFD post MSP implementation.

account for wide annual variation in EFD and BFD associated with winter severity (Figure 15)

Elk Winter Mortality Monitoring

NER has used consistent methods to monitor winter elk mortality since 1982. Each winter NER biologists and other refuge staff conduct a survey of all non-hunting related winter elk mortalities that occur on NER from November through April. Mortalities are tallied by age/sex class and percent mortality is calculated using the corresponding number of elk classified on NER feedgrounds as the denominator. We will continue to monitor elk winter mortality using the same methods post-MSP implementation, which will allow trend comparisons to the pre MSP baseline (Figure 15). Under the MSP framework, we believe the 3-year running averages for total and calf winter elk mortality will be within the range of variation exhibited by the pre MSP baseline. Historic monitoring suggests that calf and total mortality are sensitive to winter severity and disease outbreaks, and that winter mortality occasionally exceeds >3% total mortality and >10% calf mortality. Post-MSP mortality in excess of these levels may warrant shortening the feeding initiation delay in subsequent years.

Elk Collaring

One of the MSP's principal strategies is to shorten the length of the feed season to encourage elk use of native winter range, but we anticipate that this strategy will also result in an increase in elk conflicts on surrounding private land in the town of Jackson and the Spring Gulch areas, potentially including large groups of elk. To quantify this effect and provide real-time information to WGFD and NER managers to facilitate a response, we propose maintaining a sample of 50 GPS-collared elk that winter on NER throughout the MSP implementation period. Forty-five elk represents approximately 0.5% (1 in 200) of the NER winter elk population. This sample size will not be sufficient to detect all elk movements from NER to surrounding private lands, particularly movements by small groups of mature bull elk, but it will be sufficient to detect and quantify significant movements of cow/calf/yearling elk groups compared to pre-MSP baseline data.

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NER has elk GPS-collar data available from the 2008-2013, which represents the post-BEMP, pre-MSP baseline period. We hypothesize that elk movements from NER to surrounding private lands will increase during the MSP implementation period compared to the pre-treatment baseline. This will be tested by comparing the number of incidents that elk left NER for surrounding private lands (per elk/per year), and the proportion of elk GPS fixes on NER versus private lands during time periods of interest. The principal time period of interest is late December–March because this represents the period after the NER elk hunting season, and prior to, and during, NER feeding operations. This is the season when changes to the NER feeding program would be most likely to result in elk distribution changes.

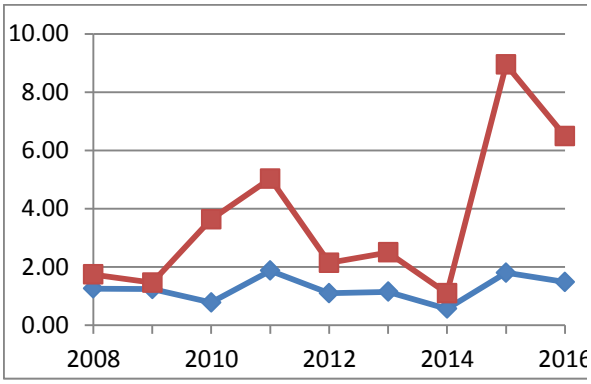


Figure 16. Total (blue) and calf (red) elk winter mortality (%) on NER in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

Thirty adult cow elk were captured on NER feedgrounds in February 2016 and Telonics Iridium GPS collars were deployed with a 90 minute fix interval. Collars will be deployed on up to 50 additional adult cow elk in February-March 2017. Given 83% annual survival for adult cow elk in the JEH (Cole and Foley et al. 2015) and 3-year collar life, approximately 10 additional elk will need to be collared each year in winter 2018 and 2019 to maintain the 50 elk desired sample size over the life of the MSP implementation period.

Ancillary data that will be collected and analyzed during the elk capture and collar data analysis process includes brucellosis seroprevalence, pregnancy rate, and elk summer range determination for comparison to the findings of Cole and Foley et al. (2015).

Disease

The primary purpose of limiting reliance on supplemental feeding is to reduce the prevalence of endemic elk and bison diseases and mitigate transmission risk associated with the introduction of novel diseases. We hypothesize that brucellosis seroprevalence will decline post MSP implementation. There are no recent brucellosis seroprevalence data for elk on the NER, but >50 elk will be captured during elk collaring operations in winter 2016, and each elk will be tested for brucellosis exposure. The 2016 Brucellosis seroprevalence rate will be the pre-treatment baseline to evaluate post MSP change. Chronic wasting disease (CWD) has been monitored in the JEH since 1997, and since 2008 it has been monitored with sufficient sample size to detect 1% prevalence with 95% confidence. No CWD positive cases have been detected in the JEH, which given the long term persistence of the disease, provides overwhelming evidence that CWD is not currently endemic to the JEH. However, most evidence suggests that the distribution of CWD is increasing and that its introduction to the JEH is inevitable. Early detection is critical to ensure a management response, and therefore ongoing monitoring at sample sizes sufficient to detect 1% CWD prevalence with 95% confidence is necessary. CWD is sampled by testing tissues collected primarily from hunter harvested elk, and past experience suggests that 2 full time technicians working from September-December are necessary to ensure minimum sample size. Typical costs associated with 2 technicians are $32,000 per year.

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Data Collected for Modeling

Table 6. Variables to be used in models to explain elk winter distribution in the Jackson Elk Herd and elk calf mortality on NER.

VARIABLE	SOURCE	Elk Winter Distribution Model	Elk Calf Mortality Model
Proportion Jackson Elk Herd on NER Feedgrounds	WGFD/NER Jackson Elk Herd February Classification Count	Yes	No
Proportion Jackson Elk Herd from South Snake River summer segment	Determined from elk GPS collar data for elk captured on NER	Yes	No
Number of wolf packs in the Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated total wolf numbers in Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated number of wolves using NER in winter	NER observations	Yes	Yes
Total NER herbaceous forage biomass	NER forage production survey data	Yes	Yes
Snow Water Equivalent	NOAA snowtell site data	Yes	Yes
NER Winter elk Mortality (calf)	NER winter elk mortality survey	No	Yes
Snow Depth	NOAA Snowtell sites and NER measurements	Yes	Yes
Available Forage	NER and GTNP monitoring in winter months	Yes	Yes
NER Elk and Bison Fed Days	NER feeding records and daily feedground estimates of elk and bison	Yes	Yes
NER Feeding Start Date	NER feeding records	Yes	Yes
Gros Ventre Feeding Start date	WGFD feeding records	Yes	No
Elk Hunting Pressure by Hunt Area	Estimated number of hunter days from WGFD completion reports	Yes	Yes

To facilitate modeling, we will collect data on the following associated variables (Table 6). The table lists variables and how they relate to our efforts to use modeling to explain changes in elk distribution and elk calf mortality relative to our principal action of reducing feed season length.

EVALUATION/FUTURE MANAGEMENT

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Consequently, we anticipate that the strategies outlined in this plan will be in place for a minimum of 5 years, after which an initial evaluation of the program will be made. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented at an annual management MSP update/report, completed by NER staff by the end of March for the previous year.

Consistent with objectives outlined in the BEMP, the long-term goal of this plan is reduce the reliance of bison and elk on intensive supplemental feeding, using adaptive management principles through a structured framework of management actions, to achieve a desired condition of animals relying predominately on native habitat on NER, GRTE, and USFS lands, and on NER cultivated forage. But because there is no precedent for what this plan proposes, there are few responses to proposed management actions that can be predicted to a degree of certainty commensurate with establishing definable thresholds or other objective criteria for success in the short term.

Factors that will be considered in evaluating the success of the program will include the trend of EFD and BFD, type and frequency of private lands conflicts, the proportion of the JEH wintering on the NER, presence or absence of CWD and other infectious diseases, elk and bison population size and distribution, elk calf winter mortality, and public support. These are complex, dynamic, and interwoven components that, together with the MSP, make up the framework for decreasing reliance on supplemental feeding. As such, the effects of changing biological, social, and political conditions on these components will be part of the evaluation process.

In the context of this larger framework, however, we believe evaluation of the trend in EFD and BFD will be most important after the first 5 years of MSP implementation. The direction and magnitude of the trend observed will provide a preliminary basis for evaluation and decisions about continued management actions. Initial success with reduced feeding will be associated with a declining trend in EFD and BFD, with greater magnitudes indicating higher degrees of success. However, determinations of overall program success will necessarily include evaluation of all system components. For example, gains in reduced feeding come could be accompanied by an increase in private land conflicts, which would affect overall success determinations. While the overriding strategy will be to decrease feeding as aggressively as possible while gauging effects on other system components, overall measures of program success through time will necessarily involve evaluating a matrix of effects. These evaluations will be included in annual MSP reports.

As proposed and new management strategies are implemented and evaluated under this plan, at some point in the future it may become apparent that meeting reduced feeding goals will not possible without reducing elk and/or bison population objectives. Population objectives for both herds are set by Wyoming Game and Fish Commission and are evaluated regularly by WGFD personnel, including public review through annual season setting meetings. The BEMP supported the State herd objectives of 500 bison and 11,000 elk, and thus due to NEPA requirements any further consideration of reduced herd sizes by the NER or GRTE are beyond the scope of this plan. However, Wyoming Game and Fish Commission changes to Jackson bison or elk herd objectives are not constrained by the BEMP.

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Investigating the potential effects of climate change on elk and bison management will also be important in the long-term. During implementation of this plan, we will collect a variety of data that could be drawn upon for this purpose.

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PUBLIC OUTREACH AND EDUCATION

The practice of winter feeding is inexorably woven into the historic fabric of Jackson Hole. Elk are identified with the rich and unique legacy for which Jackson Hole is known around the world. De-emphasizing the supplemental feeding program will be a major paradigm shift for the residents of Jackson Hole, Teton County, and the State of Wyoming.

An effective Public Outreach and Education program is essential for effective MSP implementation. The practice of feeding elk evokes passionate responses from those that oppose and those that support this practice. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk/bison herd management methods.

A detailed communication plan to guide outreach and education efforts can be found in Appendix 3.

SCHEDULE

Table 7. Proposed implementation schedule for the MSP.

Action	Date
Public outreach and education	November 2016
Initiate private lands conflicts mitigation contacts/actions	January, 2017
Implement enhanced forage monitoring	January, 2017
Initiate changes in supplemental feeding protocol	January/February 2017
GPS Collar 30-40 elk (Iridium platform)	March 2017
Monitoring/Evaluation/Annual Report	June 2017

BUDGET

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
National Elk Refuge:					
Monitoring:					
Seasonal Biological Technician (0.5 FTE, GS-7)	$24,000	$25,000	$26,000	$27,000	$28,000
Bison/elk fed days					
Mid-winter census					
Elk summer herd segment distribution[1]					
Expanded standing forage estimates[1]					
Chronic Wasting Disease, 2 seasonal bio.-techs	$32,000	$32,000	$32,000	$32,000	$32,000
Winter bison/elk distribution					
Irrigation					
50 Elk radio telemetry collars; Iridium Platform	$115,000	$25,000	$25,000	$25,000	$25,000
Bison barrier maintenance at NER south entrance	$500	$500	$500	$500	$500
Step Down Management Plan annual reporting	$2,000	$2,000	$2,000	$2,000	$2,000
Private lands:					
Easements / Leases (Private Foundations)	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000
Conflict mitigation technicians (WGFD)	$91,000	$91,000	$91,000	$91,000	$91,000
Hazing (helicopter)	$6,000	$6,000	$6,000	$6,000	$6,000
Vegetation restoration/protection[1]					
Public Outreach and Education	$11,000	$1,000	$1,000	$1,000	$1,000
Subtotal					
Grand Teton National Park:					
Monitoring:					
Summer elk classification/distribution	$10,000	$11,000	$12,000	$13,000	$14,000
Collaborative elk monitoring (GRTE portion)	$5,000	$5,000	$5,000	$5,000	$5,000
Vegetation Restoration/Protection					
Monitoring	$16,000	$16,000	$18,000	$18,000	$12,000
Temporary bison fencing	$24,000				
Temporary fence maintenance	$6,000	$8,000	$8,000	$4,000	
Hayfields restoration	$84,000	$70,000	$70,000	$31,000	
Exotic plant mitigation	$50,000	$52,000	$46,000	$32,000	$16,000
Elk Reduction Program (subject to annual review)					
Hunter harvest evaluation	$1,500	$1,500	$1,500	$1,500	$1,500
Harvest age distribution	$2,000	$2,000	$2,000	$2,000	$2,000
CWD monitoring (0.15 FTE, GS-6)	$7,000	$7,000	$7,000	$7,000	$7,000
Law Enforcement and Visitor Protection (0.15 FTE for 20 LE and support staff; supplies, and permitting)[3]	Unknown				

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year				
	1	2	3	4	5
Subtotal					
Wyoming Game and Fish Department:[2]					
Subtotal					
Grand Total					

[1]See detail in Appendix

[2] Dependent on size of elk reduction program; current annual expenditures are approx. $295,000 for 0.15 FTE for 20 LE and support staff; supplies, and permitting.

[3]Through Interagency Agreement

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APPENDIX ?? Frequently Asked Questions

Q1: Why is the MSP vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?

A1: This is the first time that the strategy of delaying feed season initiation has been employed to reduce reliance on supplemental feeding. There is uncertainty regarding the effects of this strategy on elk and bison distribution and elk winter mortality, and therefore it is important to maintain flexibility in plan implementation to avoid significant unintended negative consequences. Unintended negative consequences the MSP seeks to avoid include 1) elk or bison moving to areas where they damage property, risk human safety, or commingle with livestock, and 2) elk winter mortality levels significantly higher than baseline levels.

Q2: Why were reductions to the Jackson Elk Herd and Jackson Bison Herd population objectives not considered as a strategy to reduce reliance on supplemental feeding?

A2: The BEMP has clear population objectives of 5,000 elk wintering on NER and 500 wintering bison. Modifying those population objectives would require additional NEPA analysis. The BEMP also agreed to support State elk herd objectives. The WGFD completed a public process in 2016 to set the population objective for the overall Jackson Elk Herd, and that objective remains unchanged at 11,000 elk.

Q3: The BEMP has an objective of 5,000 elk wintering on NER. Why has that objective not been achieved through increased elk harvest?

A3: The overall Jackson Elk Herd population has declined and is currently close to the 11,000 elk objective, but the number of elk wintering on NER has been well above the 5,000 elk objective since implementation of the BEMP in 2007 (Mean =7,100 elk). When the analysis was conducted for the BEMP, elk winter distribution data suggested that 5,000 elk could winter on NER while still maintaining 11,000 elk in the Jackson Elk Herd overall. However, the proportion of the Jackson Elk Herd that winters on NER has increased significantly over time, and based on current elk distribution it is no longer possible to winter 5,000 elk on NER and maintain 11,000 elk in the overall Jackson Elk Herd. Although increasing elk harvest above current levels would likely allow us to achieve the 5,000 elk objective for NER, it would also reduce the overall Jackson Elk Herd population below the 11,000 objective. If increasing elk harvest in not plausible, the only other option to meet the 5,000 elk objective on NER is to change winter elk distribution, which is the principal strategy of the MSP.

Q4: Why is your principal strategy to delay the start of the feed season?

A4: By delaying the start of the supplemental feed season we decrease the probability that elk that use native winter range or state feed grounds will discover NER feed grounds. Because elk use of feed grounds is a learned behavior, over time this could increase the proportion of elk that winter on native winter range, reduce the number of elk that move from the Gros Ventre drainage to NER, and decrease the NER wintering elk population. The resulting shift in elk distribution would allow us to achieve the

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5,000 elk objective for NER. Because 5,000 elk and 500 bison is close to the estimated carrying capacity of NER habitat, less feeding will be necessary at these population levels.

Q5: Will delaying the start of the feed season result in elk starvation?

A5: Our goal is to delay elk feeding a sufficient amount of time to affect elk distribution without causing an increase in elk mortality.

APPENDIX 1. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007).

Populations

- Jackson elk herd objective of 11,000 would be maintained.
- New Jackson bison herd objective of 500 established.

Winter Feeding

- Supplemental feeding could be delayed or could occur earlier compared to current practices.
- Changes [to feeding program could] include alterations in the timing of feeding and providing supplemental feed in fewer years.
- Ration or pellet composition might need to be changed.
- Supplemental feeding would be initiated according to established criteria, including pre-winter forage production, assessments of forage utilization (done jointly by WGFD and NER personnel), elk condition and movements, and potentially on the January 1 index of winter severity calculations for elk (Farnes, Heydon, and Hansen 1999).
- Mechanical means could be used to increase forage access for elk after snow crusting events.
- Changes in the refuge supplemental feeding program could begin to affect elk nutrition (negligible adverse effect on NER elk from lower nutrition).
- Displacement of elk by bison during competition for standing forage would decrease as the bison herd is reduced.
- Aggressive social interactions involving competition for food among elk and bison would increase overall as feeding periods are reduced.

Winter Distribution

- Elk densities on the NER would decline due to more reliance on standing forage and wider distribution.
- Elk use of lands surrounding the NER would increase, including:
    - USFS lands east of the NER
    - Gros Ventre feedgrounds possibly
    - Southern GRTE
    - State feedgrounds south of the NER
- Most of winter distribution shift would involve elk in the Yellowstone, Teton Wilderness, and Gros Ventre segments.
- As ungulate numbers decreased and supplemental feeding was reduced, competition and aggressive social interactions on the refuge would also be reduced.
- Elk and bison distribution would increase as the animals relied more on native winter range.
- Fewer animals would be present on the refuge.

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Mortality

- As supplemental feeding is reduced, natural factors such as climate and native forage availability would have a greater influence on numbers, movements, distribution, and mortality.
- More elk would be subject to natural factors affecting mortality, including loss of body condition, predation, and starvation.
- Increased mortality on and off the refuge would mainly affect older elk and calves, and some prime bulls entering the winter energetically stressed due to rut activities.
- Late winter calf ratios could decrease as a result of higher winter calf mortality
- Average winter mortality on the refuge would increase from 1%–2% annually to an estimated 1%–5%.
- Overall, a higher total winter mortality rate of approximately 5% could be expected.

Disease

- Reductions in supplemental feeding or elk numbers would reduce the potential for impacts due to tuberculosis, septicemic pasturelosis, and CWD.
- The health and sustainability of the Jackson elk herd would be increased gradually as supplemental feeding was reduced and there was greater reliance on standing forage and wider ungulate distribution.
- Health and sustainability of the Jackson elk herd would be enhanced in the long term.
- Wider distribution of elk would result in moderate reductions in both the prevalence and potential transmission of brucellosis, as well as potential for spread of diseases not yet in the population.

Private Lands

- The agencies would work closely with the WGFD and landowners, including livestock producers, to coordinate actions that would prevent conflicts due to elk dispersal and to defray costs of managing potential conflicts. Preventing access to food/hay rewards on private lands would be vital for effective management.
- Private land conservation easements within NER boundaries would promote wider distribution.

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APPENDIX 2. Monitoring Supplemental Materials: Feeding Initiation Methods

At each sample site, 10 subplots will be measured at every 5 steps along the random bearing determined for each site. At each subplot a 13.27" diameter metal sampling ring will be placed on the ground. The amount of forage available to elk within the sampling ring (dry weight in grams) will be visually estimated. The 13.27" diameter subplot allows easy conversion from grams to lbs. per acre (each gram is equivalent to 100 lbs. per acre). During annual forage production sampling, refuge biologist Eric Cole has made approximately 1,000 of these visual estimates per year for 17 years, and 33% of Cole's estimates have been verified by clipping and weighing. Therefore, Cole will be the principal estimator, but additional personnel will be trained in these techniques to provide redundancy in the event of personnel changes, and to increase the number of observers to facilitate estimation of error.

Estimating available forage within the sample ring at each subplot is relatively straightforward when snow cover is limited, but estimating how much of the forage is accessible to elk when snow is dense, deep and crusted can be subjective. To decrease the subjectivity of the estimation process, if the area under the sample ring is covered with snow, only forage that can be exposed with a gloved hand will be included in the estimate of available forage. Forage that is fouled with manure and/or flush with the ground due to trampling and/or encrusted in ice will not be included in the estimate of available forage. At each subplot the estimate of available forage (dry weight g) will be converted to an equivalent lbs./acre value (1 gram=100 lbs./acre). The arithmetic mean of available forage (lbs./acre) for the 10 subplots provides an estimate of available forage for each index site. There are 3 sample site categories: 1) Historic Key Index Sites that have been used since 2007, 2) New randomly selected sites within areas preferred by elk, and 3) New randomly selected sites in areas not preferred by elk. Historic key index sites were not randomly selected, but were instead selected to represent areas most preferred by elk on the south end of NER. These were the sites used to determine when supplemental feeding would be initiated from 2007 until the implementation of the MSP. To facilitate comparison with pre-MSP data, we will continue to use mean lbs. per acre across historic key index sites to determine the 300 lbs. per acre threshold. However, post MSP implementation we will delay feeding initiation by 2 weeks once the 300 lbs./acre level has been reached. We will concurrently sample at randomly selected sites stratified on an annual basis between areas highly preferred and not highly preferred by elk. This will enable us to quantify the relationship between mean forage availability at historic key index sites and random sites over time.

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APPENDIX 3. Communication Plan

Communication Goals

Prior to the MSP's Implementation

- Utilize a variety of outreach methods to inform the public on the goals and timing of the MSP implementation and possible effects on wintering herds.
- Utilize a variety of outreach methods to inform the public on public comment opportunities.
- Identify and coordinate key messages and outreach with USFWS regional and national offices, State and federal agency partners, non-profits, elected officials, and other identified audiences.

During the MSP's Implementation

- Continue to utilize a variety of outreach methods to describe current management actions as well as measurable and noticeable changes on the landscape, in animal behavior, or in animal health.
- Provide a comprehensive overview of the MSP by providing links and references to previous outreach and background information.

Communication Objectives

- Work with current media contacts to promote news of the MSP via print, radio, Web, and social media platforms.
- Utilize new media and social media tools to provide information on why the MSP was developed, what public comment opportunities exist, and how the plan is being implemented.
- Plan, coordinate, and execute public meetings to allow for public comment and questions on the plan.
- Develop and provide methods for the public to submit written comments on the MSP.
- Monitor print media on Refuge elk and bison management to see how the Step own Plan objectives and reactions are being portrayed to the public.

Current Outreach Resources

- National Elk Refuge web site
- National Elk Refuge news release list
- (approximately 300 contacts)
- National Elk Refuge Twitter site (1,039 followers)
- Bison and Elk Management Plan web site (http://www.fws.gov/bisonandelkplan/)
- Space for an 11" x 17" poster in the Visitor Center on Refuge management topics
- Display panels in the Visitor Center theater for temporary displays

Available Supporting Outreach Resources

- USFWS Mountain–Prairie External Affairs staff
- USFWS Mountain–Prairie web site, including the
- "Top Stories" feature
- USFWS Mountain–Prairie Twitter site USFWS Mountain-Prairie Region Facebook page
- USFWS National Wildlife Refuge System

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- Facebook page
- USFWS Facebook page

Previous Outreach Efforts

- NER routinely writes and disseminates news releases on Refuge management activities, including the Comprehensive Conservation Plan, supplemental feeding, herd health monitoring, and forage production.
- Post the above news stories as Content.
- Management System (CMS) articles.
- Post CMS news story promos so they prominently appear on the home page, linking readers to the articles.
- Send out Twitter messages linking viewers back to the news stories.
- Prepare, upload and provide links to Adobe PDF versions of news stories with additional photos where additional images are available and/or help understand or visualize the content.
- Utilized the Conservation link on the web Content
- Management System to post information about the Bison and Elk Management Plan and the draft Comprehensive Conservation Plan.
- Retained and provided a link to the original Bison and Elk Management web page (http://www.fws.gov/bisonandelkplan/) that was developed during the planning process. The web site includes links to the Final Plan/EIS, Record of Decision, Federal Register Notice of Availability for both the Record of Decision and Final Plan/EIS, associated news releases, public meeting highlights, and other related documents. Note: the National Elk Refuge does not manage the site.

Additional Outreach Opportunities

- Public meetings in Jackson and other identified locations.
- Service produced video; video could be posted to the National Elk Refuge's multimedia web page, or USFWS Mountain–Prairie home page "Top Video" feature.
- Live radio interview on KHOL (Jackson, WY radio)
- Wyoming Public Radio interview with Refuge management staff
- Interviews with local print media sources
- Updates at community leader meetings such as Rotary Club, Jackson Hole Chamber of Commerce board meetings, and interagency breakfast meetings (with Federal agencies and local elected officials).

Target Audiences

Internal

- Regional and National USFWS Leadership
- Refuge permanent staff
- Refuge seasonal staff
- Refuge volunteers

External

- Congressional representatives
- State of Wyoming leadership
- Federal agency partners, particularly Grand Teton National Park and the Bridger–Teton National

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Forest
- Wyoming Game & Fish Department
- Other NER partners, including county and town agencies and local nonprofit organizations
- Local elected officials
- Private landowners in proximity to the National
- Elk Refuge or neighboring Federal lands
- Tribes
- Local and state media
- Local public

Key Outreach Topics

- Overview of BEMP objectives
- Strategy to change elk/bison behavior
- Threat of disease
- Natural mortality rates
- Anticipated winter distribution changes for bison/elk
- Mitigate negative effects on private lands
- Change elk behavior and distribution while avoiding increased mortality.
- Explain the historic reasons a supplemental feeding program began and why it was continued.
- Explain the NER's limited large ungulate carrying capacity and the disproportionate impact of bison on available forage; 3 elk = 1 bison.

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APPENDIX 4. Models

Elk winter distribution model

The proportion of the JEH that winter on the NER will be linked to factors hypothesized to influence elk winter distribution using a generalized linear mixed effects model (GLMM). A GLMM can account for a proportional response variable (i.e., constrained to the interval 0–1) using a log link and binomially-distributed errors. A GLMM also includes fixed and random effects, with the latter capturing residual model variance otherwise not explained by fixed effects. Year will be including as a random effect, providing several benefits. First, we don't assume years are independent and comprise all of the factor levels of interest. Instead, the effect of year is treated as a random variable, with individual year effects realizations of that distribution. This allows inference to non-sampled factor levels, i.e. years, by estimating a latent population-level proportion of elk expected to winter on the NER regardless of fixed effect influences. Thus, the random year effect can be considered a latent variable describing elk behavior manifested as observed winter distribution. Second, because year effects are not treated as independent, estimated effects of year on the proportion of JEH elk wintering on the NER are dependent on all factor levels, leading to greater precision when estimating individual year effects (Kéry 2010).

The full GLMM incorporating fixed effects for each factor identified as influencing elk winter distribution is:

$$P_t = \beta_{0(t)} + \beta_1 * AFI_t + \beta_2 * SDM_t + \beta_3 * WP_t + \beta_4 * GSP_t + \beta_5 * SWE_t + \varepsilon_t$$

where the random intercept and residual model variance are

$B_{0(t)} \sim N(\mu_{\beta_0}, \sigma^2_{\beta_0})$, and

$\varepsilon_t \sim N(0, \sigma^2)$, respectively.

Fixed effects include 1) per capita available forage at initiation of winter feeding (*AFI*) , 2) proportion of the JEH that are short-distance migrants (*SDM*), 3) number of wolf packs present on JEH native winter range (*WP*), 4) growing season (May–August) precipitation for the Wyoming Snake Drainage climate division (*GSP*; a proxy for available forage on native winter range), and 5) snow water equivalent on 1 January at Thumb Divide (*SWE*; a proxy for early winter severity).

Elk calf winter survival and forage deficits

The Forage Accounting Model of Hobbs et al. (2003) has as an output weekly available forage biomass for the NER (sum of predictions for 30 × 30 m cells). These predictions account for snow conditions using a proxy of SWE and decrement total available biomass by 35% to account for unpalatable plants within the total estimate.

While calf survival is a function of multiple factors the primary management action influencing calf survival is supplemental winter feeding. Current winter feeding initiation criteria lead to calf survival generally higher than in unfed populations. Proposed feeding initiation criteria will result in later initiation of supplemental feed, which will be most influential to calf survival. There is currently little

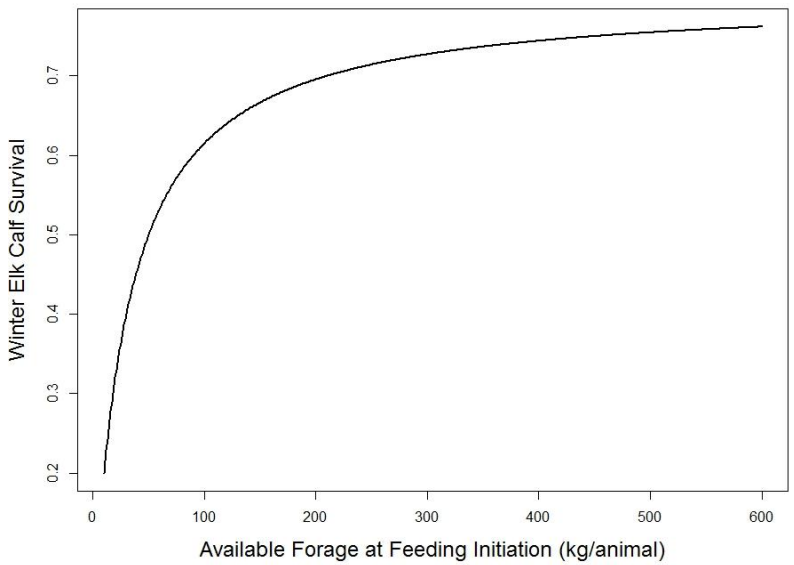
DRAFT

understanding regarding the relationship between initiation of winter feeding and calf survival, except that current feeding initiation criteria result in high calf survival. We believe a threshold level of available forage at initiation of winter feeding exists such that winter calf survival reaches an asymptote. Below this threshold, calf survival is hypothesized to decline quickly with reductions in available forage at winter feeding initiation. Available forage at the initiation of winter feeding will be related to on elk calf winter survival using a saturating function (i.e., Holling type-II functional response; Fig. 6) by

$$S_t = \frac{aAFI_t}{b + AFI_t}.$$

The parameters *a* and *b* determine how calf survival is related to available forage. Maximum calf survival is *a*, and *b* represents the value of available forage to an individual when survival is 50% of *a* (Hilborn and Mangel 1997).

Although this approach doesn't capture forage deficits *per se*, it does provide a potentially sensitive proxy for this concept. It is assumed that a forage deficit for calves would occur at a point on the curve of the relationship between calf survival and available forage at initiation of supplemental feeding. Modeling the response of winter calf elk survival to changes in feeding initiation criteria facilitates our ability to maximize the influence of feeding initiation criteria on winter distribution while minimizing the likelihood of a large mortality event.



Hypothesized relationship between winter survival of elk calves and per capita available forage at initiation of winter feeding on the National Elk Refuge.

From:	Steve Kallin
To:	"Brad Hovinga"
Subject:	RE: Updated Draft BEMP Step Down Plan
Date:	Tuesday, September 13, 2016 8:19:00 AM
Attachments:	Draft NER Step Down Plan Post Peer Review Copy_01_SEP_ 2016.pdf

Brad:

Sorry about that. Wow, you'd think I'd remember we have this Word incompatibility issue. Anyway, a pdf version is attached.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Brad Hovinga [mailto:brad.hovinga@wyo.gov]
Sent: Monday, September 12, 2016 4:46 PM
To: Steve Kallin
Cc: Dale Deiter; David Gustine
Subject: Re: Updated Draft BEMP Step Down Plan

Steve,

Can you send me a pdf version of the Draft Plan. We still cannot open this document on state computers.

Thanks,
Brad

On Mon, Sep 12, 2016 at 4:37 PM, Steve Kallin <steve_kallin@fws.gov> wrote:
Per our last Step Down Planning meeting, we have updated the draft plan (see attached) which included the addition of FAQs. This version was sent out to everyone on the Planning Team for comments but none were received. We are still working on a map to show the general area where we do not want animals to disperse. I will send you a copy of the map once it is generated. Also, we are in the process of completing some document formatting changes for the final draft to be released for public comment.

I will be briefing our Regional Office this Friday concerning the status of this Step Down Plan. The next step in the completion and implementation schedule is to release this plan to the public for comment. That could happen as early as next week. If necessary, please discuss the status of this plan and its possible release for public comment with others in your agency as your procedures require. As a reminder, this is not a NEPA process.

Don’t hesitate to call if you have any questions. Thanks again for all of your help,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

--

Brad Hovinga
Wyoming Game and Fish Department
Regional Wildlife Supervisor
Jackson Region
Jackson, WY
(307) 733-2321

E-Mail to and from me, in connection with the transaction of public business, is subject to the Wyoming Public Records Act and may be disclosed to third parties.

From: Steve Kallin
To: Mike Blenden
Subject: RE: meet with Kallin?
Date: Tuesday, September 13, 2016 2:29:50 PM

Hi Mike:

I plan to arrive Thursday evening and will be ready to meet with you and Will as early Friday as you are available.

Also, I have drafted an agenda for the meeting with Noreen which I will send you this afternoon. I am also awaiting a formatting update from Ryan Moehring on the Step Down Engagement Plan. If I don't get an update from him by 3:00 PM today, I will send you:

1. Draft Meeting agenda with Draft Completion and Implementation Schedule for the Step Down Plan;
2. Step Down Communication Plan
3. Step Down Engagement Plan (formatting needed)
4. Step Down Management Plan (latest version)
5. CCP Communications Plan

Let me know if there is anything else you need prior to the meeting.

Also, I would like to discuss some career planning with you while in Denver.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Blenden, Mike [mailto:mike_blenden@fws.gov]
Sent: Tuesday, September 13, 2016 1:34 PM
To: Steve Kallin
Subject: Fwd: meet with Kallin?

Hi Steve,

When do you plan to arrive to the merry old regional office for Friday's discussion with Noreen? I was thinking we should talk to Will before we meet with her.

Mike
---------- Forwarded message ----------
From: **Will Meeks** <will_meeks@fws.gov>
Date: Tue, Sep 13, 2016 at 11:37 AM

Subject: Re: meet with Kallin?
To: "Blenden, Mike" <mike_blenden@fws.gov>

Sure, schedule it.

Will Meeks
U.S. Fish and Wildlife Service
Mountain-Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

On Sep 13, 2016, at 9:53 AM, Blenden, Mike <mike_blenden@fws.gov> wrote:

> Will, Do you want to meet with Steve and me prior to our update with Noreen at 1:00 on Friday? I don't know Steve's schedule yet but it might be helpful for a smooth meeting with Noreen.
>
> --
> Michael Blenden
> Refuge Supervisor - Montana, Wyoming and Utah
> 134 Union Boulevard
> Lakewood, CO 80228
> 303-236-4306
> 303-710-7934 cell
>
> *Too often we...enjoy the comfort of opinion without the discomfort of thought.*
> John F. Kennedy

--
Michael Blenden
Refuge Supervisor - Montana, Wyoming and Utah
134 Union Boulevard
Lakewood, CO 80228
303-236-4306
303-710-7934 cell

Too often we...enjoy the comfort of opinion without the discomfort of thought.
John F. Kennedy

From: Steve Kallin
To: Brad Hovinga
Subject: RE: Updated Draft BEMP Step Down Plan
Date: Tuesday, September 13, 2016 4:27:45 PM

Hi Brad:

Not sure this rough draft is really ready for "prime time" with agencies that haven't been involved with the process. I should have a draft next week which is cleaned up and includes the map showing the undesirable areas for wildlife dispersal. That will be the draft we send out for public comment and may be a better draft for other agency review. Also, we have built into the schedule a 30 day review for agencies after public comments have been incorporated.

Is there a need to send to another agency before next week?

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Brad Hovinga [mailto:brad.hovinga@wyo.gov]
Sent: Tuesday, September 13, 2016 11:27 AM
To: Steve Kallin
Subject: Re: Updated Draft BEMP Step Down Plan

Steve - Is there anything that precludes us from sharing the draft plan now with other state agencies? It would help limit the criticism of a short commenting period.

Thanks,
Brad

On Tue, Sep 13, 2016 at 8:19 AM, Steve Kallin <steve_kallin@fws.gov> wrote:
Brad:

Sorry about that. Wow, you'd think I'd remember we have this Word incompatibility issue. Anyway, a pdf version is attached.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409

Fax: (307) 733-9729
steve_kallin@fws.gov

From: Brad Hovinga [mailto:brad.hovinga@wyo.gov]
Sent: Monday, September 12, 2016 4:46 PM
To: Steve Kallin
Cc: Dale Deiter; David Gustine
Subject: Re: Updated Draft BEMP Step Down Plan

Steve,

Can you send me a pdf version of the Draft Plan. We still cannot open this document on state computers.

Thanks,
Brad

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Don't hesitate to call if you have any questions. Thanks again for all of your help,

Steve Kallin
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Fax: (307) 733-9729
steve_kallin@fws.gov

--
Brad Hovinga
Wyoming Game and Fish Department
Regional Wildlife Supervisor
Jackson Region
Jackson, WY

(307) 733-2321

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Brad Hovinga
Wyoming Game and Fish Department
Regional Wildlife Supervisor
Jackson Region
Jackson, WY
(307) 733-2321

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From: Brad Hovinga
To: Steve Kallin
Subject: Re: Updated Draft BEMP Step Down Plan
Date: Tuesday, September 13, 2016 4:35:15 PM

No, I was just check. Wanted to give folks plenty of time on consider. We'll wait for the next draft.

Thanks

On Tue, Sep 13, 2016 at 4:27 PM, Steve Kallin <steve_kallin@fws.gov> wrote:

> Hi Brad:
>
> Not sure this rough draft is really ready for "prime time" with agencies that haven't been involved with the process. I should have a draft next week which is cleaned up and includes the map showing the undesirable areas for wildlife dispersal. That will be the draft we send out for public comment and may be a better draft for other agency review. Also, we have built into the schedule a 30 day review for agencies after public comments have been incorporated.
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> **Steve Kallin**
>
> Project Leader
>
> National Elk Refuge
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> PO Box 510
>
> 675 East Broadway
>
> Jackson, WY 83001
>
> Phone: (307) 201-5409
>
> Fax: (307) 733-9729
>
> steve_kallin@fws.gov
>
> **From:** Brad Hovinga [mailto:brad.hovinga@wyo.gov]
> **Sent:** Tuesday, September 13, 2016 11:27 AM
> **To:** Steve Kallin
> **Subject:** Re: Updated Draft BEMP Step Down Plan

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Take care,

Steve Kallin

Project Leader

National Elk Refuge

PO Box 510

675 East Broadway

Jackson, WY 83001

Phone: (307) 201-5409

Fax: (307) 733-9729

steve_kallin@fws.gov

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Cc: Dale Deiter; David Gustine
Subject: Re: Updated Draft BEMP Step Down Plan

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Don’t hesitate to call if you have any questions. Thanks again for all of your help,

Steve Kallin

Project Leader

National Elk Refuge

PO Box 510

675 East Broadway

Jackson, WY 83001

Phone: (307) 201-5409

Fax: (307) 733-9729

steve_kallin@fws.gov

--

Brad Hovinga

Wyoming Game and Fish Department

Regional Wildlife Supervisor

Jackson Region

Jackson, WY

(307) 733-2321

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Brad Hovinga

Wyoming Game and Fish Department

Regional Wildlife Supervisor

Jackson Region

Jackson, WY

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Brad Hovinga
Wyoming Game and Fish Department
Regional Wildlife Supervisor
Jackson Region
Jackson, WY
(307) 733-2321

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From: Will Meeks
To: Mike Blenden; Steve Kallin
Subject: Call postponed
Date: Monday, September 19, 2016 11:16:16 AM

Mike/Steve,

The call for this afternoon is postponed. Noreen can't make it. I will reschedule it with Stephanie.

Will Meeks
U.S. Fish and Wildlife Service
Mountain-Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303(w)
720-541-0310 (c)

From: Mike Blenden
To: Will Meeks
Cc: Steve Kallin
Subject: Re: Call postponed
Date: Monday, September 19, 2016 11:50:58 AM

Ok, I'm on my way back. Should be there by 12:15.

Sent from my iPhone

> On Sep 19, 2016, at 11:16 AM, Will Meeks <will_meeks@fws.gov> wrote:
>
> Mike/Steve,
>
> The call for this afternoon is postponed. Noreen can't make it. I
> will reschedule it with Stephanie.
>
> Will Meeks
> U.S. Fish and Wildlife Service
> Mountain-Prairie Region
> Assistant Regional Director
> National Wildlife Refuge System
> 303-236-4303(w)
> 720-541-0310 (c)

From: Stephanie Potter
To: Brian Salem; Steve Kallin; Mike Blenden; Will Meeks; Ryan Moehring; Anna Munoz; Noreen Walsh
Subject: Follow up National Elk Refuge

From:	Steve Kallin
To:	Dale Deiter; Murphy, Kerry M -FS; Sarah Dewey; David Gustine; Brad Hovinga; doug.brimeyer@wyo.gov; Steve Cain; Cris Dippel; Eric Cole
Cc:	Mike Blenden
Subject:	BEMP Step Down Plan Schedule and Update
Date:	Wednesday, September 28, 2016 3:44:44 PM

Hi Planning Team:

I recently briefed our Regional Office concerning the status of the BEMP Step Down Plan and the Planning Team's recommended schedule for completion, public outreach/comments, and implementation. Our Regional Leadership decided to take a "strategic pause" for several reasons which included: 1) Bad timing in the Election Cycle (soon the country will have a new President, DOI Secretary & USFWS Director); 2) The time schedule was on the aggressive side; more time to engage the public may be beneficial.

I anticipate the process to resume after completion of the next supplemental feeding season.

The draft Step Down Plan is currently going through formatting, minor editing and a map update. When this is complete, I will send you a copy.

I want to extend my sincere appreciation for all of the precious time you have been willing to devote to this effort in recent years. During these past months, your involvement required short deadlines and you responded to these challenges by providing quality work and professional insights, despite your busy schedules. Thank you again for all of your help!

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Steve Cain
To: Steve Kallin
Subject: Re: BEMP Step Down Plan Schedule and Update
Date: Wednesday, September 28, 2016 3:58:23 PM

Very interesting Steve. Its makes sense though and I think its the prudent thing to do. I hope they will put some money into the monitoring program in the meantime, especially since the stage is now set for the timing to do so.

On Wed, Sep 28, 2016 at 3:44 PM, Steve Kallin <steve_kallin@fws.gov> wrote:

> Hi Planning Team:
>
> I recently briefed our Regional Office concerning the status of the BEMP Step Down Plan and the Planning Team's recommended schedule for completion, public outreach/comments, and implementation. Our Regional Leadership decided to take a "strategic pause" for several reasons which included: 1) Bad timing in the Election Cycle (soon the country will have a new President, DOI Secretary & USFWS Director); 2) The time schedule was on the aggressive side; more time to engage the public may be beneficial.
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>
> Take care,
>
> **Steve Kallin**
>
> Project Leader
>
> National Elk Refuge
>
> PO Box 510
>
> 675 East Broadway

Jackson, WY 83001

Phone: (307) 201-5409

Fax: (307) 733-9729

steve_kallin@fws.gov

From:	Matt Hogan
To:	Steve Kallin
Subject:	RE: NPS and NER
Date:	Thursday, October 06, 2016 1:11:29 PM

Thanks Steve.

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Thursday, October 06, 2016 1:10 PM
To: Matt Hogan
Subject: RE: NPS and NER

Matt:

Because we have been the lead in this process, it seems the rest of the Step Down Planning Team has accepted this decision.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Matt Hogan [mailto:Matt_Hogan@fws.gov]
Sent: Wednesday, October 05, 2016 4:34 PM
To: Steve Kallin
Cc: Will Meeks
Subject: NPS and NER

Steve,
Sorry for the late follow up. I did connect with Sue Massica at NPS late last week and she was fine with our extended approach. Not sure if you are hearing differently from the local folks. Thanks.

From:	Will Meeks
To:	Steve Kallin; Mike Blenden
Cc:	Maureen Gallagher; Cris Dippel; Lori Iverson; Eric Cole
Subject:	RE: Step Down Plan, Jackson Hole Media
Date:	Thursday, October 06, 2016 2:22:32 PM

Thanks for the heads up Steve. I'll be in touch tomorrow.

Will Meeks
U.S. Fish and Wildlife Service
Mountain Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Thursday, October 06, 2016 12:00 PM
To: Mike Blenden
Cc: Will Meeks; Maureen Gallagher; Cris Dippel; Lori Iverson; Eric Cole
Subject: Step Down Plan, Jackson Hole Media

Mike:

This is a follow-up to our recent conversation about the BEMP Step Down Plan.

After being interviewed by the Jackson Hole News and Guide for the attached article, the news reporter asked me about the status of the Step Down Plan. I told him the decision was made to delay the process because of the election and for a longer discussion period with the public. He said the local rumor is that it was delayed due to the poor relationship between R-6 FWS Leadership and the WGFD due to the Grizzly Bear delisting process. He asked if the Regional Office would give him the same reasons for the delay if he called them. I told him I believed the RO would tell him the same thing said and gave him your contact information. Yesterday, this same reporter called and said his paper wants him to do a story on the Step Down Plan for this next week's paper (Wednesday).

We are in an awkward position. A news release announcing that we are delaying the Step Down Plan process will surely anger many because this process has taken several years and they want to see us move forward. At the same time, a news release would likely motivate those opposed to any change, and trigger a blistering attack criticizing us for mismanagement and starving elk, similar to last year's "feedback". If we were following the Step Down Communications and Engagement Plans, we would be more proactive and better positioned to address the management criticism we all expect to occur again this year. However, for a number of reasons as I previously recommended, we should not follow these plans prior to the upcoming feed season if we are not going to start making changes to the upcoming feeding program.

I suggest that I do the interview with the reporter from the New & Guide and in addition to the

reasons I initially gave him for the delay, that we add time separation between the CCP and the Step Down Plan to avoid confusion. What is the status of the CCP and when can we expect to release it?

Let me know your thoughts and be prepared for a call from this reporter.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From:	Ryan Moehring
To:	Anna Munoz; Steve Kallin
Cc:	Will Meeks; Maureen Gallagher; Mike Blenden; Cris Dippel; Lori Iverson
Subject:	RE: FW: Step Down Plan, Jackson Hole Media
Date:	Thursday, October 13, 2016 5:04:36 PM

Sure, Anna. Steve, I'll call you tomorrow.

All,

My email from earlier today re: the CCP release is directly related to this and to Steve's concerns further down this chain, so if folks get a second, I suggest taking a look at that ASAP, please.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Munoz, Anna [mailto:anna_munoz@fws.gov]
Sent: Thursday, October 13, 2016 4:59 PM
To: Steve Kallin
Cc: Will Meeks; Maureen Gallagher; Mike Blenden; Cris Dippel; Lori Iverson; Ryan Moehring
Subject: Re: FW: Step Down Plan, Jackson Hole Media

Thanks, Steve. Ryan will be our point person on this. Ryan, will you touch base with Steve tomorrow to discuss this inquiry?

On Thursday, October 13, 2016, Steve Kallin <steve_kallin@fws.gov> wrote:
Hi Anna:

I received a message from Maureen Gallagher that I should contact you to take this media request. I received the second contact from Mike Koshmrl, Environmental Reporter for the Jackson Hole News and Guide. He wants to set up an interview next Monday for a story to be printed in the Weekly Paper on Wednesday. Please let me know how you would like to proceed.

Take care,

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National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Tuesday, October 11, 2016 10:11 AM
To: Will Meeks
Subject: RE: Step Down Plan, Jackson Hole Media

Hi Will:

I have a reporter contacting me for an interview for tomorrow's paper. If we don't make contact today, I suspect they will still run the story in the future.

Steve Kallin
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National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Will Meeks [mailto:Will_Meeks@fws.gov]
Sent: Thursday, October 06, 2016 2:22 PM
To: Steve Kallin; Mike Blenden
Cc: Maureen Gallagher; Cris Dippel; Lori Iverson; Eric Cole
Subject: RE: Step Down Plan, Jackson Hole Media

Thanks for the heads up Steve. I'll be in touch tomorrow.

Will Meeks
U.S. Fish and Wildlife Service
Mountain Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Thursday, October 06, 2016 12:00 PM
To: Mike Blenden
Cc: Will Meeks; Maureen Gallagher; Cris Dippel; Lori Iverson; Eric Cole
Subject: Step Down Plan, Jackson Hole Media

Mike:

This is a follow-up to our recent conversation about the BEMP Step Down Plan.

After being interviewed by the Jackson Hole News and Guide for the attached article, the news reporter asked me about the status of the Step Down Plan. I told him the decision was made to delay the process because of the election and for a longer discussion period with the public. He said the local rumor is that it was delayed due to the poor relationship between R-6 FWS Leadership and the WGFD due to the Grizzly Bear delisting process. He asked if the Regional Office would give him the same reasons for the delay if he called them. I told him I

believed the RO would tell him the same thing said and gave him your contact information. Yesterday, this same reporter called and said his paper wants him to do a story on the Step Down Plan for this next week's paper (Wednesday).

We are in an awkward position. A news release announcing that we are delaying the Step Down Plan process will surely anger many because this process has taken several years and they want to see us move forward. At the same time, a news release would likely motivate those opposed to any change, and trigger a blistering attack criticizing us for mismanagement and starving elk, similar to last year's "feedback". If we were following the Step Down Communications and Engagement Plans, we would be more proactive and better positioned to address the management criticism we all expect to occur again this year. However, for a number of reasons as I previously recommended, we should not follow these plans prior to the upcoming feed season if we are not going to start making changes to the upcoming feeding program.

I suggest that I do the interview with the reporter from the New & Guide and in addition to the reasons I initially gave him for the delay, that we add time separation between the CCP and the Step Down Plan to avoid confusion. What is the status of the CCP and when can we expect to release it?

Let me know your thoughts and be prepared for a call from this reporter.

Take care,

Steve Kallin
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PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

--
Anna Muñoz
Assistant Regional Director - External Affairs
U.S. Fish and Wildlife Service, Mountain-Prairie Region
Office: 303-236-4510
Cell: 720-648-2542

From:	Steve Kallin
To:	Danielle Stevens
Cc:	Toni Griffin; Cris Dippel; Eric Cole; Lori Iverson
Subject:	RE: NER Step-Down Plan
Date:	Friday, October 14, 2016 3:26:25 PM

Danielle:

Took a quick look at the plan, it looks great! Thank you for all your work to make this a document worthy of public release. I don't believe we will need hard copies at this time. The decision has been made to delay the start of the Step Down Plan public engagement process.

Thanks again,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Danielle Stevens [mailto:danielle_stevens@fws.gov]
Sent: Friday, October 07, 2016 11:52 AM
To: Steve Kallin
Cc: Eric Cole
Subject: NER Step-Down Plan

Hi Steve and Eric,
Attached are the final Draft versions of the Step-down plan.
An item to note:
I've included several blank page for pagination and printing purposes, use caution when/if you decide to edit the Word file.

If you need hard copy prints, let me know. I can send the file to our local printer here in Denver, I just need four to six business days to get them produced.

Thanks,
Danielle

Danielle Stevens, Writer-Editor
"Whatever you are, be a good one." ~Abraham Lincoln
"The truth of the matter is that you always know the right thing to do. The hard part is doing it." ~ H. Norman Schwarzkopf
Refuge Planning
Division of Biological Resources
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd

Lakewood, CO 80228
Office Phone: 303-236-4317
danielle_stevens@fws.gov

From: Will Meeks
To: Ryan Moehring
Cc: Anna Munoz; Steve Kallin; Maureen Gallagher; Mike Blenden; Cris Dippel; Lori Iverson
Subject: Re: Step Down Plan, Jackson Hole Media
Date: Monday, October 17, 2016 1:05:13 PM

Well done. Thank you Ryan. Please send me the article when you see it. Have a good week all.

Will Meeks
U.S. Fish and Wildlife Service
Mountain-Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

On Oct 17, 2016, at 1:03 PM, Ryan Moehring <ryan_moehring@fws.gov> wrote:

> I just spoke with the reporter. He tried to stoke the flames of controversy but I made it clear that the grizzly delisting proposal is a wholly separate issue from NER management and that the CCP delay was related to our being a large administrative region with a significant workload. Per Toni, I told him that we should publish the CCP within the next month and also mentioned that we would be launching an engagement process for the BEMP in 2017. I stressed that we are committed to a robust public participation process prior to making changes to our supplemental feeding program. Steve, there were a couple of BEMP step down-specific questions that I did not know the answers to with 100% certainty (nothing controversial, just specific contents of plan/status kind of stuff), so I told him he was welcome to follow up on those w/ you. If he starts taking the conversation in another direction, please feel free to direct him to me.
>
> Thanks,
> Ryan
>
> Ryan Moehring
> Public Affairs
> U.S. Fish and Wildlife Service
> Mountain-Prairie Region
> 303-236-0345
>
> **From:** Munoz, Anna [mailto:anna_munoz@fws.gov]
> **Sent:** Thursday, October 13, 2016 4:59 PM
> **To:** Steve Kallin
> **Cc:** Will Meeks; Maureen Gallagher; Mike Blenden; Cris Dippel; Lori Iverson; Ryan Moehring
> **Subject:** Re: FW: Step Down Plan, Jackson Hole Media
>
> Thanks, Steve. Ryan will be our point person on this. Ryan, will you touch base

with Steve tomorrow to discuss this inquiry?

On Thursday, October 13, 2016, Steve Kallin <steve_kallin@fws.gov> wrote:
Hi Anna:

I received a message from Maureen Gallagher that I should contact you to take this media request. I received the second contact from Mike Koshmrl, Environmental Reporter for the Jackson Hole News and Guide. He wants to set up an interview next Monday for a story to be printed in the Weekly Paper on Wednesday. Please let me know how you would like to proceed.

Take care,

Steve Kallin
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steve_kallin@fws.gov

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Tuesday, October 11, 2016 10:11 AM
To: Will Meeks
Subject: RE: Step Down Plan, Jackson Hole Media

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Steve Kallin
Project Leader
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From: Will Meeks [mailto:Will_Meeks@fws.gov]
Sent: Thursday, October 06, 2016 2:22 PM
To: Steve Kallin; Mike Blenden
Cc: Maureen Gallagher; Cris Dippel; Lori Iverson; Eric Cole
Subject: RE: Step Down Plan, Jackson Hole Media

Thanks for the heads up Steve. I'll be in touch tomorrow.

Will Meeks
U.S. Fish and Wildlife Service

Mountain Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Thursday, October 06, 2016 12:00 PM
To: Mike Blenden
Cc: Will Meeks; Maureen Gallagher; Cris Dippel; Lori Iverson; Eric Cole
Subject: Step Down Plan, Jackson Hole Media

Mike:

This is a follow-up to our recent conversation about the BEMP Step Down Plan.

After being interviewed by the Jackson Hole News and Guide for the attached article, the news reporter asked me about the status of the Step Down Plan. I told him the decision was made to delay the process because of the election and for a longer discussion period with the public. He said the local rumor is that it was delayed due to the poor relationship between R-6 FWS Leadership and the WGFD due to the Grizzly Bear delisting process. He asked if the Regional Office would give him the same reasons for the delay if he called them. I told him I believed the RO would tell him the same thing said and gave him your contact information. Yesterday, this same reporter called and said his paper wants him to do a story on the Step Down Plan for this next week's paper (Wednesday).

We are in an awkward position. A news release announcing that we are delaying the Step Down Plan process will surely anger many because this process has taken several years and they want to see us move forward. At the same time, a news release would likely motivate those opposed to any change, and trigger a blistering attack criticizing us for mismanagement and starving elk, similar to last year's "feedback". If we were following the Step Down Communications and Engagement Plans, we would be more proactive and better positioned to address the management criticism we all expect to occur again this year. However, for a number of reasons as I previously recommended, we should not follow these plans prior to the upcoming feed season if we are not going to start making changes to the upcoming feeding program.

I suggest that I do the interview with the reporter from the New & Guide and in addition to the reasons I initially gave him for the delay, that we add time separation between the CCP and the Step Down Plan to avoid confusion. What is the status of the CCP and when can we expect to release it?

Let me know your thoughts and be prepared for a call from this reporter.

Take care,

Steve Kallin
Project Leader
National Elk Refuge

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Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

--
Anna Muñoz
Assistant Regional Director - External Affairs
U.S. Fish and Wildlife Service, Mountain-Prairie Region
Office: 303-236-4510
Cell: 720-648-2542

From:	Steve Kallin
To:	Mike Blenden
Cc:	Ryan Moehring; Maureen Gallagher; Amanda Soliday; ann_blakley@fws.gov; Bryan Yetter; Cris Dippel; Eric Cole; Fernando Escobedo; Geneva Chong; Lori Iverson; Michael Nordell; Natalie Fath
Subject:	NER Step Down Plan News Article, Jackson Hole News and Guide, 10/19/2016
Date:	Wednesday, October 19, 2016 12:23:31 PM

FYI

http://www.jhnewsandguide.com/news/environmental/elk-refuge-step-down-plan-remains-held-up/article_2ac4ff2c-a9d4-51b8-bd8e-6373bc54a15f.html

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Tom Segerstrom
To: Steve Kallin
Subject: Conservation District Discussion
Date: Thursday, October 27, 2016 2:21:47 PM

Hi Steve.

My board would like to speak with you as a group in executive session regarding your ongoing initiative with landowners and the role of our Conservation District. Would it be possible for you to attend our next board meeting is on Wednesday December 21, 2016 toward the end of the day (i.e. 4:00pm to 5:00pm)? Doing so would help the Supervisors in working among themselves to discern our District's role. The Board of Supervisors will not be meeting in November due to our statewide meeting being held in Casper that month.

I personally would appreciate your help. Thanks for your consideration.

Tom Segerstrom
Executive Director
Teton Conservation District
P.O. Box 1070
Jackson, WY 83001
Phone: (307) 733-2110
Fax: (307) 733-8179
Cell: (307) 413-2704
Email: tom@tetonconservation.org

AGENDA

Briefing with Regional Director, Region 6

National Elk Refuge CCP & Bison/Elk Management

September 16, 2016

1. **CCP:** Communication Plan Completed

2. **Bison/Elk Management Plan (BEMP)**

   a. **Background; BEMP ROD Guidance**

   b. **Summary of key recommendations by Planning Team (Draft Step Down Plan)**
      i. Redistribute elk & bison; Management actions:
         1. Delay start of feeding
         2. End feeding earlier
      ii. Proposed Plan Completion & Implementation schedule (attached)

   c. **Status of WGFD Support**

(b) (5) [redacted]

   e. **Regional Office Support**
      i. Commitment to implementation
      ii. Funding

DRAFT Completion and Implementation Schedule for the BEMP Step Down Management Plan

July 27, 2016

	STEP DOWN PLAN COMPLETION AND APPROVAL PROCESS	INITIATE	COMPLETE	WORK DAYS
1	Final Step Down Plan Meeting	July 18, 2016	July 18, 2016	
2	Final 1st Draft Step Down Plan; Team reviews changes	July 19, 2016	July 27, 2016	7
3	Peer review panel	July 27, 2016	Aug. 11, 2016	11
4	Team meets to review Panel's suggested changes	Aug. 12, 2016	Aug. 12, 2016	1
5	Team changes finalized	Aug. 15, 2016	Aug. 17, 2016	3
6	Agency comments (Planning Team)	Aug. 17, 2016	Aug. 31, 2016	10
7	Incorporate agency comments; finalize draft	Sept. 1, 2016	Sept. 9, 2016	7
8	Release draft plan to public; Public outreach, meetings	Sept. 12, 2016		
9	Public review and comment period (60 days)	Sept. 12, 2016	Nov. 10, 2016	60 (calendar)
10	Review public comments and incorporate changes	Nov. 11, 2015	Nov. 18, 2016	6
11	Team review & comments	Nov. 21, 2016	Nov. 25, 2016	5
12	Agency Review of updated document	Nov. 28, 2015	Jan. 6, 2016	28
13	Update final document	Jan. 9, 2017	Jan. 13, 2017	5
14	Final FWS/NPS review and signatures.	Jan 16, 2017	Jan. 27, 2017	10
15	Release Final Step Down Plan. Continue Public outreach/meetings.	Jan. 30, 2017		
16	Initiate enhanced forage monitoring	Jan. 1, 2017	Feb. 1, 2017	30
17	Implement new feeding schedule (delay 1-5 days)	Feb. 1, 2017	Feb. 15, 2016	
18	Feedground tours for elected officials, key stakeholders	Feb. 15, 2017	March 22, 2017	22
19	GPS collar 30 elk	March 1, 2017	March 15, 2017	10
20	Initiate early termination of supplemental feeding	April 2, 2017		

From:	Steve Kallin
To:	Mike Blenden
Cc:	Cris Dippel; Lori Iverson; Eric Cole
Subject:	FW: meet with Kallin?
Date:	Tuesday, September 13, 2016 3:33:46 PM
Attachments:	DRAFT RO Briefing Agenda 9-16-2016.docx (b) (5) Draft NER Step Down Plan Post Peer Review Copy_01_SEP_ 2016.docx DRAFT NER CCP Comms Strategy 8-23-2016.docx (b) (5)

Hi Mike:

Attached are documents which may be relevant to our meeting with Noreen on Friday, Sept. 16. Let me know if you need additional info and want to chat briefly prior to our meeting with Will.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Tuesday, September 13, 2016 2:30 PM
To: Mike Blenden
Subject: RE: meet with Kallin?

Hi Mike:

I plan to arrive Thursday evening and will be ready to meet with you and Will as early Friday as you are available.

Also, I have drafted an agenda for the meeting with Noreen which I will send you this afternoon. I am also awaiting a formatting update from Ryan Moehring on the Step Down Engagement Plan. If I don't get an update from him by 3:00 PM today, I will send you:

1. Draft Meeting agenda with Draft Completion and Implementation Schedule for the Step Down Plan;
2. Step Down Communication Plan
3. Step Down Engagement Plan (formatting needed)
4. Step Down Management Plan (latest version)
5. CCP Communications Plan

Let me know if there is anything else you need prior to the meeting.

Also, I would like to discuss some career planning with you while in Denver.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Blenden, Mike [mailto:mike_blenden@fws.gov]
Sent: Tuesday, September 13, 2016 1:34 PM
To: Steve Kallin
Subject: Fwd: meet with Kallin?

Hi Steve,

When do you plan to arrive to the merry old regional office for Friday's discussion with Noreen? I was thinking we should talk to Will before we meet with her.

Mike
---------- Forwarded message ----------
From: **Will Meeks** <will_meeks@fws.gov>
Date: Tue, Sep 13, 2016 at 11:37 AM
Subject: Re: meet with Kallin?
To: "Blenden, Mike" <mike_blenden@fws.gov>

Sure, schedule it.

Will Meeks
U.S. Fish and Wildlife Service
Mountain-Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

On Sep 13, 2016, at 9:53 AM, Blenden, Mike <mike_blenden@fws.gov> wrote:

> Will, Do you want to meet with Steve and me prior to our update with Noreen at 1:00 on Friday? I don't know Steve's schedule yet but it might be helpful for a smooth meeting with Noreen.
>
> --
> Michael Blenden
> Refuge Supervisor - Montana, Wyoming and Utah
> 134 Union Boulevard
> Lakewood, CO 80228
> 303-236-4306
> 303-710-7934 cell

Too often we...enjoy the comfort of opinion without the discomfort of thought.
John F. Kennedy

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Michael Blenden
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AGENDA

Briefing with Regional Director, Region 6

National Elk Refuge CCP & Bison/Elk Management

September 16, 2016

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   a. **Background; BEMP ROD Guidance**

   b. **Summary of key recommendations by Planning Team (Draft Step Down Plan)**
      i. Redistribute elk & bison; Management actions:
         1. Delay start of feeding
         2. End feeding earlier
      ii. Proposed Plan Completion & Implementation schedule (attached)

   c. **Status of WGFD Support**

(b) (5) [redacted]

   e. **Decisions**
      i. Initiate BEMP Step Down Plan process? RO commitment to implement?
      ii. Additional funding to implement BEMP Step Down Plan?
      iii. CCP Federal Register Process and release to public?

DRAFT Completion and Implementation Schedule for the BEMP Step Down Management Plan

July 27, 2016

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From: Steve Kallin
To: Mike Blenden
Subject: Updated Documents per our conversation
Date: Wednesday, September 14, 2016 3:26:56 PM
Attachments: DRAFT RO Briefing Agenda 9-16-2016.docx
(b) (5)
Draft NER Step Down Plan Post Peer Review Copy_01_SEP_ 2016.pdf
(b) (5)
DRAFT NER CCP Comms Strategy 8-23-2016.docx

Mike:

See attached updated documents for Friday's meeting with Noreen.

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Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Ryan Moehring
To: Mike Blenden; Will Meeks
Subject: RE: Updated Documents per our conversation
Date: Wednesday, September 14, 2016 3:55:00 PM

Hi Mike,

(b) (5) [redacted]

We also have news releases for both the CCP and the BEMP step down, if Noreen would like to review those as well during the briefing. That is up to you guys.

Apologies for any confusion, and thanks for all of your work on this.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Blenden, Mike [mailto:mike_blenden@fws.gov]
Sent: Wednesday, September 14, 2016 3:35 PM
To: Will Meeks
Cc: Ryan Moehring
Subject: Fwd: Updated Documents per our conversation

Will,

Attached are supporting documents for our NER conversation with Noreen on Friday. Please make sure you are comfortable with the agenda. Let me know if you have suggestions.

---------- Forwarded message ----------
From: **Steve Kallin** <steve_kallin@fws.gov>
Date: Wed, Sep 14, 2016 at 3:26 PM
Subject: Updated Documents per our conversation
To: Mike Blenden <mike_blenden@fws.gov>

Mike:

See attached updated documents for Friday's meeting with Noreen.

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John F. Kennedy

From:	Ryan Moehring
To:	"Griffin, Toni"; "Steve Kallin"; "Cris Dippel"; "Iverson, Lori"; "Mike Blenden"; "Kelly Hogan"; "Maureen Gallagher"
Cc:	Anna Munoz (anna_munoz@fws.gov); "Mogadam, Roya"; "Will Meeks"; "Gallagher, Maureen"; "Robert Mansheim"
Subject:	RE: SCHEDULED: Document Number - 2016-27268
Date:	Thursday, November 10, 2016 4:00:00 PM
Attachments:	NER CCP Comms Strategy_SURNAME.docx NER CCP Dear Reader Letter_SURNAME.doc NER CCP News Release_SURNAME.docx NER CCP Postcard_SURNAME.pdf NER_FinalCCP_Book_2016-1110(reduced).pdf

---

Thanks, Toni. We appreciate all the hard work you put in to get us to this point.

All,

Normally we conduct outreach the day the NOI hits the reading room (i.e., today), but given the late hour this reached us on an early release day we have decided to push the announcement until Monday morning. There is a slight possibility that someone will see this in the reading room and report on it prior to Monday, but that is a risk we are willing to take to ensure we are all coordinated. In the unlikely scenario that does happen and you get inquiries over the holiday weekend (or if you simply need to discuss), please call me on my personal cell phone: (b) (6) .

I have updated our outreach plan and news release with our new dates and timeline, so if you have a role in this announcement please review the attached and make sure you understand your responsibilities on Monday morning.

Thanks for all of your help and patience along the way.

-Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Griffin, Toni [mailto:toni_griffin@fws.gov]
Sent: Thursday, November 10, 2016 1:13 PM
To: Steve Kallin; Cris Dippel; Iverson, Lori; Mike Blenden; Ryan Moehring; Kelly Hogan; Maureen Gallagher
Subject: Fwd: SCHEDULED: Document Number - 2016-27268

Hi-

It's official, the Notice of Availability of the Final CCP will be published in the Federal Register Monday. We're working to upload the Final CCP documents to the R6 Refuge Planning website this afternoon, so the document will be available to the public when the notice hits the street Monday morning. We'll also send out hard copies to everyone on our mailing list.

A reduced size pdf of the Final CCP is attached here which you can use as needed (e.g., post on your website, print, or email upon request).

Thanks again,
Toni

Toni Griffin
Refuge Planning
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
Lakewood, CO 80228
Office Phone: 303/236-4378
Telework: Tuesday, Friday

---------- Forwarded message ----------
From: **Wilkinson, Susan** <susan_wilkinson@fws.gov>
Date: Tue, Nov 8, 2016 at 2:05 PM
Subject: Fwd: SCHEDULED: Document Number - 2016-27268
To: Toni Griffin <Toni_Griffin@fws.gov>, Lisa Ellis <lisa_ellis@fws.gov>, Betsy Matten <betsy_matten@fws.gov>
Cc: Sara Prigan <sara_prigan@fws.gov>, Anissa Craghead <anissa_craghead@fws.gov>, Kerry Rodgers <kerry_rodgers@ios.doi.gov>, "Lawyer, Mark" <Mark_Lawyer@ios.doi.gov>

---------- Forwarded message ----------
From: **noreply@fedreg.gov** <noreply@fedreg.gov>
Date: Tue, Nov 8, 2016 at 3:59 PM
Subject: SCHEDULED: Document Number - 2016-27268
To: fws_fedregpub@fws.gov
Cc: JSHELLEY@gpo.gov

Please do not reply directly to this e-mail. If you have any questions or comments regarding this email, please contact Jason Shelley.

Attention : Fish and Wildlife Service FWS, (FWS) Fish and Wildlife Service

Document 2016-27268, Category NOTICES has been scheduled to publish on 11-14-2016.
This document will be placed on public inspection on 11-10-2016 08:45:00.

The subject of this document is Environmental Assessments; Availability, etc.:.
The submitting Agency is (FWS) Fish and Wildlife Service.
The Docket Id is FWS–R6–R–2016–N040; FF06R06000–FXRS12610600000-167.
The RIN is NA.
This document has an effective date of NA.
The comments due date is NA.
The separate part # for this document is NA.
Agency/CFR Title/CFR Part:
(FWS) Fish and Wildlife Service, CFR Title is NA, CFR Part is NA

DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
[FWS–R6–R–2016–N040; FF06R06000–FXRS12610600000-167]

National Elk Refuge, Teton County, Wyoming; Final Comprehensive Conservation Plan and Finding of No Significant Impact for Environmental Assessment

AGENCY: Fish and Wildlife Service, Interior.
ACTION: Notice of availability.
SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce the availability of a final comprehensive conservation plan (CCP) and finding of no significant impact (FONSI) for the environmental assessment (EA) for the National Elk Refuge (Refuge, NWR). In this final CCP, we describe how we intend to manage the refuge for the next 15 years.
[...]

--
Susan Wilkinson
Division of Policy, Performance, and Management Programs
U.S. Fish and Wildlife Service Headquarters
5275 Leesburg Pike, MS: BPHC
Falls Church, VA 22041-3803
703-358-2506

From: Ryan Moehring
To: Steve Kallin
Cc: Cris Dippel; Lori Iverson; Eric Cole; Bryan Yetter; toni_griffin@fws.gov
Subject: Re: SCHEDULED: Document Number - 2016-27268
Date: Thursday, November 10, 2016 8:38:07 PM

Apologies...I inadvertently hit sent prematurely. We sent the postcard and other outreach materials for review prior to surname on 9/23 and the only feedback we received on the post card was regarding the centered nature of the text. As I understand it, there is no way to modify the post card at this point, so if there is a fatal flaw, please let Toni, now copied, know ASAP, as I believe she was planning on sending these out to her list on Monday.

-Ryan

Sent from my iPhone

On Nov 10, 2016, at 8:32 PM, Ryan Moehring <ryan_moehring@fws.gov> wrote:

> Hi Steve,
>
> We sent the entire packing, including the post card,
>
> Sent from my iPhone
>
> On Nov 10, 2016, at 4:47 PM, Steve Kallin <steve_kallin@fws.gov> wrote:
>
> > Hi Ryan:
> >
> > Thanks for this information. Question, how is the "postcard" going to be used? It looks nice but the vision statement is not identified as such. The vision statement is our aspired future condition and does not accurately reflect our current condition. Without that clarification, the public could rightly say it doesn't accurately describe the NER.
> >
> > Thanks for the help,
> >
> > **Steve Kallin**
> > Project Leader
> > National Elk Refuge
> > PO Box 510
> > 675 East Broadway
> > Jackson, WY 83001
> > Phone: (307) 201-5409
> > Fax: (307) 733-9729
> > steve_kallin@fws.gov
> >
> > ---
> >
> > **From:** Ryan Moehring [mailto:ryan_moehring@fws.gov]
> > **Sent:** Thursday, November 10, 2016 4:00 PM
> > **To:** Griffin, Toni; Steve Kallin; Cris Dippel; Iverson, Lori; Mike Blenden; Kelly

Hogan; Maureen Gallagher
Cc: Anna Munoz; Mogadam, Roya; Will Meeks; Robert Mansheim
Subject: RE: SCHEDULED: Document Number - 2016-27268

Thanks, Toni. We appreciate all the hard work you put in to get us to this point.

All,

Normally we conduct outreach the day the NOI hits the reading room (i.e., today), but given the late hour this reached us on an early release day we have decided to push the announcement until Monday morning. There is a slight possibility that someone will see this in the reading room and report on it prior to Monday, but that is a risk we are willing to take to ensure we are all coordinated. In the unlikely scenario that does happen and you get inquiries over the holiday weekend (or if you simply need to discuss), please call me on my personal cell phone: (b) (6) .

I have updated our outreach plan and news release with our new dates and timeline, so if you have a role in this announcement please review the attached and make sure you understand your responsibilities on Monday morning.

Thanks for all of your help and patience along the way.

-Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Griffin, Toni [mailto:toni_griffin@fws.gov]
Sent: Thursday, November 10, 2016 1:13 PM
To: Steve Kallin; Cris Dippel; Iverson, Lori; Mike Blenden; Ryan Moehring; Kelly Hogan; Maureen Gallagher
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Thanks again,
Toni

Toni Griffin
Refuge Planning
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
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Office Phone: 303/236-4378
Telework: Tuesday, Friday

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DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
[FWS–R6–R–2016–N040; FF06R06000–FXRS12610600000-167]

National Elk Refuge, Teton County, Wyoming; Final Comprehensive Conservation Plan and Finding of No Significant Impact for Environmental Assessment

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[...]

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Susan Wilkinson
Division of Policy, Performance, and Management Programs
U.S. Fish and Wildlife Service Headquarters
5275 Leesburg Pike, MS: BPHC
Falls Church, VA 22041-3803
703-358-2506

From: Ryan Moehring
To: Lori Iverson; Toni Griffin
Subject: RE: NER CCP
Date: Tuesday, July 05, 2016 2:11:00 PM

I'm working on getting guidance from Will and Anna. Hang in there!

Thanks,
Ryan

Ryan Moehring
Public Affairs (ND, SD, WY, MT)
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Iverson, Lori [mailto:lori_iverson@fws.gov]
Sent: Tuesday, July 05, 2016 1:15 PM
To: Griffin, Toni; Ryan Moehring
Subject: Re: NER CCP

Thanks for including the part about explaining the delay to the public. Even without the July 25 deadline, it's getting awkward to explain why the document still isn't out after being signed last September. In this day and age -- and especially in this contentious community -- transparency is key to public trust.

Lori

Lori Iverson
Outreach & Visitor Services
U.S. Fish & Wildlife Service
National Elk Refuge
PO Box 510 / 675 East Broadway
Jackson, WY 83001
Phone: 307.201.5433
Cell: 307.690.4375
Fax: 307.733.9729
lori_iverson@fws.gov
National Elk Refuge photo gallery
National Elk Refuge web site
Twitter: @NatlElkRefuge

"Once you can accept the universe as matter expanding into nothing that is something, wearing stripes with plaid comes easy." - Albert Einstein

On Tue, Jul 5, 2016 at 1:06 PM, Griffin, Toni <toni_griffin@fws.gov> wrote:
Steve, Mike, and Ryan,

I'm happy to help with the public outreach for the CCP and BEMP as needed.
I'll be out of the office July 11-14 for training but am otherwise available to assist.

Something to be aware of is the HQ clearance window for the FR notice ends July 25. If we're not able to publish the notice by July 25 we'll need to submit it through the HQ clearance process again.

My concern is the NER CCP was approved last fall. It typically takes 3-4 months to produce the final document and make it available to the public after it's been approved. I'm not sure how to address the delay in releasing the CCP to the public but it's something we should consider as we work on the outreach/communications plan.

Thanks

Toni Griffin
Refuge Planning
Division of Biological Resources
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
Lakewood, CO 80228
Office Phone: 303-236-4378

On Mon, Jun 27, 2016 at 4:15 PM, Steve Kallin <steve_kallin@fws.gov> wrote:
Mike & Ryan:

This is a brief update concerning the BEMP Step Down Plan. On June 17, we completed our first Step Down Plan Team meeting (agencies) since August 2015. A number of questions came up during the meeting, prompting additional communications between the Jackson WGFD Wildlife Office and the WGFD Wildlife Administration Office in Cheyenne. Last Friday, June 24, I had a conversation with the Jackson WGFD Regional Wildlife Supervisor to clarify some of these questions after he discussed them with the WGFD Cheyenne Office. The June 24 conversation was encouraging.

In general, the Jackson WGFD Office appears willing to work with us (NER and Grand Teton National Park) to implement the strategy of redistributing wintering elk as outlined in the Draft Step Down Plan. However, my impression during the June 24 conversation was that some WGFD Wildlife Administrators in the Cheyenne Office are skeptical and their support for this effort seems to be very soft. They are requiring a minimum of 30 days for a review of the final draft Step Down Plan by the WGFD and other state departments before they can commit state support.

We are updating the Step Down Plan based on the last meeting and conversations. The Step Down Planning Team is scheduled to again meet on July 18 and hopefully will complete a draft plan that will go out for peer review. After incorporating peer review comments, the plan will go back to the agencies for a quick review and comments before going out for public review. After the public comments are incorporated, agencies will have another opportunity to review. This is where the state is requesting 30 days.

The Planning Team understands the goal is to have an approved Step Down Plan so implementation can begin during the upcoming 2017 feed season. We have identified at least 14 steps that need to be completed by then, so time is tight. Hopefully, a draft plan can be released to the public for comments in September or October. There will be no shortage of public controversy when the draft plan is released.

I strongly recommend the NER CCP be released as soon as possible. I predict the controversy associated with the Final CCP will be manageable and if addressed soon, will not impair our ability to complete and implement an approved BEMP Step Down Plan by the next feeding season. However, if we wait to release the CCP when the Step Down Plan goes out for public comment, all bets are off.

If needed, I would appreciate discussing these issues in more detail at everyone's earliest convenience.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Ryan Moehring [mailto:ryan_moehring@fws.gov]
Sent: Monday, June 27, 2016 2:18 PM
To: Steve Kallin
Cc: Mike Blenden
Subject: RE: NER CCP

Hi Steve,

I am confident that the CCP is going to be held up until we satisfy Noreen's desire for an engagement strategy around the step-down. I just responded to my last email chain on the subject so we can continue the dialogue with the group. Please share your thoughts in the form of a reply-all when you have a moment and I'll be happy to work with you to get this across the finish line.

Thanks,
Ryan

Ryan Moehring
Public Affairs (ND, SD, WY, MT)
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Steve Kallin [mailto:steve_kallin@fws.gov]

Sent: Monday, June 27, 2016 1:48 PM
To: Ryan Moehring
Cc: Mike Blenden
Subject: RE: NER CCP

Ryan:

Any idea where we stand on the release of the CCP?

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Ryan Moehring [mailto:ryan_moehring@fws.gov]
Sent: Wednesday, June 01, 2016 5:01 PM
To: Mike Blenden; Steve Kallin
Cc: Will Meeks; Maureen Gallagher; Toni Griffin; Keenan Adams; Lori Iverson; Anna Munoz
Subject: NER CCP

All,

Anna told me today that Noreen is in receipt of the NER Final CCP FR notice. It seems that Noreen had some concerns that releasing the notice at this time might fan the supplemental feeding flames we experienced this winter.

We have not made much progress on the engagement strategy Noreen requested for the BEMP, primarily because we have been waiting on WGFD to signal how/if it would support the plan. To my knowledge, we are still waiting on that information.

My intent is to 1) ensure that all of us copied here are in the loop and that we have an ongoing dialogue before and as we move forward; 2) provide us with enough time to adequately plan our outreach and engagement activities to ensure both the CCP and BEMP are well-received; 3) keep leadership informed of our plans and activities along the way.

I'm open to others' thoughts re: next steps, though it seems to me that one of them should be for Steve to share with us the latest from WGFD and their Elk Herd Objective Meetings and how those items are likely to affect the content of the final step down plan. Once we know what our final plan is going to look like, we can begin working in earnest on the engagement/outreach plan and how that relates to the CCP rollout.

Full disclosure: I am almost fully committed for the month of June, so my availability to work on this is going to be limited in the short term. It may take us some time to work through the above details, so hopefully if we start talking now, by the time my schedule frees up we'll be a in a good place to move forward.

Please share your thoughts when you have a moment.

Thanks,
Ryan

Ryan Moehring
Public Affairs (ND, SD, WY, MT)
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

Web |Facebook | Twitter | Flickr | YouTube

From:	Will Meeks
To:	Anna Munoz
Cc:	ryan_moehring@fws.gov
Subject:	Fwd: NER CCP
Date:	Friday, July 08, 2016 8:27:16 AM

We do need to talk about this. I'd like to take the approach that proposes:

1. Publish CCP
2. Public engagement strategy per the Adaptive Management Plan (AMP)
3. Future Implementation of AMP

The CCP is a different planning document since the EIS per the court case forced the Bison and Elk Management Plan of which the AMP is a step-down.

They are related, but are different.

Let's get together soon.

Will Meeks
U.S. Fish and Wildlife Service
Mountain-Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

Begin forwarded message:

> **From:** "Griffin, Toni" <toni_griffin@fws.gov>
> **Date:** July 5, 2016 at 1:06:31 PM MDT
> **To:** Steve Kallin <steve_kallin@fws.gov>
> **Cc:** Mike Blenden <mike_blenden@fws.gov>, Ryan Moehring <ryan_moehring@fws.gov>, Will Meeks <will_meeks@fws.gov>, Maureen Gallagher <maureen_gallagher@fws.gov>, Keenan Adams <keenan_adams@fws.gov>, Lori Iverson <lori_iverson@fws.gov>, Anna Munoz <anna_munoz@fws.gov>, Cris Dippel <cris_dippel@fws.gov>, Eric Cole <eric_cole@fws.gov>
> **Subject: Re: NER CCP**
>
> Steve, Mike, and Ryan,
>
> I'm happy to help with the public outreach for the CCP and BEMP as needed. I'll be out of the office July 11-14 for training but am otherwise available to assist.
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Toni Griffin
Refuge Planning
Division of Biological Resources
Mountain-Prairie Region
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Office Phone: 303-236-4378

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If needed, I would appreciate discussing these issues in more detail at everyone's earliest convenience.

Take care,

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Project Leader

National Elk Refuge

PO Box 510

675 East Broadway

Jackson, WY 83001

Phone: (307) 201-5409

Fax: (307) 733-9729

steve_kallin@fws.gov

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Ryan Moehring

Public Affairs (ND, SD, WY, MT)

U.S. Fish and Wildlife Service

Mountain-Prairie Region

303-236-0345

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Public Affairs (ND, SD, WY, MT)

U.S. Fish and Wildlife Service

Mountain-Prairie Region

303-236-0345

Web |Facebook | Twitter | Flickr | YouTube

From: Ryan Moehring
To: Anna Munoz (anna_munoz@fws.gov)
Subject: RE: NER CCP
Date: Wednesday, July 13, 2016 12:15:00 AM

Anna,

Below is what I would like to send to Will, but I thought it appropriate to run it past you first. My gut, and that of every other person in Refuges with whom I've spoken about this, tells me to get this CCP out the door as soon as humanly possible.

Thanks, Will.

Given how difficult it can be to align our schedules, and the narrow FR publishing timeframe Toni outlined below, I'm wondering if you would consider giving your approval to publish the CCP in advance of our meeting. It seems to me that we may have just enough time to meet the deadline if we set that process in motion ASAP. We could start discussing/working on the AMP and related engagement strategy just as soon as we can all get in a room together (likely next week). My concern is that if you wait to give the OK to publish the CCP until after we meet we'll miss the FR window, which will likely delay CCP publication by months (because the package will need to be re-assembled/submitted) and potentially have negative impacts on the future reception of our engagement strategy (more than a year will have passed between signing the CCP and publishing it, naturally leading the public to question why).

Does that seem like a logical approach to you? From your email below it appears that you were already inclined to publish the CCP in advance of the engagement strategy's completion; this way we would simply set that process in motion prior to discussing the rest of these NER items. I haven't checked with Toni recently on the reality of this timeline, since I've been on S/L and she's been in training, but my sense is that if we pull the trigger immediately we can just barely publish the CCP before our current window closes.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Will Meeks [mailto:will_meeks@fws.gov]
Sent: Friday, July 08, 2016 8:27 AM
To: Anna Munoz
Cc: ryan_moehring@fws.gov
Subject: Fwd: NER CCP

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Will Meeks
U.S. Fish and Wildlife Service
Mountain-Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

Begin forwarded message:

> **From:** "Griffin, Toni" <toni_griffin@fws.gov>
> **Date:** July 5, 2016 at 1:06:31 PM MDT
> **To:** Steve Kallin <steve_kallin@fws.gov>
> **Cc:** Mike Blenden <mike_blenden@fws.gov>, Ryan Moehring <ryan_moehring@fws.gov>, Will Meeks <will_meeks@fws.gov>, Maureen Gallagher <maureen_gallagher@fws.gov>, Keenan Adams <keenan_adams@fws.gov>, Lori Iverson <lori_iverson@fws.gov>, Anna Munoz <anna_munoz@fws.gov>, Cris Dippel <cris_dippel@fws.gov>, Eric Cole <eric_cole@fws.gov>
> **Subject: Re: NER CCP**
>
> Steve, Mike, and Ryan,
>
> I'm happy to help with the public outreach for the CCP and BEMP as needed. I'll be out of the office July 11-14 for training but am otherwise available to assist.
>
> Something to be aware of is the HQ clearance window for the FR notice ends July 25. If we're not able to publish the notice by July 25 we'll need to submit it through the HQ clearance process again.
>
> My concern is the NER CCP was approved last fall. It typically takes 3-4 months to produce the final document and make it available to the public after it's been approved. I'm not sure how to address the delay in releasing the CCP to the public but it's something we should consider as we work on the outreach/communications plan.
>
> Thanks

Toni Griffin
Refuge Planning
Division of Biological Resources
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
Lakewood, CO 80228
Office Phone: 303-236-4378

On Mon, Jun 27, 2016 at 4:15 PM, Steve Kallin <steve_kallin@fws.gov> wrote:
Mike & Ryan:

This is a brief update concerning the BEMP Step Down Plan. On June 17, we completed our first Step Down Plan Team meeting (agencies) since August 2015. A number of questions came up during the meeting, prompting additional communications between the Jackson WGFD Wildlife Office and the WGFD Wildlife Administration Office in Cheyenne. Last Friday, June 24, I had a conversation with the Jackson WGFD Regional Wildlife Supervisor to clarify some of these questions after he discussed them with the WGFD Cheyenne Office. The June 24 conversation was encouraging.

In general, the Jackson WGFD Office appears willing to work with us (NER and Grand Teton National Park) to implement the strategy of redistributing wintering elk as outlined in the Draft Step Down Plan. However, my impression during the June 24 conversation was that some WGFD Wildlife Administrators in the Cheyenne Office are skeptical and their support for this effort seems to be very soft. They are requiring a minimum of 30 days for a review of the final draft Step Down Plan by the WGFD and other state departments before they can commit state support.

We are updating the Step Down Plan based on the last meeting and conversations. The Step Down Planning Team is scheduled to again meet on July 18 and hopefully will complete a draft plan that will go out for peer review. After incorporating peer review comments, the plan will go back to the agencies for a quick review and comments before going out for public review. After the public comments are incorporated, agencies will have another opportunity to review. This is where the state is requesting 30 days.

The Planning Team understands the goal is to have an approved Step Down Plan so implementation can begin during the upcoming 2017 feed season. We have identified at least 14 steps that need to be completed by then, so time is tight. Hopefully, a draft plan can be released to the public for comments in September or October. There will be no shortage of public controversy when the draft plan is released.

I strongly recommend the NER CCP be released as soon as possible. I predict the controversy associated with the Final CCP will be manageable and if addressed soon, will not impair our ability to complete and implement an approved BEMP Step Down Plan by the next feeding season. However, if we wait to release the CCP when the Step Down Plan goes out for public comment, all bets are off.

If needed, I would appreciate discussing these issues in more detail at everyone's earliest convenience.

Take care,

Steve Kallin
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steve_kallin@fws.gov

From: Ryan Moehring [mailto:ryan_moehring@fws.gov]
Sent: Monday, June 27, 2016 2:18 PM
To: Steve Kallin
Cc: Mike Blenden
Subject: RE: NER CCP

Hi Steve,

I am confident that the CCP is going to be held up until we satisfy Noreen's desire for an engagement strategy around the step-down. I just responded to my last email chain on the subject so we can continue the dialogue with the group. Please share your thoughts in the form of a reply-all when you have a moment and I'll be happy to work with you to get this across the finish line.

Thanks,
Ryan

Ryan Moehring
Public Affairs (ND, SD, WY, MT)
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Monday, June 27, 2016 1:48 PM
To: Ryan Moehring
Cc: Mike Blenden
Subject: RE: NER CCP

Ryan:

Any idea where we stand on the release of the CCP?

Steve Kallin
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steve_kallin@fws.gov

From: Ryan Moehring [mailto:ryan_moehring@fws.gov]
Sent: Wednesday, June 01, 2016 5:01 PM
To: Mike Blenden; Steve Kallin
Cc: Will Meeks; Maureen Gallagher; Toni Griffin; Keenan Adams; Lori Iverson; Anna Munoz
Subject: NER CCP

All,

Anna told me today that Noreen is in receipt of the NER Final CCP FR notice. It seems that Noreen had some concerns that releasing the notice at this time might fan the supplemental feeding flames we experienced this winter.

We have not made much progress on the engagement strategy Noreen requested for the BEMP, primarily because we have been waiting on WGFD to signal how/if it would support the plan. To my knowledge, we are still waiting on that information.

My intent is to 1) ensure that all of us copied here are in the loop and that we have an ongoing dialogue before and as we move forward; 2) provide us with enough time to adequately plan our outreach and engagement activities to ensure both the CCP and BEMP are well-received; 3) keep leadership informed of our plans and activities along the way.

I'm open to others' thoughts re: next steps, though it seems to me that one of them should be for Steve to share with us the latest from WGFD and their Elk Herd Objective Meetings and how those items are likely to affect the content of the final step down plan. Once we know what our final plan is going to look like, we can begin working in earnest on the engagement/outreach plan and how that relates to the CCP rollout.

Full disclosure: I am almost fully committed for the month of June, so my availability to work on this is going to be limited in the short term. It may take us some time to work through the above details, so hopefully if we start talking now, by the time my schedule frees up we'll be a in a good place to move forward.

Please share your thoughts when you have a moment.

Thanks,
Ryan

Ryan Moehring
Public Affairs (ND, SD, WY, MT)
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

Web |Facebook | Twitter | Flickr | YouTube

From:	Steve Kallin
To:	Dale Deiter; Murphy, Kerry M -FS; Sarah Dewey; David Gustine; Brad Hovinga; doug.brimeyer@wyo.gov; Steve Cain; Cris Dippel; Eric Cole
Subject:	Updated Draft BEMP Step Down Plan (v. 2.8)
Date:	Thursday, July 21, 2016 3:34:11 PM
Attachments:	Draft NER Step Down Plan v2.8_7-21-2016.docx

Hi All:

Attached is the most recent version of the Draft BEMP Step Down Plan (v. 2.8), which includes the changes discussed at our last Team Meeting on Monday, July 18.

Sorry I was unable to get this out sooner in the week. A BIG thank you to Dave Gustine for repairing troublesome Table #4 that delayed progress. Please review and make comments/changes using "track changes" and return to me at your earliest convenience. Our goal is to make updates based on your comments and then send it out for peer review on Monday, 7/25.

Thank you for your help; sorry for the short turn around,

Steve Kallin
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U.S. Fish and Wildlife Service National Park Service

July 21, 2016 Draft

BISON AND ELK MANAGEMENT STEP DOWN PLAN

A Structured Framework for Reducing Reliance on Supplemental Winter Feeding

National Elk Refuge

Grand Teton National Park

DRAFT

July 21, 2016

July 21, 2016 Draft

BISON AND ELK
MANAGEMENT STEP DOWN PLAN

For the

National Elk Refuge,

Grand Teton National Park,

John D. Rockefeller, Jr. Memorial Parkway

Teton County, Wyoming

DRAFT

***Suggested Citation**:* U.S. Fish and Wildlife Service: 2015. Bison and Elk Management Step Down Plan, National Elk Refuge and Grand Teton National Park. U.S. Department of the Interior, Washington D.C. Available online at:

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EXECUTIVE SUMMARY

Overview

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands, focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The final plan directed the NER and GRTE (in conjunction with the Wyoming Game and Fish Department: WGFD) to maintain the state's elk herd objective of 11,000; establish a bison population objective of 500; restore habitat on the NER and in GRTE; continue hunting bison and elk on the NER; continue the elk reduction program, when necessary, in GRTE; allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available; and develop a dynamic, structured framework and Step Down Management Plan for decreasing the need for supplemental feeding on the NER. ***This Bison and Elk Management Step Down Plan (SDP) was developed to specifically addresses the criteria for a structured framework referenced in the Record of Decision.***

Background

Winter feeding of elk in Jackson was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. The loss of available winter range in Jackson Hole due to new ranching operations and a growing town resulted in significant numbers of elk dying during several severe winters in the late 1800s and early 1900s. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, established the National Elk Refuge. Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding.

Bison were extirpated outside Yellowstone National Park (YNP) by the mid-1880s but in 1948 were reintroduced to Jackson Hole when 20 bison from (YNP) were released near Moran, Wyoming. The herd remained small until discovering elk feedlines in 1980, when the population began sustained population growth. Bison and elk that winter on the NER are migratory and occupy summer ranges predominantly to the north.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands, thereby reducing other wildlife associated with woody vegetation, unusually low winter mortality, which affects predators and other species and requires intensive hunting programs.

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. The potential risk of catastrophic disease outbreaks and the need to mitigate this threat is a vital component in achieving the BEMP Sustainable Populations Goal.

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Objectives

This Step Down Plan addresses several objectives under a broader BEMP goal of sustainable populations, which directed the agencies to: 1) Develop a dynamic, structured framework for reducing NER supplemental feeding; 2) [implement a] phased reduction of animals on feed: a) Phase 1, to 5,000 elk and 500 bison, and b) Phase 2 [to a point where] elk and bison rely predominantly on native habitat; 3) maintain natural elk bull-to-cow ratios in park summer herd; and 4) Enhance public outreach/education. The BEMP further stated that consideration criteria for implementing the 2nd phase of reduced feeding would include some or all of: 1) the level of forage production and availability on the National Elk Refuge , 2) desired herd sizes and age/sex ratios, 3) effective mitigate of bison and elk co-mingling with livestock on private lands , 4) winter distribution patterns of elk and bison, 5) prevalence of brucellosis, chronic wasting disease, and other wildlife diseases, and 6) public support. **In short, the overall objective of this plan is to provide a path for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives and public support.**

Strategies

Elk have been fed for some period during nearly every winter on the National Elk Refuge since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during a time of year when natural forage is typically most limited is powerful to both species, and their knowledge of its existence has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Attempting to modify this behavior on a large scale is unprecedented and will necessarily require investigation, constant evaluation, modifications to approach when indicated, and repeated trials.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into the 3 broad categories of 1) timing and intensity of winter feeding, 2) timing and intensity of hunting, and 3) herd segment specific and overall harvest levels.

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes. Rather than basing progress toward the number of elk on feed for the entire season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 were elk fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000. We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both species on supplemental winter feeding. However, these benchmarks are not the exclusive method to determine Step Down Plan success (see p. 21?; Elk Fed Days and Bison Fed Days).

Initial success of MSP implementation will be a consistent decline in the 3-year running average of elk and bison fed days from the established

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baseline. While the BEMP did provide specific measurement criteria for the definition of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage" we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row.

Chronic Wasting Disease. CWD has been detected within 40 miles of the Jackson Elk Herd (JEH) in moose, within 35 miles in deer, and within 175 miles in elk. Continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence will take place. Some aspects of CWD response planning could change depending on the outcome of the WGFD CWD management plan revision process.

Winter Feeding. Currently, the initiation of supplemental winter feeding occurs when available forage drops to 300 lbs./acre along transects in areas with highly preferred grasses. This protocol will change to delay the initiation of feeding.

The strategy of delaying the start of supplemental feeding is to encourage elk and bison to use native winter range, especially those individuals that have not previously received a food reward on the Refuge. Over time, it's anticipated a cohort of animals will develop that are not conditioned to the Refuge supplemental feeding program, which will reduce herd concentrations and the risk of disease transmission.

To reduce supplemental feeding overall, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require assistance with focused mitigation measures.

As bison and elk behavioral responses are better understood, feeding delays will be extended to encourage a redistribution of elk and bison to native winter range.

There are a number of variables (Table 4, Fig. 10) which will be considered and will influence the feeding delay length and timing.

Time of season could influence this interval, most likely shortening it as the feeding initiation date gets later. During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Delaying feeding by two weeks in January, for example, is likely to be more successful in dispersing animals, than doing so in February, when food stress and tendency for animals to move to private lands is greater. Forage availability could also have an influence, particularly if a freeze thaw event resulted in an acute and large reduction in available forage. Both time of season and forage availability considerations would be affected by the numbers of elk and bison on the NER. And finally, the distribution of animals, particularly on private, livestock producing lands, would be considered.

Monitoring programs will include measures of calf mortality and it will be an influencing parameter in feedback mechanisms. The BEMP anticipated that elk mortality could increase from 1-2% overall to 1-5%.

Initially, the termination of feeding, which is now based on a snow cover index and subjective evaluation of available forage, is expected to occur about a week earlier.

Harvest. Few options for manipulating elk hunting are currently available because the JEH is at or near the 11,000 WGFD objective. Proposed changes include allowing limited any elk permits

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and consideration of a bow season near developments on the NER, and shifting the season later to better coincide with migration timing.

Based on bull ratios in the park summer herd that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to antlerless only in 2012. ERP permit structures in the park will remain antlerless only unless bull ratios consistently exceed 35:100 cows. Park and refuge officials will work together to support this goal as expanded refuge hunting opportunities are considered.

Recent trends of reduced use of traditional winter range and increases in short-distance migrant summer herd segments have led to significant increases of winter elk concentrations on the NER. If efforts to encourage increased use of native winter range are unsuccessful, ~~serious consideration should be given to reducing the Jackson Elk Herd population objective in the future,~~ agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future Jackson Elk Herd population objective, ~~which would~~ to provide a level of harvest flexibility more commensurate with addressing these herd changes.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution or discouraging bison from attempting to leave the NER via the south boundary into the town of Jackson. Serious consideration should be given to reducing the bison herd population objective in the future to lower winter NER forage consumption and help reduce elk and bison winter concentrations. Genetic diversity could be addressed by periodically introducing bison from other herds.

Effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st in the future.

Private Lands Mitigation. Several strategies would be employed to mitigate likely changes in bison and elk distribution, including providing incentives for non-breeding cattle operations, increased fencing in some limited areas to separate elk/bison from livestock feed lines, hazing elk/bison away from livestock feed lines and purchasing private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal wildlife conflict technician positions supervised by WGFD.

Vegetation Restoration.

The varied approaches to restore the Kelly Hayfields in GRTE (4,500 acres) was initiated in 2008 and will likely be complete in 2035. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. The restoration process involves removal of non-native vegetation, collection and propagation of native seeds and plants, as well as the seeding of native plants.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres are currently under restoration treatment and 3,265 acres remain non-native pasture. Maintenance of restored ecological conditions will require management efforts in perpetuity to keep non-native species from colonizing restored areas. The park will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

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Strategies Considered But Rejected

Strategies considered but rejected include fertility control in elk and bison, agency reduction of either elk or bison, and altering rations of supplemental feed.

Models and Monitoring

Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

A robust monitoring program will be necessary to track the effects of actions implemented under this plan. Critical monitoring components will include: 1) enhanced forage production and availability sampling; 2) measuring animal abundance and distribution including differences in some sex and age classes; determining elk and bison fed days each feeding season; 3) estimating winter mortality; 4) brucellosis seroprevalence rates; and 5) CWD surveillance. In many cases, attribute baselines for the period preceding implementation of this plan have been developed for comparison after the plan is implemented.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term, sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented in an annual Step Down Pplan update/report, completed by NER staff by the end of June.

Public Outreach/Education

De-emphasizing the supplemental feeding program will be a major paradigm shift especially for the residents of Jackson Hole and, Teton County, and the State of Wyoming but will also be of interest to others in Wyoming and across the nation familiar with the long history of feeding elk on the National Elk Refuge. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk/bison herd management methods. A detailed communication plan has been developed that identifies key messages and utilizes a variety of outreach methods, including print, video, and voice material, utilizing social media, and meetings with elected officials, state and local governments, agency and tribal partners, community organizations, stakeholders, and the general public.

Schedule

Assuming adequate funding, actions under this plan will begin with radio-collaring elk in February 2016, followed by public outreach, private lands conflict mitigation and contacts, and enhanced forage monitoring in March 2016, and initiating supplemental feeding changes in January 2017.

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INTRODUCTION

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands. It included directives for forthcoming development of adaptive management practices to address several objectives in the plan, including a desired future condition of elk and bison relying predominantly on native forage. This Bison and Elk Management Step Down Plan has been developed expressly for that purpose.

Bison and Elk Populations

While Jackson Hole is probably best known for the splendor and ruggedness of the Teton Range, the Jackson bison and elk herds rank among the top characterizing features of the valley. Both figure prominently in Jackson Hole's history and culture, although bison were absent from the valley for about 100 years between the mid-1800s and mid-1900s.

The Jackson elk herd occupies approximately 8,000 km^2 in the upper Snake River watershed north of the town of Jackson (Fig. 1). Much of the herd is migratory, moving between distinct wintering and summer ranges. Primary wintering areas include the Buffalo Valley, lower elevations of the Gros Ventre River drainage, the National Elk Refuge (NER), and areas adjacent to the NER on Bridger-Teton National Forest (BTNF) lands. Summering areas occur throughout the herd's range and for convenience are divided into five geographic regions that include Grand Teton National Park (GRTE), Yellowstone National Park (YNP), the Gros Ventre drainage, Teton Wilderness, and Southwest Boundry area, which includes private and public lands in the vicinity of GRTE's southwest boundary.

In the late 1800s, when elk populations all over North America were being extirpated, the residents of Jackson Hole protected elk from "tusk hunters" and large-scale commercial hunting operations. Elk are just as important to today's residents of the valley. Thousands of people each year have the opportunity to see elk at close range on the refuge while riding on horse-drawn sleighs. Thousands of pounds of shed elk antlers are sold at an annual antler auction each spring in the town square. Elk are important to backcountry users as well as to people that never leave the road. Jackson Hole is a popular destination for instate and out-of-state elk hunters. The draw of elk to visitors contributes significantly to the local economy.

Winter feeding of elk in Jackson Hole began in 1910 and was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. According to historical reports, before Euro-American settlement some Jackson elk wintered in the southern portion of Jackson Hole (present location of the NER town of Jackson) and may have used areas outside Jackson Hole, including the Green River and Wind River basins to the south and east, respectively, and the Snake River basin to the southwest in what is now eastern Idaho (Allred 1950; Anderson 1958; Blair 1987; Barnes 1912; Sheldon 1927). Radio-collar studies have documented small numbers of Jackson elk wintering in each of these areas in recent times as well (NER and GRTE, unpublished data). Over time, changes in land use and development in these areas, over hunting, and establishment of feedgrounds probably reduced the use of these areas by Jackson elk.

By the end of the 19th century the Jackson elk herd was believed to be largely confined to Jackson Hole and the immediately surrounding area, where wintering conditions are often harsh. Compounded by the loss of available winter range in Jackson Hole due to new ranching

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operations and a growing town, significant numbers of elk died during several severe winters in the late 1800s and early 1900s. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, appropriated $45,000 for the purchase of lands and maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first winter census in

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the area was conducted in 1912 and showed about 20,000 elk residing in Jackson Hole and the Hoback River drainage (the latter is not within the Jackson elk herd's range).

Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding,

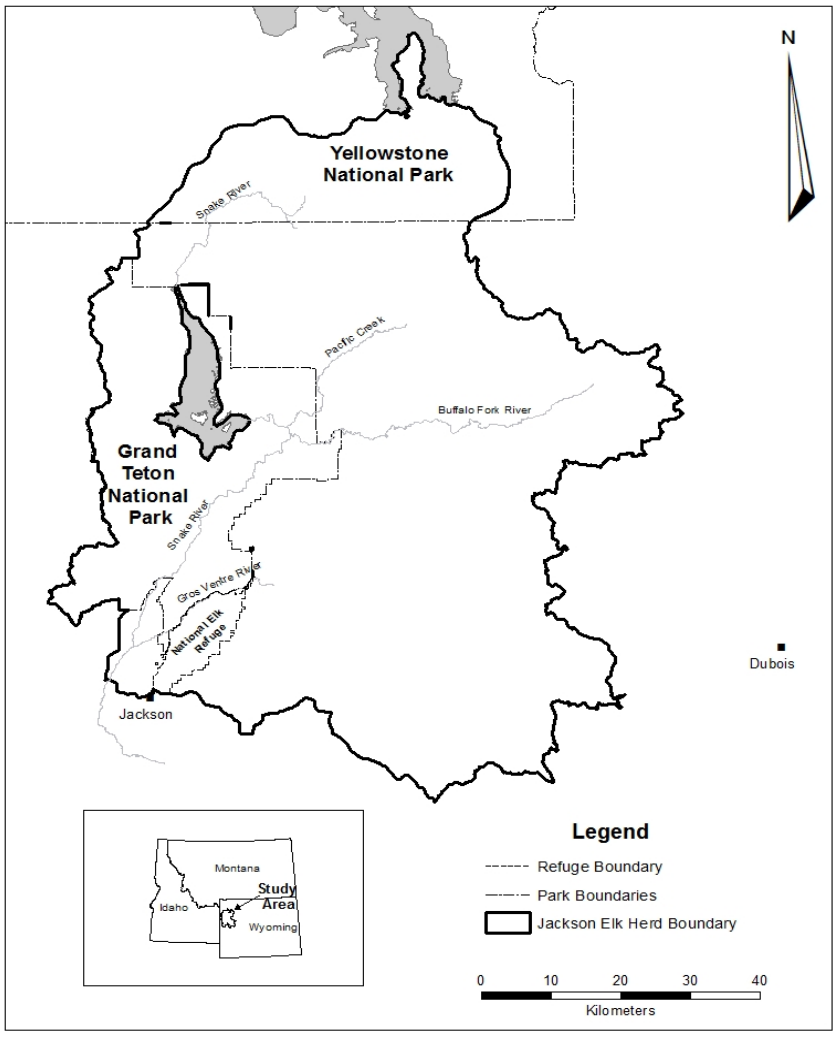


Figure 1. Jackson elk and bison herd ranges, including the National Elk Refuge, Grand Teton and Yellowstone National Parks, and Bridger-Teton National Forest. [include bison range, labels for continental divide and Bridger-Teton National Forest, and in Legend Jackson elk herd unit].

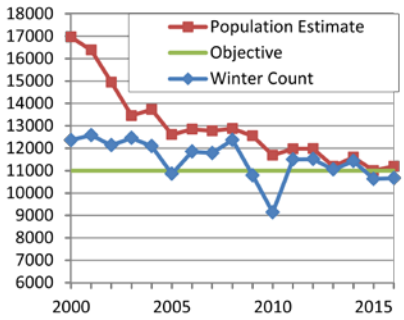


Figure 2. Winter Counts, population estimates, and herd objective for the Jackson elk herd, 2000-2016.

and the desire to maintain a population objective established in the context of supplemental feeding. Its population in recent times has fluctuated near its herd objective of 11,000 adopted by the WGFD (Fig. 2)

An iconic symbol of the American West, bison are also popular with visitors and residents. Because so few opportunities remain to see bison in the wild, viewing and photographing them in Grand Teton National Park with the Teton Range in the background is a treasured opportunity for many of the valley's visitors. Similar to elk, there is also a high level of interest in bison hunting. Bison are of particular interest to nearby American Indian tribes and tribes in other parts of the United States because the animals are central to their culture and tradition.

Bison are native to Jackson Hole, as evidenced by the presence of prehistoric bison remains throughout the valley, but were extirpated outside Yellowstone National Park by the mid-1880s. In 1948, 20 bison from Yellowstone National Park (YNP) were reintroduced to the 1,500-acre Jackson Hole Wildlife Park near Moran. The Jackson Hole Wildlife Park was a private, non-profit organization sponsored by the New York Zoological Society, the Jackson Hole Preserve, Inc., and the Wyoming Game and Fish Department (WGFD). A population of 15–30 bison was maintained in a large enclosure there until 1963, when brucellosis was discovered in the herd (likely transferred with the original 20 animals from YNP). At that time, all the adult animals were destroyed, but four vaccinated yearlings and five vaccinated calves were retained. In 1964 twelve certified brucellosis free bison from Theodore Roosevelt National Park were added to the herd. In 1968 the herd (down to 11 animals) escaped the confines of the wildlife park, and a year later the decision was made to allow them to range freely. The expansion of GRTE in 1950 had enveloped the Wildlife Park, and allowing the bison to free range was and remains consistent with National Park Service wildlife management policy. The herd remained small and wintered mostly in the Snake River bottoms in GRTE until 1975, when it followed the winter environmental gradient to the NER and began wintering there. The use of standing forage by bison on the NER was viewed as natural behavior thus acceptable to managers. In 1980, however, bison discovered and utilized supplemental feed provided for elk, and they have continued to do so every winter since.

The discovery of supplemental feed by bison has had several consequences, including a significant increase in the population's growth rate (Fig 3). Bison on the elk feedlines have at times disrupted feeding operations and displaced and injured elk. To minimize conflicts between bison and elk, managers have provided separate feedlines for bison since 1984. As the population has grown, separating elk and bison on feedlines has become increasingly difficult, and a variety of feeding strategies are employed to help reduce displacement of elk.

As the herd has grown it has maintained fairly stable movement patterns, wintering almost entirely on the NER and summering within GRTE and adjacent lands on the BTNF (Fig. 1).

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison

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herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands, thereby reducing other wildlife associated with woody vegetation, unusually low winter mortality, which affects predators and other species and requires intensive hunting programs.

Planning History

Jackson's bison and elk populations have been the subject of previous planning efforts. Elk management and research has been guided by the Jackson Hole Cooperative Elk Studies Group since it was established in 1958. The group consists of biologists and agency administrators from the National Elk Refuge, Grand Teton and Yellowstone National Parks, the Bridger-Teton National Forest, and Wyoming Game and Fish Department, who meet at least annually to coordinate management of the population and its habitat. Coordination of bison management began soon after they started frequenting the NER in 1976 and using supplemental feed provided to elk in 1980 (Fig. 3). Release of an "Interim" plan that called for maintaining a herd of 90-110 bison while data were gathered for a long term plan occurred in 1988. It was followed by implementation of a sport hunt outside GRTE, administered by WGFD. This plan was halted after litigation in which the plan's violation of NEPA was successfully argued by plaintiffs.

In 1996, after considerable herd growth, a new long term management plan and environmental assessment for the Jackson bison herd was released (Fig 3). This plan had strong support and called for maintaining a herd size of 350-400 bison, but it was shelved a year later when plaintiffs from the earlier litigation successfully

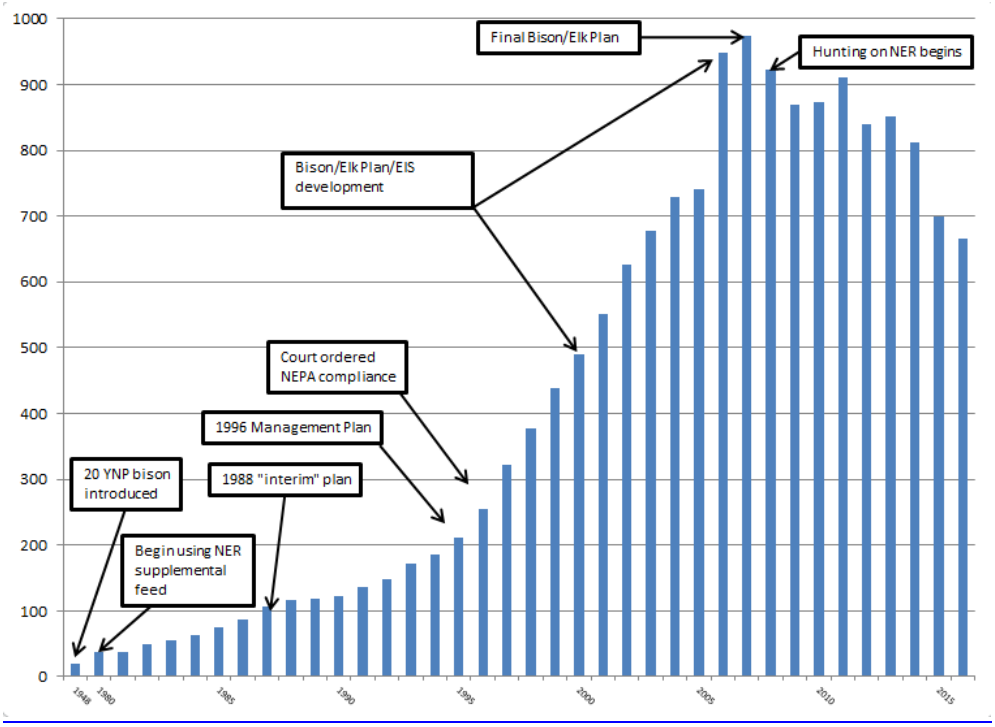


Figure 3. Population growth and planning history for the Jackson bison herd, 1948-2016.

argued that, because the plan failed to consider the effects of feeding elk on bison management, it also violated NEPA and was not sufficient. This led to development of the draft bison and elk management plan and environmental impact statement from 2000-2006 and release of the final plan in 2007 (Fig 3).

The 2007 Bison and Elk Management Plan (BEMP; USFWS 2007) considered six alternatives for bison and elk management focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The primary management scenarios presented in the alternatives included the status quo, terminating elk and bison hunting on the NER and the elk reduction program in GRTE, brucellosis vaccination options, restoring habitat, improving forage, and decreasing or phasing out supplemental winter feeding.

The final BEMP (USFWS 2007; www.fws.gov/bisonandelkplan) which set management direction for 15 years or until a subsequent plan is developed, proposed to maintain the state's elk herd objective of 11,000, establish a bison population objective of 500, restore habitat on the NER and in GRTE, continue hunting bison and elk on the NER, continue the elk reduction program in GRTE, when necessary, in concert with the parks enabling legislation (citation), allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available, and develop a dynamic framework of management actions which adaptively decrease the need for supplemental feeding on the NER. ***This Bison and Elk Management Step Down Plan was developed to address the latter and specifically addresses the criteria for a structured framework listed on page 5 of the Record of Decision*** **(Fig. 4).** It does not address other on-going bison and elk management actions already prescribed by the BEMP.

The BEMP scheduled the completion of the Step Down Management Plan for 2008. However, litigation challenging the BEMP in 2008 led to the decision to postpone its development until litigation was resolved. As of March 2015, two court rulings have upheld the 2007 BEMP and ROD. In a lawsuit against the BEMP and its author agencies (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2010), plaintiffs argued that the BEMP violated the National Wildlife Refuge System Improvement Act (National Wildlife Refuge System Improvement Act 1997) by disrupting the biological integrity of the Refuge, and that the plan and the accompanying EIS violated NEPA because they were insufficiently detailed to allow a reasonably complete discussion of mitigation. The crux of the plaintiff's argument was that the plan did not set a specific date for the cessation of supplemental feeding. In response, the agencies argued that the plan constituted a valid exercise of discretion and that it and the EIS were sufficiently detailed to satisfy the requirements of NEPA. In March 2010 the United States District Court for the District of Columbia sided in favor of the agencies in this case. In 2011 the plaintiffs appealed this ruling to the United States Court of Appeals for the District of Columbia Circuit. This Court affirmed the District Court ruling (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2011).

National Environmental Protection Act Compliance

The 2007 BEMP/EIS and Final Record of Decision (ROD) satisfied NEPA requirements for current bison and elk management through a detailed analysis of alternative management actions and their likely effect on the environment, and substantial involvement of the public in the process. This Step Down Management Plan is does not duplicate or add to this process. It is designed to tier off of the BEMP as a dynamic implementation guide to one part of the preferred alternative outlined in the BEMP ROD.

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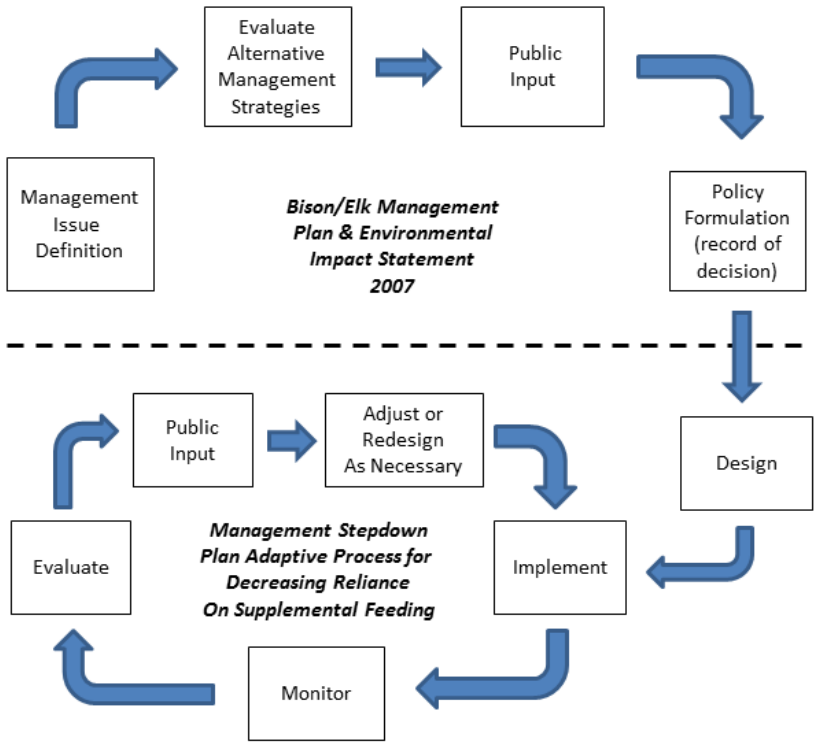


Figure 4. Management step down planning for supplemental feeding on the National Elk Refuge and its relationship to the 2007 Bison/Elk Management Plan and Environmental Assessment.

As such, references to NEPA covered in the BEMP will be included where necessary in this document, and the discussion of any action that would require additional NEPA compliance will be explicitly stated as such in that context.

Management Step Down Planning

The use of adaptive management plans has gained popularity in natural resource management planning because, by definition, they allow modifications of strategy based on monitoring results and outcomes toward reaching specific goals or objectives. Four elements generally included in an adaptive management approach include: 1) well defined and mutually agreed upon objectives, 2) knowledge (including descriptive models) of the dynamics of the system being managed, 3) clearly articulated management actions and strategies, and 4) a monitoring program to evaluate responses of the system to management actions (Walters 1986).

This step-down plan utilizes adaptive management planning principles but is not intended to include all of the adaptive management planning elements outlined in the Department of Interior Adaptive Management Technical Guide (2007). This Step-Down Plan is more accurately described as a "structured framework" of adaptive management actions

that progressively transitions from supplemental winter feeding to greater reliance on free-standing forage (BEMP ROD p.5).

OBJECTIVES

The management direction and desired conditions stated in the BEMP called for the NER and GRTE staffs to work with others (agencies, partners, etc) to "adaptively manage elk and bison in a manner that contributes to the State's herd objectives yet allows for the biotic integrity and environmental health of the resources to be sustained," so that the public can enjoy a variety of compatible wildlife-dependent recreational opportunities. Under the BEMP's 4 primary goals, 20 associated objectives were identified (Table 1). This Step Down Plan addresses four objectives under the goal of sustainable populations (Fig. 5).

The reduction of animals on feed at the NER was proposed to be spread over two phases. In Phase 1 , the aim is to reduce the average number of elk on feed to 5,000 (while maintaining WGFD's 11,000 elk herd objective), and reduce the winter population of bison to the BEMP recommended and WGFD adopted objective of 500. In Phase 2, the overall objective is to reduce the reliance of bison and elk on supplemental feed (USFWS and USNPS 2007a). Desired conditions include animals relying predominantly on native habitat and cultivated forage. Important consideration criteria for implementing Phase 2 will include: 1) the level of forage production and availability on the National Elk Refuge and adjacent winter ranges, 2) maintenance of desired herd sizes and age/sex ratios, 3) the ability to effectively mitigate bison and elk livestock conflicts, such as co-mingling on on private lands during high risk disease transmission periods, 4) maintaining desirable winter distribution patterns of elk and bison, 5) the prevalence of brucellosis, chronic wasting disease, and other wildlife diseases, and 6) public support. In short, the overall objective of this plan is to outline a framework for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives.

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This Plan focuses on management actions to initially achieve Phase 1 objectives. However, if successful, these actions will continue to be used to achieve the Phase 2 objective of reducing reliance on supplemental feeding while considering the six criteria listed above.

Table 1. 2007 Bison/Elk Management Plan Goals and Objectives (Step Down Plan objectives shaded)

Goal: Habitat Conservation

Objectives:

- Conserve important private lands.
- Increase forage production.
- Minimize non-native plants.
- Protect sagebrush grasslands.
- Restore willow, aspen, and cottonwood.
- Perpetuate natural mosaic of plant communities.

Goal: Sustainable Populations

Objectives (BEMP pages 135-136):

- Develop structured framework for reducing NER supplemental feeding.
- Phase reduction of animals on feed: 1) to 5,000 elk and 500 bison, and 2) elk and bison rely predominantly on native habitat.
- Maintain natural bull-to-cow ratios in park summer herd.
- Ensure a genetically viable bison herd with close to an even sex ratio.
- Enhance public outreach/education.

Goal: Elk and Bison Numbers

Objectives:

- Maintain state elk herd objective of 11,000.
- Maintain a genetically viable bison population of about 500 animals.

Goal: Disease Management

Objectives:

- Manage brucellosis transmission risk from elk and bison to livestock.
- Manage feeding to reduce brucellosis transmission among bison and elk.
- Educate hunters about wildlife disease human health hazards.

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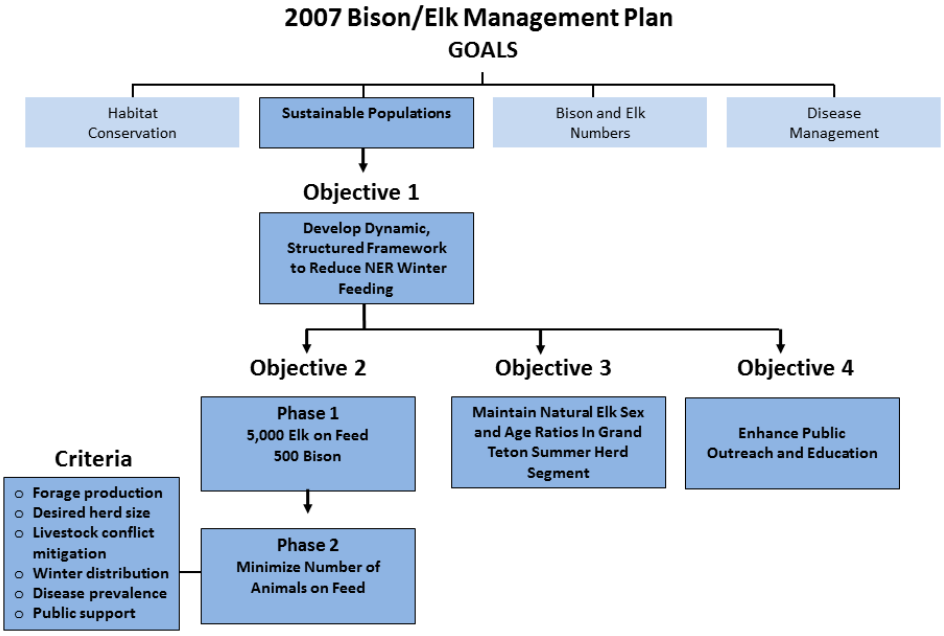


Figure 5. Relationship of Step Down Management Plan to the 2007 Bison/Elk Management plan goals, phasing of objectives, and consideration criteria for reducing the reliance of elk and bison on supplemental feed during phase 2.

MANAGEMENT ACTIONS AND STRATEGIES

Background

The principle goal of reducing reliance on supplemental feeding is to limit transmission of density dependent diseases in elk and bison while simultaneously minimizing winter mortality in elk. We will attempt to achieve this goal by experimentally reducing feed season length and closely monitoring elk and bison distribution and winter mortality.

Elk have been fed on the National Elk Refuge each year in all but 9 winters since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during winter months is powerful to both species, and their knowledge of Refuge feed grounds has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Because use of feed grounds is a learned behavior, decreasing feed season length will potentially reduce the likelihood of elk that winter on native range finding NER feed grounds. Over time this could result in a greater percentage of elk using native winter range relative to NER feed grounds. Because it is largely unprecedented, the concept of modifying this behavior on such a large scale is daunting and poses questions for which there are no immediate answers. In some cases, the likelihood a specific management strategy's success will only be able to be roughly estimated,

and unanticipated results are likely. Closely monitoring forage availability, elk and bison distribution, and elk mortality will allow us to evaluate the effectiveness of management actions and adjust management actions as needed should unintended negative consequences arise.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into the 3 broad categories of 1) timing and intensity of winter feeding, 2) timing and intensity of hunting, and 3) herd segment specific and overall harvest levels.

Important Changes Since 2007

The BEMP was developed based on data collected and knowledge that existed up until its Record of Decision in 2007. Since then, important changes have taken place, some of which are advantageous to this effort and some of which are not.

A primary change that will facilitate meeting objectives under this plan is the reduction of the bison population from nearly 1,200 animals in 2007 to about 666 during winter 2015-2016 (Fig. 3) through hunting programs administered by WGFD. Licensing changes enacted in 2014 included a reduction in the bison cow/calf license fee (from $416 to $263 for residents and $2522 to $1022 for non-residents) and eliminating the once-in-a-lifetime restriction on a successful bison hunter to only those that successfully harvested a bull. Continued progress toward the 500 animal herd objective will require sustained harvest success.

During the same period, the Jackson elk herd has declined from nearly 13,000 to its objective of 11,000, but because the proportion of the Jackson Elk Herd that winters on NER has increased dramatically (Fig. 6), this will make achieving the Phase I objective of 5,000 elk on feed and any future elk population reductions more difficult. Preliminary modeling suggests that the increasing proportion of the Jackson Elk Herd wintering on NER has been associated with 1) changes in elk winter distribution associated with wolves (NER, unpublished data) and 2) high numbers of elk that summer immediately adjacent to NER (Cole and Foley et al. 2015).

Refuge-wide herbaceous forage production averaged 14,387 (SD = 4125) tons during 1998–2013. In recent years irrigation of approximately 3,600 acres has increased refuge-wide forage production by approximately 10% compared to what would have been produced with precipitation alone, and by 15% in the southern portion of NER which receives the greatest use by elk and bison.

Since 2007, the general awareness of climate change among the public has greatly increased. A strong, credible body of scientific evidence shows that climate change is occurring, is caused largely by human activities, and poses significant risks for a broad range of human and natural systems (National Academy of Science 2010). Ecological systems in the GYE are likely to be affected and associated changes may have implications for elk and bison management.

Current Management

Ongoing primary management actions on the NER include winter feeding, harvest, irrigation, and hazing. In GRTE, harvest of elk during the Elk Reduction Program takes place, when necessary, in collaboration with WGFD, and restoration of previously cultivated and irrigated sagebrush-grasslands is ongoing. Fundamental components of each of these will be briefly described below to provide a basis for comparison to Step Down management strategies that will follow.

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Chronic Wasting Disease

Supplemental feeding has occurred in all but 9 winters on NER since 1912, and although this strategy minimizes winter elk mortality from starvation and contributes to Wyoming state elk herd objectives, elk occur at numbers and densities well in excess of carrying capacity (Smith et al. 2004, Lubow and Smith 2004). Considerable evidence suggests that Chronic Wasting Disease (CWD) transmission and prevalence are density dependent (Peters et al. 2000, Williams et al. 2002). Monello et al. (2014) found that elk densities of 15-110 per square km (0.06 to 0.45 per acre) in Rocky Mountain National Park were associated with 13% CWD prevalence, and they predicted elk population declines when CWD prevalence exceeded 13%. NER elk densities range from 77-16,850 per square km (0.31-68 per acre; NER unpublished data)~~commonly exceed 160 per square km (0.65 per acre; NER unpublished data)~~, which suggests that the introduction of CWD to NER elk would have significant negative population effects over time.

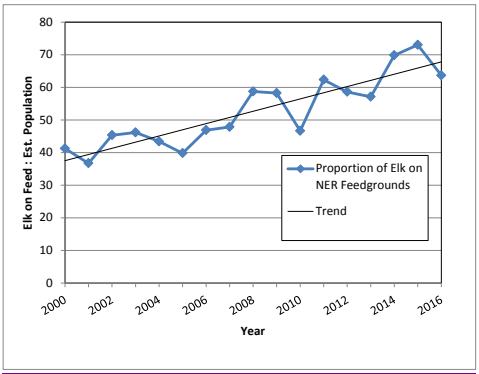


Figure 6. Increasing trend of National Elk Refuge elk on feed as a proportion of the Jackson Elk Herd estimated population size.

Winter Feeding

Initiation of feeding has the primary objectives of 1) minimizing elk winter mortality, focusing on calves since they are the most susceptible age class, and 2) minimizing comingling of elk with cattle on nearby adjacent private lands. Winter feeding begins when available forage reaches approximately 300 lbs/ac. Historic radio telemetry data and observations of elk movements indicate that when available forage ~~delclines~~ declines below 300 lbs/ac., some elk leave NER for surrounding private lands. Therefore, the purpose of this feeding trigger is to keep elk on the NER and prevent them from searching off-refuge for forage which increases the potential of comingling and damage to private lands. This trigger is not a warning that a significant nutritional deficit threshold has been reached. Available winter forage for elk and bison on the NER is largely determined by biomass of forage produced during the previous growing season, rate of forage consumption during fall and winter, and how snow conditions affect forage availability.

Index sites are used to sample forage biomass and determine when feeding should be initiated. These sites are selected annually to represent plant communities that are highly

Table 2. Annual distribution of wintering elk from the Jackson Elk Herd during February classification counts, 2011–2016, relative to the current objective.

	OBJECTIVE	2011	2012	2013	2014	2015	2016	mean
NER	5,000	7,746	7,360	6,285	8,296	8,390	7,290	7,561
Gros Ventre	3,500	2,775	3,265	2,982	2,326	1,162	1,667	2,362
Native Range[1]	2,500	982	894	1,784	801	913	1,711	1,180
Total	11,000	11,503	11,519	11,051	11,423	10,465	10,668	11,105

preferred by elk due to plant species composition and the persistence of green vegetation. Sampling is conducted at least weekly beginning in late December and available forage biomass at each index site is estimated. When average available forage across index sites declines below 300 lbs. per acre, biologists typically recommend that supplemental feeding be initiated.

During 1995–2013, on average, initiation of NER winter feeding occurred on 28 January (range 30 December - 28 February), and feeding was terminated on 3 April (range 20 March - 20 April). Variation in feeding initiation and termination dates has been based on winter conditions and a desire to avoid elk-cattle comingling on nearby private lands. Coordination of winter feeding dates on the NER and WGFD-operated Gros Ventre drainage feedgrounds (Alkali, Patrol Cabin, Fish Creek) occurs annually to help minimize movement of elk between these areas. This coordination will continue regardless of the management strategy employed. The relationship of recent elk numbers and objectives for NER and WGFD-operated feedgrounds and native range is shown in Table 2.

Bison discovered refuge feeding operations in 1980, and since that time they have been fed each year to help minimize disruption to elk feeding operations. Because bison displace elk from feedlines, NER staff attempt to feed most bison in the northernmost refuge feedground and to provide a heavy feed ration, which helps keep them in this area. This strategy prevents bison from mingling with elk and also prevents bison from moving to areas where conflicts with humans are more likely.

Harvest

Total hunter harvest of the JEH was gradually reduced over the last decade as the population neared objective (Fig. 7). Elk hunting on the NER (Hunt Area 77) typically begins in mid-October and ends in mid-December, with peak harvest in recent years occurring in late November to early December From 2005 to 2015 an average of 422 (SD = 102, range 329-612) hunters harvested an average of 196 (SD = 95, range 126-457) elk per year during the NER hunt.

The 1950 legislation that created Grand Teton National Park provided for a controlled reduction of elk, when necessary, in specific portions of the park, primarily east of the Snake River. Elk reduction programs have taken place in the park each year since 1950 except two (1959, 1960), when GRTE and WGFD officials agreed a reduction was not necessary (Figure 8). Season dates have varied over the years but recently have run from mid-October to early-December. The GRTE harvest accounts for about 25% of the JEH overall harvest, thus has been an important factor in regulating the population. Increased natural regulation, likely a result of increases in grizzly bears and wolves over the last 20 years, has decreased the need for large harvests in the park.

Bison hunting begins on August 15 and ends in early to mid-January. Most harvest occurs on the NER, with some additional harvest on private and BTNF lands. Since resuming the bison hunt in 2007, mean harvest has been 210 (SD = 45.5, range 139-301) bison per year. This level of harvest has been sufficient to arrest the exponential growth of the population, reducing bison numbers from the peak in 2007 to about 700 animals in winter 2015 (Fig 3). Tribal bison harvest of up to 5 animals for ceremonial purposes was authorized in the BEMP. Translocation of wild bison to lands outside of Teton County is not currently permitted due to brucellosis concerns.

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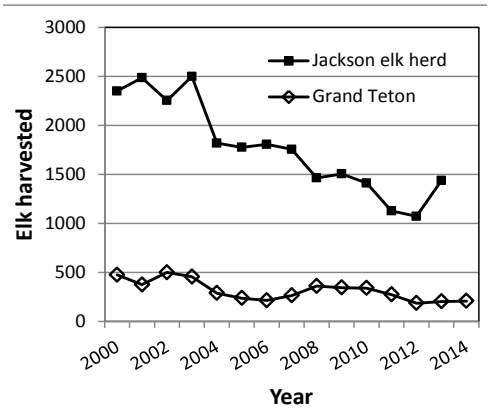


Figure 7. Estimated elk harvests for Grand Teton National Park and the Jackson elk herd (including the park) 2000–2014.

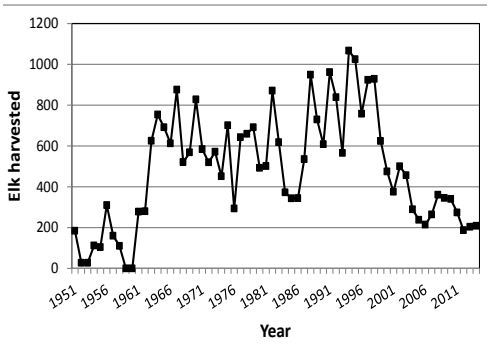


Figure 8. Elk harvest in Grand Teton National Park, 1950-2015.

Bison hunting is not allowed in GRTE because of long standing National Park Service policy that prohibits most hunting in national parks. Bison quickly learned to take advantage of the parks safety, which has made obtaining hunter harvest goals difficult. Many bison stay in the park during the hunting season, with only occasional short term movements to the NER, until severe winter conditions occur. In response, NER and WGFD managers attempt to balance extending the hunt as late in January as practicable without conflicting with winter feeding. The unpredictable nature of winter conditions that time of year makes thisa risky proposition, and can result in the use of emergency season extensions or reductions.

Hazing

NER staff haze elk and bison to conserve winter forage, prevent year round use of winter range, and in some cases to prevent elk and bison from moving to private lands or other areas where conflicts with humans are likely. Hazing using ATVs has proven most effective. The strategy is typically employed during 3 time periods: 1)In May to move elk and bison off NER that are lingering on NER winter range; 2) In July when some bison typically return to NER; and 3) In the period just prior to feeding initiation when elk and bison are most likely to leave NER for private lands.

Vegetation Restoration and Protection

The BEMP identified approximately 4,500 acres of previously irrigated and cultivated grasslands in GRTE in need of restoration to native sagebrush grasslands community. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. After 2 years of research and field studies, restoration efforts began in 2008. The restoration process involves several steps including: removal of non-native vegetation through repeated herbicide applications, collection and propagation of native grass, forb and shrub seeds and finally native seeding. Repeated herbicide treatments have been warranted prior to native seed planting as well as spot treatments of invasive weed species subsequent to native seeding. Substantial progress in this endeavor has been made since 2008, including: 1,235 acres of previously cultivated lands are under restoration treatment. Of the 1,235 acres undergoing treatment, 745 acres has been seeded with native grass, shrub, and select forb mixes, and 89 acres is considered fully restored. Two-hundred and seventy-five of these acres are currently fenced to reduce grazing pressure of early native vegetation establishment from bison and other ungulates.

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An additional 490 acres are targeted for native seeding in 2016 once removal of the invasive vegetation is successful. All treatments are monitored for native plant establishment and invasive plant infestations and treatments will be adjusted as necessary. Invasive plant treatments may have to continue indefinitely. The park will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Private Lands Mitigation

Fencing of hay stacks and livestock feedlines has been historically used to mitigate particularly difficult conflicts on private lands. Targeted fencing of golf course greens and sand traps fall through spring has also been successful in some situations for mitigating elk and bison presence and associated damage in these areas. It is important to note that the county has a 'wildlife-friendly' fence policy and does not support extensive fencing that is impermeable to wildlife in residential areas.

Methods, Assumptions, and Constraints Common to All Strategies

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes, particularly population sizes. Measurements of the Jackson bison herd will be based on the annual mid-winter census and sex and age classification survey performed by NER, GRTE, and WGFD biologists. This survey occurs one day in ~~early~~ February and includes ground counts of animals on feed at the NER and aerial counts of outlying bison across their winter ranges on the refuge, park, and Bridger-Teton National Forest.

Elk population estimates will also be based on mid-winter aerial and ground counts. However, the mid-winter counts are undertaken during a single survey period and do not necessarily represent either peak or cumulative abundance of elk on feed. Rather than basing progress toward the number of elk on feed for the entire season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 were elk fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000.

We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both species on supplemental winter feeding.

Initial success of the Step Down Plan will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP does not provide specific measurement criteria to determine when the Refuge has successfully attained the objective of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage", we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row.

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Table 3. Summary of potential Step Down Plan constraints.

Policy

- ESA[1] Lynx – limits on habitat impacts
- Greater Sage Grouse – core area protection
- 2007 BEMP/EIS (federal actions/lands)
  - No fertility control
  - No test and slaughter
  - Limited tribal harvest
- Bison/elk hunt end date (Feb. 1st)
  - WGFD, brucelosis safety
- Carcass disposal (Feb. 15th)
  - WGFD, brucellosis safety
- Forest Service winter closure (Dec. 1st – April 30th)
- Easement limitation (NER boundary)

Winter Feeding

- Only during non-hunting periods

Harvest

- State regulations

Vegetation Restoration/Protection

- Bison/elk distribution
- Exotic plant species management

Private Lands

- Owner agreements

Social

- Hunter density (safety; hunt quality)
- Elk/bison winter mortality levels
- Public safety (ungulate/vehicle collisions)
- Disease
- Land-use conflicts (agricultural and residential)

Biological

- Disease (bison/elk/cattle commingling)
- Sage grouse habitat conflicts
- Fencing/wildlife conflicts
- Elk herd distribution
  - summer segment distribution goals

Funding

- Easement purchase
- Plan implementation

[1]Endangered Species Act

Several management constraints are common to the strategies discussed below (Table 3). Many law and policy constraints are applicable but we include here only those most pertinent. Endangered Species Act (16 USC 1531 et seq.) requirements for wolves, grizzly bears, lynx, and others apply. Lynx requirements for maintaining certain habitat types could limit methods used and areas considered for habitat improvements in GRTE. Similarly, compliance with the Wyoming greater sage-grouse core area protection executive order (2011-5 and supplement 2013-3) could restrict habitat manipulations. NEPA compliance conducted as part of the BEMP/EIS constrains what federal actions can be taken as a part of this plan. State regulations constrain late (winter) hunt and carcass disposal timing to protect against brucellosis contamination, since February-April represent the period bison and elk are most likely to transmit the disease. Restrictions on hunting timing also result from BTNF winter range closures, immediately east of the NER and elsewhere, December 1 to April 30. Additional details about these and other constraints will be included in discussions about specific strategies that follow.

Strategies

This section describes the management action this SMP proposes to implement. As such, it unveils the heart of management changes proposed to begin the process of transitioning to greater reliance of bison and elk on native forage during winter. Fundamentally, the strategies discussed in this plan represent an experiment designed to achieve Phase I objectives of 5,000 elk and 500 bison on NER and are a first step towards reducing reliance on supplemental feeding while meeting the sustainable population goals identified in the SMP.

Initial strategies for achieving sustainable population goals identified in the BEMP (Table 1) are presented by objective below. The primary management actions available to the agencies to achieve phase I objectives are modifications to winter feeding and hunting seasons. To a lesser

extent, vegetation protection and restoration can be important, particularly for improving long-term ecological balance and enhancing natural production of native forage. Private lands are also an integral component as changes in elk and bison distribution occur and new challenges develop. The likely consequences of implementing these strategies were evaluated in the BEMP. The most relevant of these are summarized in Appendix 1.

Objective: *[Implement] a phased reduction of animals on NER feed: 1) to 5,000 elk and 500 bison, and 2) [to an extent where] elk and bison rely predominantly on native habitat* (Table 1).

The first phase objective will be to reduce the number of elk on NER feed to approximately 5,000 and achieve a target population of about 500 bison. The second phase objective will be to adaptively manage bison and elk populations to achieve desired conditions, with animals relying predominately on available native habitat (on refuge, park, and forest lands) and cultivated forage (on the NER).

As previously mentioned, the concept of reducing winter feeding after more than 100 years of the practice, and the associated behavioral conditioning of elk and bison to its presence, represents a formidable challenge that must be approached cautiously and systematically. The strategies discussed below have been developed in this context, with appropriate feedback mechanisms through rigorous monitoring and frequent evaluation. Inability to meet this objective under the strategies presented here would trigger a thorough evaluation and consideration of more aggressive strategies when the BEMP is updated in 2022.

Chronic Wasting Disease

Since 1997 NER has cooperated with Wyoming Game and Fish Department (WGFD) to conduct intensive surveillance for CWD in the JEH unit. GRTE has also collaborated with WGFD to collect samples from the park's elk reduction program and from road-killed cervids. Although this effort indicates that CWD is not currently found in the JEH, continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence annually will be critical to ensure a timely management response and limit the long-term population effects of the [USFWS and USNPS, 2007b]. Given that CWD has been detected within 40 miles of the JEH in moose, within 35 miles in deer, and within 175 miles in elk, this level of surveillance is warranted.

In 2016 the WGFD cooperated with federal agencies and other stakeholders to revise the 2006 Wyoming CWD Management Plan. The NER and USFWS Region 6 Wildlife Health Office staff participated in several meetings associated with this effort. The Wyoming CWD Plan lists several management responses for consideration should CWD be detected on or adjacent to State or NER elk feedgrounds. Early detection of CWD in the JEH is essential to allow implementation of management responses.

The BEMP (2007) identifies the management response to the arrival of CWD as following the State of Wyoming CWD Plan in effect in 2007. The Wyoming CWD Plan was updated and significantly changed in 2016. In light of changes in the Wyoming State CWD Plan, and the results of CWD Studies completed since 2007, the NER management response to CWD will be reviewed and updated in a NER Disease Contingency Plan, as identified in the NER Comprehensive Conservation Plan (2016). The CWD section of the NER Disease Contingency Plan will remain consistent with the goals of the BEMP. The NER Disease Contingency Plan is scheduled to be completed in 2017.

Winter Feeding

Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the long run, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning them to expect feed later on average, with the desired outcome of building a

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cohort of animals that rely primarily on native winter range and are not food conditioned. To reduce supplemental feeding overall, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require assistance with focused mitigation measures.,

As bison and elk behavioral responses are better understood, feeding delays will be extended depending on several variables (Table 4, Fig. 9). Time of season could influence this interval, most likely shortening it as the feeding initiation date gets later. During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Delaying feeding by two weeks in January, for example, is likely to have fewer negative effects than doing so in February, when food stress and tendency for animals to move to private lands is greater. Forage availability could also have an influence, particularly if a freeze thaw event resulted in an acute and large reduction in available forage. Both time of season and forage availability considerations would be affected by the numbers of elk and bison on the NER. And finally, the distribution of animals, particularly on private, livestock producing lands, would be considered.

A primary concern of manipulating feeding is elk winter mortality, particularly among calves. As food becomes limited in winter, calves are usually the first to experience nutitional deficit and winter mortality because of being displaced by more dominant animals. Monitoring programs will include measures of calf mortality and it will be an influencing parameter in feedback mechanisms. The BEMP anticipated that elk mortality could increase from 1-2% overall to 1-5% (Appendix 1).

Initially, the termination of feeding, which is now based on a snow cover index and subjective evaluation of available forage, will occur about a week earlier. The combination of a 2 week delay in feed initiation and 1 week advance in termination would shorten the feeding season by 3 weeks on average, or 32% based on an average feeding season length of 9.3 weeks from 1995-2015.

The MSP winter feeding strategy would include the establishment of additional key forage index sites and on-going measurements at those sites throughout the winter.

Harvest

Currently the Jackson elk herd is at the Wyoming Game and Fish Commission established objective of 11,000 animals, which means there is less flexibility in manipulation of harvest regimes than there would be if the herd was above objective. Initially there would be little change in elk harvest programs on the NER, with the exception of allowing a limited number of any elk permits throughout the season, considering allowing bow hunting near developed areas (roads and buildings) and shifting the season about a week later (Table 4). Allowing a limited number of any elk permits would be consistent with providing sport hunting recreation on National Wildlife Refuges (NWRS Improvement Act; 1997) and the NER CCP [USFWS, 2015] and possibly encourage more hunters to participate in antlerless elk hunts. Monitoring programs and consideration of bull ratios in the GRTE summer segment (since most park bulls migrate to the NER) would help inform levels of take proposed. Bow hunting in areas currently closed to firearms will likely increase harvest by eliminating “no-hunt” areas which can become sanctuaries for large numbers of elk. Shifting the hunt one week later is consistent with later migrations and will improve harvest effectiveness (Fig. 9).

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General elk harvest patterns in GRTE would continue to be based on need for harvest, summer segment population estimates, and mitigation for impacts on other resources and visitor activities.

Elk herd population objectives are reviewed every five years by the Wyoming Game and Fish Commission and adjusted as necessary. Agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future Jackson Elk Herd population objective. ~~Serious c~~Consideration should be given to reducing the Jackson Elk Herd population objective. Lowering the population would help compensate for reduced use of traditional native winter range and increased growth of short-distance migrants which has led to significant increases of winter elk concentrations on the NER.

The annual fall/winter arrival of elk to the NER during the past several decades has been occurring progressively later. This trend may necessitate extending the elk hunting season later into the year to achieve harvest objectives.

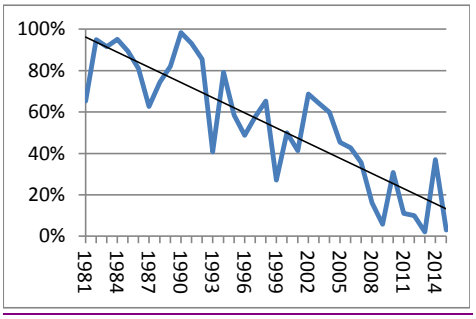


Figure 9. The percentage of elk that wintered on NER counted there on December 1, showing progressively later annual fall/winter arrival of elk to the NER during the past several decades.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution or Special limited hunts will be considered which will be designed to discourage bison from attempting to leave the NER via the south boundary into the town of Jackson. If progress toward reaching the herd objective of 500 animals continues and the objective is reached, WGFD will adjust harvest quotas in the context of the objective, as necessary, to address population changes through time.

A cattle guard was installed on the Refuge Road near the east end of Broadway Avenue to help prevent bison and elk herds from entering the Town of Jackson. This will reduce the potential for dangerous human/wildlife interactions.

Currently, the effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st in the future.

Annual herd-wide population estimates, elk summer herd segment estimates in GRTE and NER, temporal and spatial harvest patterns, and animal-fed-days would be monitored, and the resulting information would be used to inform ongoing evaluation of elk and bison management harvest programs (Figs. 9 and 10).

Hazing

No change in hazing practices is anticipated initially under this Step Down framework.

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Private Lands Mitigation

Delaying the onset of NER feeding is likely to result in changes in bison and elk distribution (Appendix 1). Some elk or bison may move to private lands in search of forage. Of greatest concern is the potential for elk or bison to commingle with cattle of cow/calf operations, where brucellosis transmission could have considerable consequences, in the worst case requiring depopulation of the cattle herd.

Several strategies would be employed to mitigate potential problems (Table 4), including providing incentives for non-breeding cattle operations (because brucellosis transmission to slaughter-bound cattle is not economically important), increased fencing in some limited areas to separate elk/bison from livestock feed lines, haze elk/bison away from livestock feed lines and purchase private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal Wildlife Conflict Technician positions which are supervised by the WGFD. These Technicians are also critical to the success of an expanded monitoring program vital to the MSP (see Monitoring section below).

A database will be established to track non-agricultural conflicts on private lands to determine trends which will help evaluate the effectiveness of MSP mitigation efforts.

Preventing elk and especially bison from entering the Town of Jackson is essential in minimizing safety and private property conflicts. Currently, bison are hazed northward when they drift south of Miller Butte. A cattle guard was installed on the Refuge Road just north of Broadway Avenue. This barrier is designed to prevent elk/bison from entering the Town of Jackson.

Vegetation Restoration/Protection

The varied approaches to restore the Kelly Hayfields in GRTE (4,500 acres) was initiated in 2008 following 2 years of research and field studies (Moeny 2008). Our approach to ecological restoration includes serial treatments to 1) remove non-native species (e.g., herbicide application and prescribed burning); 2) seed native shrub, grass, and forb species; and 3) treat subsequent invasive plants by applying herbicides and, where appropriate, construct temporary fences to protect recently seeded pastures from colonization of non-native species and damage from large herbivores during early phases of restoration.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres within 7 pasture units are currently under restoration treatment and 3,265 acres remain non-native grass pasture (as of 2016; Figure 9). The non-native grass pastures are divided into 13 pasture treatment areas and are projected to be likely restored by 2035. As of 2016, approximately 745 acres are seeded with native vegetation, and 89 acres are considered fully restored. Maintenance of restored ecological conditions, however, will likely require management efforts in perpetuity to keep non-native species from colonizing restored areas. All 1,235 acres that are underway toward ecological restoration are being monitored for native plant establishment, invasive plant infestations, including cheatgrass spread. Park staff will continue to monitor and adaptively adjust treatments and restoration strategies according to our results.

Objective: *Maintain natural bull-to-cow ratios in park summer herd* (Table 1).

National Park Service management policy (NPS 2006) provides guidance for maintaining naturally regulated wildlife populations, free from the impacts of humans, to the greatest extent possible. The final BEMP identified a goal of maintaining park elk bull:cow ratios (a common way of expressing sex and age ratios in wild ungulate populations) near 35 adult bulls per 100 adult cows, based on estimates of what this ratio would be in a herd free from the effects of human harvest. The sex and age ratios of most North American elk populations are affected by

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sport hunting and herd managers generally maintain lower bull ratios.

Harvest

Based on bull ratios in the park summer herd that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to antlerless only in 2012. ERP permit structures in the park will remain antlerless only until the bull ratios consistently exceed 35:100 cows. Park and refuge officials will work together to support this goal, recognizing that bulls harvested on the NER are most likely from the park summer herd segment.

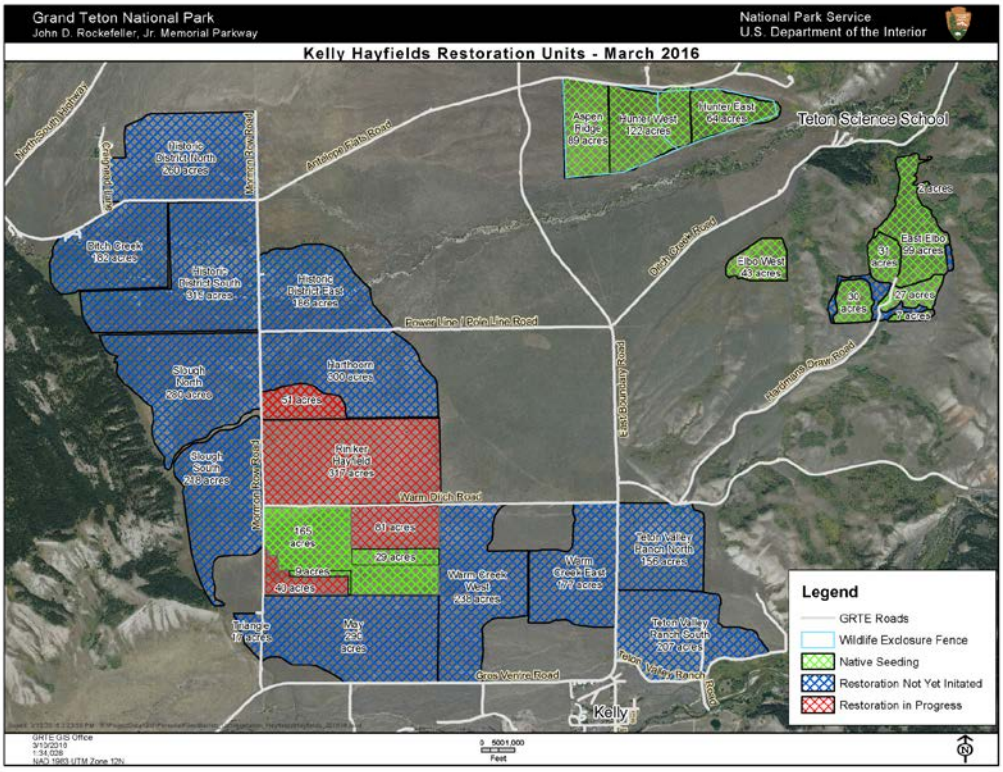


Figure 9. Units and status for the Kelly Hayfields ecological restoration effort in Grand Teton National Park, March 2016

Table 4. Comparison of current and primary Step Down Plan components and parameters.

Action	Current Management	Management	Comment
Winter Feeding:			
Feed	Pelleted alfalfa	Pelleted alfalfa	No change
Ration	Full ration average: 8-12 lbs/day/elk	No Change ~~8 lbs/day/elk~~	No change, to minim mortality. Note average daily ration over the entire feed season is lower than a full ration because feed rate is gradually increased at the beginning of the feed season and gradually reduced at the end to facilitate rumen acclimation
	20-22 lbs/day/bison	20 lbs/day/bison	
Start criteria:			
Available standing forage	300 lbs/acre, as measured at traditional key index sites	Generally later; index sites to be increased in number and distribution	Influencing factors: -time of season -forage availability -number of elk/bison on NER -elk/bison distribution
			~~- time of season~~
			~~- forage availability~~
			~~- numbers of elk/bison on NER~~
			~~- elk/bison distribution~~
End criteria:			
Available forage	Based on a snow cover index and subjective estimate of when residual or new forage is adequate	Generally 1 week earlier than current management	Development of more objective criteria for future implementation ongoing
Monitoring:			
Animals on feed	Mid-winter census	Elk/bison fed days[1]	
Proportion of JEH on NER	Mid-winter census	Mid-winter census	
feed			
Calf mortality	2008-2015 Average: 3.3% (range 1.1-9.0%)	~~<= 10%~~Potentially higher than current but less than native winter range	
	~~3.3% (range 1.1-9.0%)~~		
~~- Elk/bison distribution - visual~~			
Elk/bison distribution – collars	Almost no documented use of private lands during feeding operations	Unknown, but likely higher use of private lands than current management	
~~- collars~~			

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Table 4. Comparison of current and primary Step Down Plan components and parameters.

Action	Current Management	Management	Comment
Elk Winter mortality (all age classes)	2008-2015 Average:	<=3%	
	1.2% (range 0.6-1.9%)		
Elk summer range segment Proportions for NER wintering elk	Approximately -40% GTNP North of Moose -35% South Snake River -10% Gros Ventre/Flat Creek -10% Teton Wilderness -5% Southern Yellowstone	Unknown, but will be monitored based on summer distribution of radio collared elk	Based on summer distribution of elk that were randomly radio collared on NER.
~~Proportions for NER wintering elk~~	~~40% GTNP North of Moose~~		
	~~35% South Snake River~~		
	~~10%Gros Ventre/Flat Creek~~		
	~~10% Teton Wilderness~~		
	~~5% Southern Yellowstone~~[1]		
Harvest, National Elk Refuge elk:			
Frequency	Annual	Annual	
Begin Date	2nd week October	~~3rd week October~~No Change	Modified as necessary
End Date	3~~2~~nd week December	~~3rd week December~~No Change	Modified as necessary
Structure	- 1 week initial drawing	- 1 week initial drawing	
	- 1 week left over 1st served	- 1 week left over 1st served	
	- partial week alternate	- partial week alternate	
	-daily 1st served alternates	- daily 1st served alternates	
Refuge permit types	- 1st week any elk	- Primarily antlerless only	
	- Antlerless only remainder of season	- limited any elk permits throughout season	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries		Consider expanding to allow bow hunting near developed areas	
Harvest, National Elk Refuge bison:			
Frequency	Annual	Annual	
Begin date	August 15th	August 15th	Modified as necessary
End date	2nd or 3rd week January	Consider later dates as appropriate	Modified as necessary
Hunting Season Structure	As per WGFD	As per WGFD	

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Table 4. Comparison of current and primary Step Down Plan components and parameters.

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Action	Current Management	Management	Comment
Refuge permit types	Any bison or cow/calf per state license	Any bison or cow/calf per state license	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries	Limited to north of Nowlin Creek area	Consider escorted hunting in South Unit as needed	Guided hunts in South Unit when authorized
Harvest, Grand Teton NP elk:			
Frequency	As needed	As needed	
Begin Date	3rd week October	3rd week October	Modified as necessary
End Date	2nd week December	2nd week December	Modified as necessary
License types	Antlerless only	Antlerless only[2]	
Special regulations:	Cartridge limits	Cartridge limits	
	Bear spray required	Bear spray required	
	Hunter safety card required	Hunter safety card required	
Harvest, Bridger-Teton NF, Elk Hunt Area 80:			
Begin Date			
End Date		15-Dec	Would require change in winter closure dates
Harvest, Elk Hunt Area 78			
Structure			Changes at discretion of WGFD
License Types			
Private Lands Mitigation:			
Cattle commingling		Incentives for non-breeding operation	
Hay depredation		Increased fencing	
Landscape damage			
Easement acquisition			
Vegetation Restoration/ Protection: Elk Refuge			
Vegetation Restoration/ Protection: Grand Teton	Herbicide treatments, prescribed burning, native seed propagation and planting, and protection and maintenance of restored pastures	Same as Current Management for remaining non-native grasslands in Kelly Hayfields	

[1]Number elk and bison on feed per day, totaled by feeding season.

[2]Any elk licenses could be offered if bull ratios in the park consistently exceed BEMP criteria.

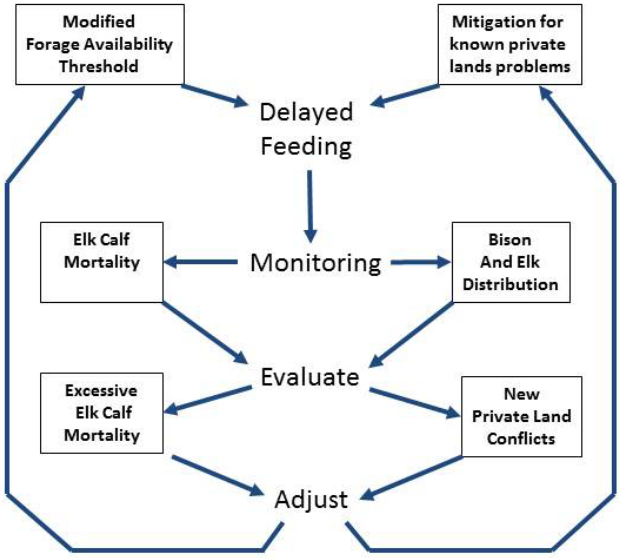


Figure 10. Framework for delayed feeding strategy under Management Step Down Plan.

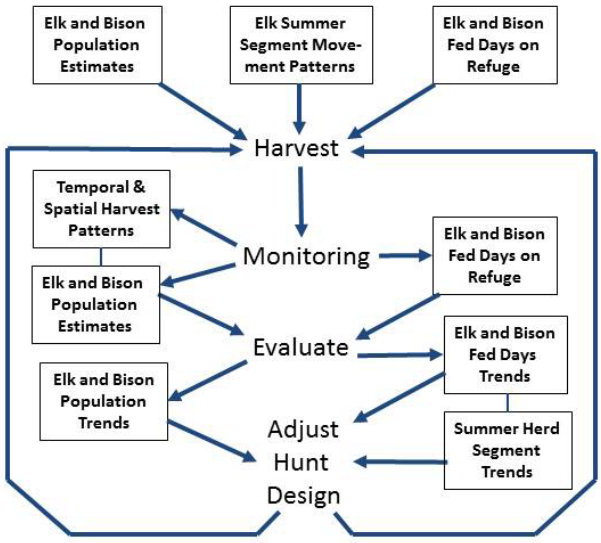


Figure 11. Framework for harvest strategy under Step Down Management Plan.

Strategies Considered But Rejected

The BEMP considered several additional strategies for elk and bison management that, for a variety of reasons, were not selected for implementation in the preferred alternative and Record of Decision. The agencies reconsidered a subset of these during the development of this MSP (Table 5). Since they were not part of the ROD, additional NEPA compliance would be necessary to incorporate any of them into this Step Down Plan, and thus they are not being considered at this time.

Table 5. Strategies considered but rejected.

Strategy Considered	Reason Rejected
Fertility control in elk	Judged not reasonable or feasible in BEMP, primarily due to major technical, social, and financial hurdles[1]. For MSP discussed primarily with regard to the difficult to harvest herd segment in Hunt Area 78 on private lands, where federal agencies have no jurisdiction.
Fertility control in bison	Impacts discussed at length in BEMP[2]. Not considered for MSP because current hunting programs appear effective at slowly moving the herd toward the 500 animal herd objective.
Agency reduction of bison or elk	Not considered necessary or desirable on federal lands because current hunting programs that utilize sport hunters are effective at meeting herd objectives.
Altering rations of supplemental feed	Rejected as a strategy because reducing daily feed ration below 8 lbs/elk would be enough feed to encourage elk to remain on NER but would result in unacceptably high elk calf mortality rates.
Private Lands Hunting Coordinator	The WGFD contacted private landowners and ranchers in the Spring Gulch area and discussed this concept to enhance elk harvest of short distance migrants. Generally, landowner interest was low.

MODELS OF SYSTEM DYNAMICS

Models provide a simplified representation of the biological system being managed. We will use modeling to quantify the effects of our management actions on 2 key repsonses of interest, elk distribution and winter elk calf mortality.

(ADD: range of elk calf mortality in non-fed populations.

Fig. 12 describes possible factors that affect winter elk distribution (the proportion of elk on NER feedgrounds versus native winter range). Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

An increase in calf elk winter mortality is a potential result of reduced feed season length. Fig. 13 portrays factors that influence winter calf elk survival on NER.

Models will be used to assess the effects of available forage on winter calf elk survival (Appendix 4). Over time this will allow us to assess the effects of our principal management strategy (reducing feed season length) relative to winter elk calf survival.

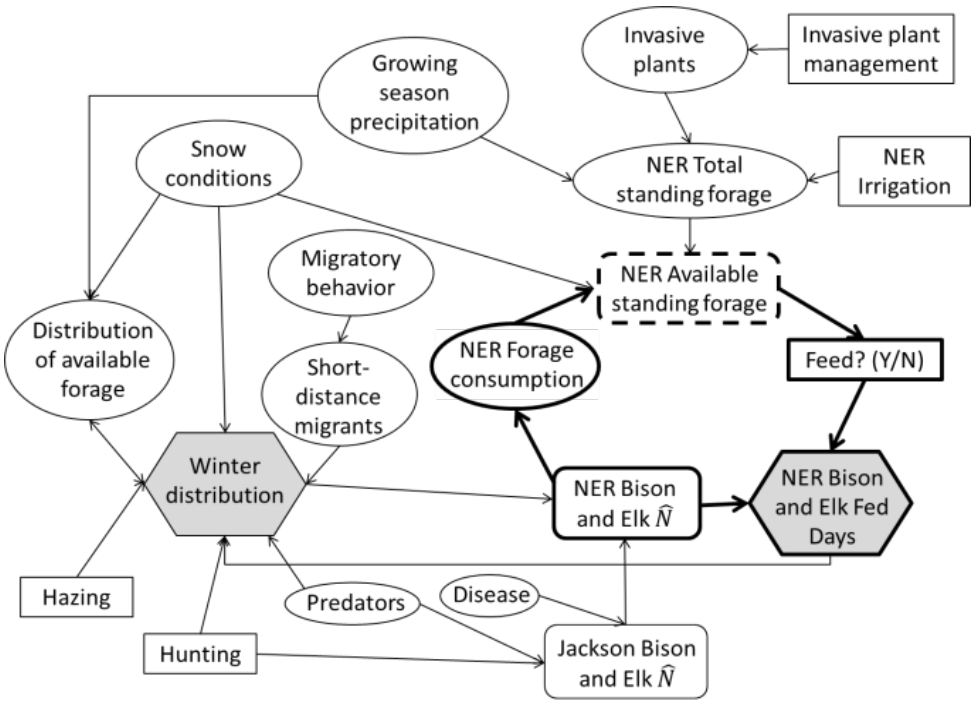


Figure 12. Diagram depicting the factors that potentially influence outcomes identified in the Bison and Elk Management Plan (BEMP; USFWS 2007a). Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

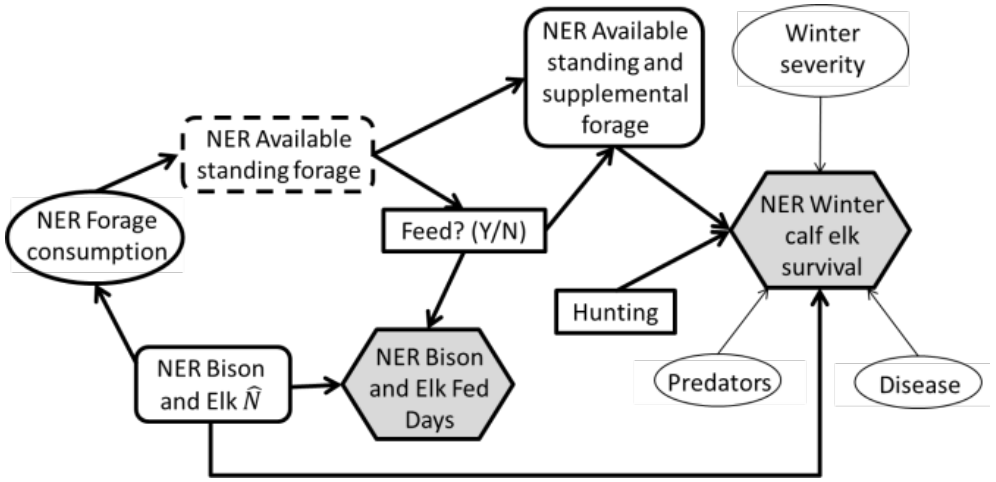


Figure 13. Diagram depicting the factors that potentially influence bison and elk fed days on the National Elk Refuge (see text for description) and winter calf elk survival. Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

MONITORING

Feeding Initiation Monitoring

NER uses weekly field estimates of the amount of forage available to elk to determine feeding initiation date. Currently measurements are taken at key index sites representing areas preferred by elk on NER (see supplemental materials at end of this section). These methods will be enhanced by 1) increasing the number of sampled sites to better represent the total amount of forage available to elk on the southern half of NER; 2) increasing the precision of estimates at each site by increasing the number of observers; and 3) extending the monitoring period later in the winter to assess the relationship between available forage and elk and bison distribution.

To better represent the total amount of forage available on the southern half of NER, a subsample of current key index sites will be retained to facilitate comparison with historic data, but additional random sample sites stratified by elk habitat preference will be added. Historic elk distribution mapping and elk GPS collar data (NER unpublished data) suggest that the areas most preferred by elk on southern NER are associated with moderate to high forage production and green vegetation. Because the distribution of forage production and greenness characteristics vary annually based on irrigation and precipitation patterns, we will annually map areas preferred and not preferred by elk and sample sites will be randomly selected within each of these mapped categories. At least 3 historic key index sites, 3 random sites in areas preferred by elk, and 3 sites in areas not preferred by elk will be sampled each week from late December through the initiation of supplemental feeding.

Currently the NER biologist is the only person trained in the techniques used to estimate available forage (see supplemental materials). At least 2 additional personnel will be trained in these techniques. This will provide a backup in

the event of future personnel changes and will facilitate error estimates of the available forage measurements at each site.

Currently NER and WYGFD biologists monitor available forage conditions at least weekly from late December until average available forage at key index sites nears the threshold level of 300 lbs. per acre and feeding is initiated. The principal MSP strategy is to delay the initiation of supplemental feeding after average forage production reaches the 300 lbs. per acre level at key index sites. Therefore the monitoring period will be extended to include this period of delayed feeding.

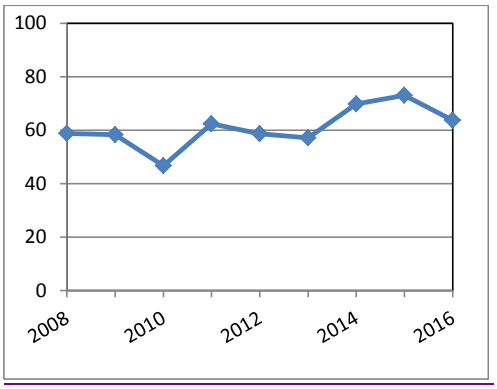


Figure14. Proportion of the Jackson Elk Herd that was classified on NER feedgrounds in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the Management Step Down Plan (2008-2016). These values represent the pretreatment baseline which will be compared to the 3 year running average post MSP implementation.

Proportion of Elk Wintering on NER

A principal MSP goal is to reduce the number of elk wintering on NER. Our strategy will be to effect redistribution of elk to native winter range from NER over time via shortening the duration of the feed season, and thus slowly conditioning elk to seek food elsewhere. As feeding periods are shortened, the probability of younger elk age classes discovering NER feedgrounds will be reduced, and, hypothetically, that proportion of the JEH that utilizes NER feedgrounds will decline over time. We will measure this effect by examining changes in the winter distribution of the JEH. WGFD annual trend/classification count data provide a multi-year baseline data set to measure changes in the winter distribution of the JEH and categorizes observations by location. In each year, we will calculate the proportion of total classified elk in the JEH that are classified on NER feedgrounds. We will compare the 3-year running average post MSP implementation to the pre-implementation baseline. The pretreatment baseline will be comprised of data from 2008-2016, a time period that represents BEMP implementation prior to MSP actions (Figure 13).

Elk Fed Days and Bison Fed Days

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. We further assume the variables elk-fed-days (EFD) and bison-fed-days (BFD) are a proxy for these conditions. EFD and BFD will be calculated annually for each species based on the following formulas:

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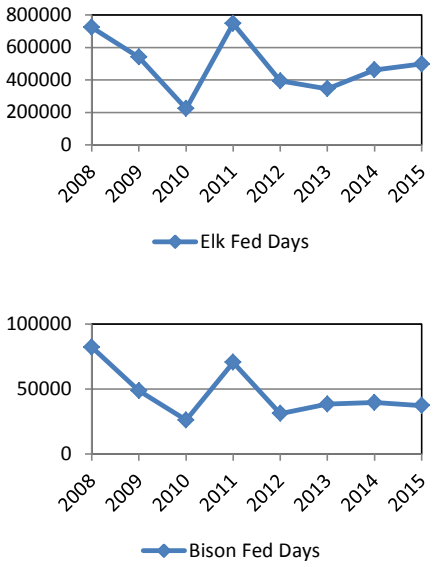


Figure15. Elk Fed Days (EFD) and Bison Fed Days (BFD) in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the Management Step Down Plan (2008-2015). These values represent the pretreatment baseline which will be compared to the 3 year running average EFD and BFD post MSP implementation.

EFD= ∑ Total elk counted on feed during daily feedground counts for duration of feed season

BFD= ∑ Total bison counted on feed during daily feedground counts for duration of feed season

Because EFD and BFD are influenced by feed season length and the number of animals on feed, the MSP strategy of delaying the initiation of supplemental feeding will inherently reduce the number of EFD and BFD through a reduction in average feed season length. We believe that EFD will be further reduced by encouraging a greater proportion of the Jackson Elk Herd to winter on native winter range, thereby reducing the number of elk occupying NER feedgrounds. We will evaluate changes in EFD and BFD by comparing the 3-year running average post MSP implementation compared to mean EFD and BFD from 2008-2015. The running average is an appropriate comparison because it will help account for wide annual variation in EFD and BFD associated with winter severity (Fig. 15)

Elk Winter Mortality Monitoring

NER has used consistent methods to monitor winter elk mortality since 1982. Each winter NER biologists and other refuge staff conduct a survey of all non-hunting related winter elk mortalities that occur on NER from November through April. Mortalities are tallied by age/sex class and percent mortality is calculated using the corresponding number of elk classified on NER feedgrounds as the denominator. We will continue to monitor elk winter mortality using the same methods post MSP implementation, which will allow trend comparisons to the pre MSP baseline (Figure 15). Under the MSP framework, we believe the 3 year running averages for total and calf winter elk mortality will be within the range of variation exhibited by the pre MSP baseline. Historic monitoring suggests that calf and total mortality are sensitive to winter severity and disease outbreaks, and that winter mortality occasionally exceeds >3% total mortality and >10% calf mortality. Post MSP mortality in excess of these levels may warrant shortening the 2-week feeding initiation delay in subsequent years.

Elk Collaring

One of the MSP's principal strategies is to shorten the length of the feed season to encourage elk use of native winter range, but we anticipate that this strategy will also result in an increase in elk conflicts on surrounding private land in the town of Jackson and the Spring Gulch areas, potentially including large groups of elk. To quantify this effect and provide real time information to WGFD and NER managers to facilitate a response, we propose maintaining a sample of 50 GPS collars on elk that winter on NER throughout the MSP

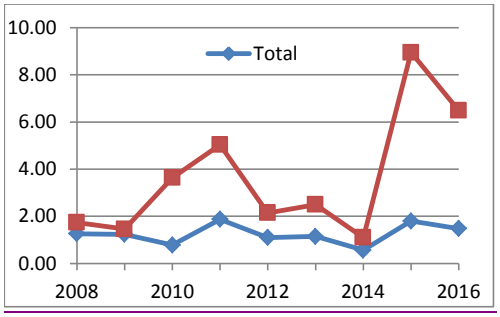


Figure16. Total and calf elk winter mortality (%) on NER in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the Management Step Down Plan (2008-2016). These values represent the pretreatment baseline which will be compared to the 3 year running average post MSP implementation.

implementation period. Forty -five elk represents approximately 0.5% (1 in 200) of the NER winter elk population. This sample size will not be sufficient to detect all elk movements from NER to surrounding private lands, particularly movements by small groups of mature bull elk, but it will be sufficient to detect and quantify significant movements of cow/calf/yearling elk groups compared to pre-MSP baseline data.

NER has elk GPS collar data available from the 2008-2013, which represents the post BMP, pre MSP baseline period. We hypothesize that elk movements from NER to surrounding private lands will increase during the MSP implementation period compared to the pre-treatment baseline. This will be tested by comparing the number of incidents that elk left NER for surrounding private lands (per elk/per year), and the proportion of elk GPS fixes on NER versus private lands during time periods of interest. The principal time period of interest is late December-March because this represents the period after the NER elk hunting season, and prior to and during NER feeding operations. This is the season when changes to the NER feeding program would be most likely to result in elk distribution changes.

Fifty adult cow elk will be captured on NER feedgrounds during February-March 2016 and Telonics Iridium GPS collars will be deployed with a 90 minute fix collection interval. Given 83% annual survival for adult cow elk in the Jackson Elk Herd (Cole and Foley et al. 2015) and 3 year collar life, approximately 10 additional elk will need to be collared each year in winter 2017 and 2018 to maintain the 50 elk desired sample size.

Ancillary data that will be collected and analyzed during the elk capture and collar data analysis process includes brucellosis seroprevalence, pregnancy rate, and elk summer range determination for comparison to the findings of Cole and Foley et al. (2015).

Disease

The primary purpose of limiting reliance on supplemental feeding is to reduce the prevalence of endemic elk and bison diseases and mitigate transmission risk associated with the introduction of novel diseases. We hypothesize that brucellosis seroprevalence will decline post MSP implementation. There are no recent brucellosis seroprevalence data for elk on the National Elk Refuge, but >50 elk will be captured during elk collaring operations in winter 2016, and each elk will be tested for Brucellosis exposure. The 2016 Brucellosis seroprevalence rate will be the pre-treatment baseline to evaluate post MSP change.

Chronic wasting disease (CWD) has been monitored in the JEH since 1997, and since 2008 it has been monitored with sufficient sample size to detect 1% prevalence with 95% confidence. No CWD positive cases have been detected in the JEH, which given the long term persistence of the disease, provides overwhelming evidence that CWD is not currently endemic to the JEH. However, most evidence suggests that the distribution of CWD is increasing and that its introduction to the JEH is inevitable. Early detection is critical to ensure an adequate

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management response, and therefore ongoing monitoring at sample sizes sufficient to detect 1% CWD prevalence with 95% confidence is necessary. CWD is sampled by testing tissues collected primarily from hunter harvested elk, and past experience suggests that 2 full time technicians working from September-December are necessary to ensure minimum sample size. Typical costs associated with 2 technicians are $32,000 per year.

Data Collected for Modeling

To facilitate modeling, we will collect data on the following associated variables (Table 6). The table lists variables and how they relate to our efforts to use modeling to explain changes in elk distribution and elk calf mortality relative to our principal action of reducing feed season length.

Table 6. Variables to be used in models to explain elk winter distribution in the Jackson Elk Herd and elk calf mortality on NER.

VARIABLE	SOURCE	Elk Winter Distribution Model	Elk Calf Mortality Model
Proportion Jackson Elk Herd on NER Feedgrounds	WGFD/NER Jackson Elk Herd February Classification Count	Yes	No
Proportion Jackson Elk Herd from South Snake River summer segment	Determined from elk GPS collar data for elk captured on NER	Yes	No
Number of wolf packs in the Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated total wolf numbers in Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated number of wolves using NER in winter	NER observations	Yes	Yes
Total NER herbaceous forage biomass	NER forage production survey data	Yes	Yes
Snow Water Equivalent	NOAA snowtell site data	Yes	Yes
NER Winter elk Mortality (calf)	NER winter elk mortality survey	No	Yes
Snow Depth	NOAA Snowtell sites and NER measurements	Yes	Yes
Available Forage	NER and GTNP monitoring in winter months	Yes	Yes
NER Elk and Bison Fed Days	NER feeding records and daily feedground estimates of elk and bison	Yes	Yes
NER Feeding Start Date	NER feeding records	Yes	Yes
Gros Ventre Feeding Start date	WGFD feeding records	Yes	No
Elk Hunting Pressure by Hunt Area	Estimated number of hunter days from WGFD completion reports	Yes	Yes

EVALUATION/FUTURE MANAGEMENT

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term, sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Consequently, we anticipate that the strategies outlined in this plan will be in place for a minimum of 5 years, after which an initial evaluation of the program will be made. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented in an annual management Step Down Plan update/report, completed by NER staff by the end of March for the previous year.

Consistent with objectives outlined in the BEMP, the long-term goal of this plan is reduce the reliance of bison and elk on intensive supplemental feeding, using adaptive management principles through a structured framework of management actions, to achieve a desired condition of animals relying predominately on native habitat on refuge, park, and forest lands, and on NER cultivated forage. But because there is no precedent for what this plan proposes, there are few responses to proposed management actions that can be predicted to a degree of certainty commensurate with establishing definable thresholds or other objective criteria for success in the short term.

Factors that will be considered in evaluating the success of the program will include the trend of EFD and BFD, type and frequency of private lands conflicts, the proportion of the Jackson elk herd wintering on the NER, presence or absence of CWD and other infectious diseases, elk and bison population size and distribution, elk calf winter mortality, and public support. These are complex, dynamic, and interwoven components that, together with the management Step Down actions, make up the framework for decreasing reliance on supplemental feeding. As such, the effects of changing biological, social, and political conditions on these components will be part of the evaluation process.

In the context of this larger framework, however, we believe evaluation of the trend in EFD and BFD will be most important after the first 5 years of MSP implementation. The direction and magnitude of the trend observed will provide a preliminary basis for evaluation and decisions about continued management actions. Initial success with reduced feeding will be associated with a declining trend, with greater magnitudes indicating higher degrees of success. However, determinations of overall program success will necessarily include evaluation of all system components. For example, gains in reduced feeding come could be accompanied by an increase in private land conflicts, which would affect overall success determinations. While the overriding strategy will be to decrease feeding as aggressively as possible while gauging effects on other system components, overall measures of program success through time will necessarily involve a complex matrix of component evaluation. These evaluations will be included in annual MSP reports.

As proposed and new management strategies are implemented and evaluated under this plan, at some point in the future it may become apparent that meeting reduced feeding goals will not possible without reducing elk and/or bison population objectives. Population objectives for both herds are set by Wyoming Game and Fish Commission and are evaluated regularly by WGFD personnel, including public review through annual season setting meetings. The BEMP supported the State herd objectives of 500 bison and 11,000 elk, and thus due to NEPA requirements any further consideration of reduced herd

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sizes by the NER or GRTE are beyond the scope of this plan. However, WGFC changes to Jackson bison or elk herd objectives are not constrained by the BEMP.
Investigating the potential effects of climate change on elk and bison management will also be important in the long-term. During implementation of this plan, we will collect a variety of data that could be drawn upon for this purpose.

PUBLIC OUTREACH AND EDUCATION

The practice of winter feeding is inexorably woven into the historic fabric of Jackson Hole. Elk are identified with the rich and unique legacy for which Jackson Hole is known around the world. De-emphasizing the supplemental feeding program will be a major paradigm shift for the residents of Jackson Hole, Teton County, and the State of Wyoming.

An effective Public Outreach and Education program is essential for effective MSP implementation. The practice of feeding elk evokes passionate responses from those that oppose and those that support this practice. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk/bison herd management methods.

A detail communication plan to guide outreach and education efforts can be found in Appendix 3.

SCHEDULE

Table 6. Step Down Plan proposed implementation schedule.

Action	Date
Public outreach and education	November 2016
Initiate private lands conflicts mitigation contacts/actions	January, 2017
Implement enhanced forage monitoring	January, 2017
Initiate changes in supplemental feeding protocol	January/February 2017
GPS Collar 30-40 elk (Iridium platform)	March 2017
Monitoring/Evaluation/Annual Report	June 2017

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BUDGET

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

	Year				
Agency / Activity	**1**	**2**	**3**	**4**	**5**
National Elk Refuge:					
Monitoring:					
Seasonal Biological Technician (0.5 FTE, GS-7)	$24,000	$25,000	$26,000	$27,000	$28,000
Bison/elk fed days					
Mid-winter census					
Elk summer herd segment distribution[1]					
Expanded standing forage estimates[1]					
Chronic Wasting Disease, 2 seasonal bio.-techs	$32,000	$32,000	$32,000	$32,000	$32,000
Winter bison/elk distribution					
Irrigation					
50 Elk radio telemetry collars; Iridium Platform	$115,000	$25,000	$25,000	$25,000	$25,000
Bison barrier maintenance at NER south entrance	$500	$500	$500	$500	$500
Step Down Management Plan annual reporting	$2,000	$2,000	$2,000	$2,000	$2,000
Private lands:					
Easements / Leases (Private Foundations)	~~Unknown~~Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000
Conflict mitigation technicians (WGFD)	$91,000	$91,000	$91,000	$91,000	$91,000
Hazing (helicopter)	$6,000	$6,000	$6,000	$6,000	$6,000
Vegetation restoration/protection[1]					
Public Outreach and Education	$11,000	$1,000	$1,000	$1,000	$1,000
Subtotal					
Grand Teton National Park:					
Monitoring:					
Summer elk classification/distribution	$10,000	$11,000	$12,000	$13,000	$14,000
Collaborative elk monitoring (GRTE portion)	$5,000	$5,000	$5,000	$5,000	$5,000
Vegetation Restoration/Protection					
Monitoring	$16,000	$16,000	$18,000	$18,000	$12,000
Temporary bison fencing	$24,000				
Temporary fence maintenance	$6,000	$8,000	$8,000	$4,000	
Hayfields restoration	$84,000	$70,000	$70,000	$31,000	
Exotic plant mitigation	$50,000	$52,000	$46,000	$32,000	$16,000
Elk Reduction Program (subject to annual review)					
Hunter harvest evaluation	$1,500	$1,500	$1,500	$1,500	$1,500
Harvest age distribution	$2,000	$2,000	$2,000	$2,000	$2,000
CWD monitoring (0.15 FTE, GS-6)	$7,000	$7,000	$7,000	$7,000	$7,000
Law Enforcement and Visitor Protection (0.15 FTE for 20 LE and support staff;	Unknown				

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
supplies, and permitting)[3]					
Subtotal					
Wyoming Game and Fish Department:[2]					
Subtotal					
Grand Total					

[1]See detail in Appendix
[2] Dependent on size of reduction program; current annual expenditures are approx. $295,000 for 0.15 FTE for 20 LE and support staff; supplies, and permitting.
[3]Through Interagency Agreement

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APPENDIX 1. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007).

Populations

- Jackson elk herd objective of 11,000 would be maintained.
- New Jackson bison herd objective of 500 established.

Winter Feeding

- Supplemental feeding could be delayed or could occur earlier compared to current practices.
- Changes [to feeding program could] include alterations in the timing of feeding and providing supplemental feed in fewer years.
- Ration or pellet composition might need to be changed.
- Supplemental feeding would be initiated according to established criteria, including pre-winter forage production, assessments of forage utilization (done jointly by WGFD and NER personnel), elk condition and movements, and potentially on the January 1 index of winter severity calculations for elk (Farnes, Heydon, and Hansen 1999).
- Mechanical means could be used to increase forage access for elk after snow crusting events.
- Changes in the refuge supplemental feeding program could begin to affect elk nutrition (negligible adverse effect on NER elk from lower nutrition).
- Displacement of elk by bison during competition for standing forage would decrease as the bison herd is reduced.
- Aggressive social interactions involving competition for food among elk and bison would increase overall as feeding periods are reduced.

Winter Distribution

- Elk densities on the NER would decline due to more reliance on standing forage and wider distribution.
- Elk use of lands surrounding the NER would increase, including:
    - USFS lands east of the NER
    - Gros Ventre feedgrounds possibly
    - Southern GRTE
    - State feedgrounds south of the NER
- Most of winter distribution shift would involve elk in the Yellowstone, Teton Wilderness, and Gros Ventre segments.
- As ungulate numbers decreased and supplemental feeding was reduced, competition and aggressive social interactions on the refuge would also be reduced.
- Elk and bison distribution would increase as the animals relied more on native winter range.
- Fewer animals would be present on the refuge.

Mortality

- As supplemental feeding is reduced, natural factors such as climate and native forage availability would have a greater influence on numbers, movements, distribution, and mortality.
- More elk would be subject to natural factors affecting mortality, including loss of body condition, predation, and starvation.
- Increased mortality on and off the refuge would mainly affect older elk and calves, and some prime bulls entering the winter energetically stressed due to rut activities.

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- Late winter calf ratios could decrease as a result of higher winter calf mortality
- Average winter mortality on the refuge would increase from 1%–2% annually to an estimated 1%–5%.
- Overall, a higher total winter mortality rate of approximately 5% could be expected.

Disease

- Reductions in supplemental feeding or elk numbers would reduce the potential for impacts due to tuberculosis, septicemic pasturelosis, and CWD.
- The health and sustainability of the Jackson elk herd would be increased gradually as supplemental feeding was reduced and there was greater reliance on standing forage and wider ungulate distribution.
- Health and sustainability of the Jackson elk herd would be enhanced in the long term.
- Wider distribution of elk would result in moderate reductions in both the prevalence and potential transmission of brucellosis, as well as potential for spread of diseases not yet in the population.

Private Lands

- The agencies would work closely with the WGFD and landowners, including livestock producers, to coordinate actions that would prevent conflicts due to elk dispersal and to defray costs of managing potential conflicts. Preventing access to food/hay rewards on private lands would be vital for effective management.
- Private land conservation easements within NER boundaries would promote wider distribution.

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APPENDIX 2. Monitoring Supplemental Materials: Feeding Initiation Methods

At each sample site, 10 subplots will be measured at every 5 steps along the random bearing determined for each site. At each subplot a 13.27" diameter metal sampling ring will be placed on the ground. The amount of forage available to elk within the sampling ring (dry weight in grams) will be visually estimated. The 13.27" diameter subplot allows easy conversion from grams to lbs. per acre (each gram is equivalent to 100 lbs. per acre). During annual forage production sampling, refuge biologist Eric Cole has made approximately 1,000 of these visual estimates per year for 17 years, and 33% of Cole's estimates have been verified by clipping and weighing. Therefore, Cole will be the principal estimator, but additional personnel will be trained in these techniques to provide redundancy in the event of personnel changes, and to increase the number of observers to facilitate estimation of error.

Estimating available forage within the sample ring at each subplot is relatively straightforward when snow cover is limited, but estimating how much of the forage is accessible to elk when snow is dense, deep and crusted can be subjective. To decrease the subjectivity of the estimation process, if the area under the sample ring is covered with snow, only forage that can be exposed with a gloved hand will be included in the estimate of available forage. Forage that is fouled with manure and/or flush with the ground due to trampling and/or encrusted in ice will not be included in the estimate of available forage.

At each subplot the estimate of available forage (dry weight g) will be converted to an equivalent lbs./acre value (1 gram=100 lbs./acre). The arithmetic mean of available forage (lbs./acre) for the 10 subplots provides an estimate of available forage for each index site. There are 3 sample site categories: 1) Historic Key Index Sites that have been used since 2007, 2) New randomly selected sites within areas preferred by elk, and 3) New randomly selected sites in areas not preferred by elk. Historic key index sites were not randomly selected, but were instead selected to represent areas most preferred by elk on the south end of NER. These were the sites used to determine when supplemental feeding would be initiated from 2007 until the implementation of the MSP. To facilitate comparison with pre-MSP data, we will continue to use mean lbs. per acre across historic key index sites to determine the 300 lbs. per acre threshold. However, post MSP implementation we will delay feeding initiation by 2 weeks once the 300 lbs./acre level has been reached. We will concurrently sample at randomly selected sites stratified on an annual basis between areas highly preferred and not highly preferred by elk. This will enable us to quantify the relationship between mean forage availability at historic key index sites and random sites over time.

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APPENDIX 3. Communication Plan

Communication Goals

Prior to the Step Down Plan's Implementation

- Utilize a variety of outreach methods to inform the public on the goals and timing of the Step Down Plan implementation and possible effects on wintering herds.
- Utilize a variety of outreach methods to inform the public on public comment opportunities.
- Identify and coordinate key messages and outreach with USFWS regional and national offices, State and federal agency partners, non-profits, elected officials, and other identified audiences.

During the Step Down Plan's Implementation

- Continue to utilize a variety of outreach methods to describe current management actions as well as measurable and noticeable changes on the landscape, in animal behavior, or in animal health.
- Provide a comprehensive overview of the Step Down Plan by providing links and references to previous outreach and background information.

Communication Objectives

- Work with current media contacts to promote news of the Step Down Plan via print, radio, Web, and social media platforms.
- Utilize new media and social media tools to provide information on why the Step Down Plan was developed, what public comment opportunities exist, and how the plan is being implemented.
- Plan, coordinate, and execute public meetings to allow for public comment and questions on the plan.
- Develop and provide methods for the public to submit written comments on the Step Down Plan.
- Monitor print media on Refuge elk and bison management to see how the Step own Plan objectives and reactions are being portrayed to the public.

Current Outreach Resources

- National Elk Refuge web site
- National Elk Refuge news release list
- (approximately 300 contacts)
- National Elk Refuge Twitter site (1,039 followers)
- Bison and Elk Management Plan web site (http://www.fws.gov/bisonandelkplan/)
- Space for an 11" x 17" poster in the Visitor Center on Refuge management topics
- Display panels in the Visitor Center theater for temporary displays

Available Supporting Outreach Resources

- USFWS Mountain–Prairie External Affairs staff
- USFWS Mountain–Prairie web site, including the
- "Top Stories" feature

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- USFWS Mountain–Prairie Twitter site USFWS Mountain-Prairie Region Facebook page
- USFWS National Wildlife Refuge System
- Facebook page
- USFWS Facebook page

Previous Outreach Efforts

- NER routinely writes and disseminates news releases on Refuge management activities, including the Comprehensive Conservation Plan, supplemental feeding, herd health monitoring, and forage production.
- Post the above news stories as Content.
- Management System (CMS) articles.
- Post CMS news story promos so they prominently appear on the home page, linking readers to the articles.
- Send out Twitter messages linking viewers back to the news stories.
- Prepare, upload and provide links to Adobe PDF versions of news stories with additional photos where additional images are available and/or help understand or visualize the content.
- Utilized the Conservation link on the web Content
- Management System to post information about the Bison and Elk Management Plan and the draft Comprehensive Conservation Plan.
- Retained and provided a link to the original Bison and Elk Management web page (http://www.fws.gov/bisonandelkplan/) that was developed during the planning process. The web site includes links to the Final Plan/EIS, Record of Decision, Federal Register Notice of Availability for both the Record of Decision and Final Plan/EIS, associated news releases, public meeting highlights, and other related documents. Note: the National Elk Refuge does not manage the site.

Additional Outreach Opportunities

- Public meetings in Jackson and other identified locations.
- Service produced video; video could be posted to the National Elk Refuge's multimedia web page, or USFWS Mountain–Prairie home page "Top Video" feature.
- Live radio interview on KHOL (Jackson, WY radio)
- Wyoming Public Radio interview with Refuge management staff
- Interviews with local print media sources
- Updates at community leader meetings such as Rotary Club, Jackson Hole Chamber of Commerce board meetings, and interagency breakfast meetings (with Federal agencies and local elected officials).

Target Audiences

Internal

- Regional and National USFWS Leadership
- Refuge permanent staff
- Refuge seasonal staff
- Refuge volunteers

External

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- Congressional representatives
- State of Wyoming leadership
- Federal agency partners, particulary Grand Teton National Park and the Bridger–Teton National Forest
- Wyoming Game & Fish Department
- Other NER partners, including county and town agencies and local nonprofit organizations
- Local elected officials
- Private landowners in proximity to the National
- Elk Refuge or neighboring Federal lands
- Tribes
- Local and state media
- Local public

Key Outreach Topics

- Overview of BEMP objectives
- Strategy to change elk/bison behavior
- Threat of disease
- Natural mortality rates
- Anticipated winter distribution changes for bison/elk
- Mitigate negative effects on private lands
- Change elk behavior and distribution while avoiding increased mortality.
- Explain the historic reasons a supplemental feeding program began and why it was continued.
- Explain the NER's limited large ungulate carrying capacity and the disproportionate impact of bison on available forage; 3 elk = 1 bison.

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APPENDIX 4. Models

Elk winter distribution model

The proportion of the JEH that winter on the NER will be linked to factors hypothesized to influence elk winter distribution (Fig. 2) using a generalized linear mixed effects model (GLMM). A GLMM can account for a proportional response variable (i.e., constrained to the interval 0–1) using a log link and binomially-distributed errors. A GLMM also includes fixed and random effects, with the latter capturing residual model variance otherwise not explained by fixed effects. Year will be including as a random effect, providing several benefits. First, we don't assume years are independent and comprise all of the factor levels of interest. Instead, the effect of year is treated as a random variable, with individual year effects realizations of that distribution. This allows inference to non-sampled factor levels, i.e. years, by estimating a latent population-level proportion of elk expected to winter on the NER regardless of fixed effect influences. Thus, the random year effect can be considered a latent variable describing elk behavior manifested as observed winter distribution. Second, because year effects are not treated as independent, estimated effects of year on the proportion of JEH elk wintering on the NER are dependent on all factor levels, leading to greater precision when estimating individual year effects (Kéry 2010).

The full GLMM incorporating fixed effects for each factor identified as influencing elk winter distribution (Fig. 2) is:

$$P_t = \beta_{0(t)} + \beta_1 * AFI_t + \beta_2 * SDM_t + \beta_3 * WP_t + \beta_4 * GSP_t + \beta_5 * SWE_t + \varepsilon_t$$

where the random intercept and residual model variance are

$B_{0(t)} \sim N(\mu_{\beta_0}, \sigma^2_{\beta_0})$, and

$\varepsilon_t \sim N(0, \sigma^2)$, respectively.

Fixed effects include 1) per capita available forage at initiation of winter feeding (*AFI*) , 2) proportion of the JEH that are short-distance migrants (*SDM*), 3) number of wolf packs present on JEH native winter range (*WP*), 4) growing season (May–August) precipitation for the Wyoming Snake Drainage climate division (*GSP*; a proxy for available forage on native winter range), and 5) snow water equivalent on 1 January at Thumb Divide (*SWE*; a proxy for early winter severity).

Elk calf winter survival and forage deficits

The Forage Accounting Model of Hobbs et al. (2003) has as an output weekly available forage biomass for the NER (sum of predictions for 30 × 30 m cells). These predictions account for snow conditions using a proxy of SWE and decrement total available biomass by 35% to account for unpalatable plants within the total estimate.

While calf survival is a function of multiple factors (Fig. 3), the primary management action influencing calf survival is supplemental winter feeding. Current winter feeding initiation criteria lead to calf survival generally higher than in unfed populations. Proposed feeding initiation criteria will result in later

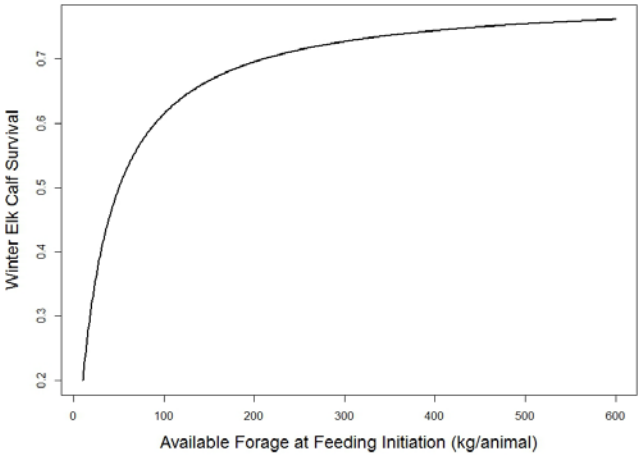
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initiation of supplemental feed, which will be most influential to calf survival. There is currently little understanding regarding the relationship between initiation of winter feeding and calf survival, except that current feeding initiation criteria result in high calf survival. We believe a threshold level of available forage at initiation of winter feeding exists such that winter calf survival reaches an asymptote. Below this threshold, calf survival is hypothesized to decline quickly with reductions in available forage at winter feeding initiation. Available forage at the initiation of winter feeding will be related to on elk calf winter survival using a saturating function (i.e., Holling type-II functional response; Fig. 6) by

$$S_t = \frac{aAFI_t}{b + AFI_t}.$$

The parameters *a* and *b* determine how calf survival is related to available forage. Maximum calf survival is *a*, and *b* represents the value of available forage to an individual when survival is 50% of *a* (Hilborn and Mangel 1997).

Although this approach doesn't capture forage deficits *per se*, it does provide a potentially sensitive proxy for this concept. It is assumed that a forage deficit for calves would occur at a point on the curve of the relationship between calf survival and available forage at initiation of supplemental feeding. Modeling the response of winter calf elk survival to changes in feeding initiation criteria facilitates our ability to maximize the influence of feeding initiation criteria on winter distribution while minimizing the likelihood of a large mortality event.



Hypothesized relationship between winter survival of elk calves and per capita available forage at initiation of winter feeding on the National Elk Refuge.

From: Gustine, David
To: Steve Kallin
Subject: MSP
Date: Saturday, July 23, 2016 12:44:54 PM
Attachments: Draft NER Step Down Plan v2.8_7-21-2016_GRTE_ddg_22-Jul-16.docx

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hi Steve-

See attached for mostly minor editing/formatting changes--take em or leave em--but some minor yet important rewording as well.

let me know if you have any questions.

have a good weekend,

dave

--

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U.S. Fish and Wildlife Service National Park Service

July 21, 2016 Draft

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BISON AND ELK MANAGEMENT STEP DOWN PLAN

A Structured Framework for Reducing Reliance on Supplemental Winter Feeding

National Elk Refuge
Grand Teton National Park

DRAFT

July 21, 2016

BISON AND ELK MANAGEMENT STEP DOWN PLAN

For the

National Elk Refuge,
Grand Teton National Park,
John D. Rockefeller, Jr. Memorial Parkway

Teton County, Wyoming

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***Suggested Citation**:* U.S. Fish and Wildlife Service: 2015. Bison and Elk Management Step Down Plan, National Elk Refuge and Grand Teton National Park. U.S. Department of the Interior, Washington D.C. Available online at:

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Appendix I. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section

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of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007)**. .....**
Appendix 2. Monitoring Supplemental Materials: Feeding Initiation Methods**.....**
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EXECUTIVE SUMMARY

Overview

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands, focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The final plan directed the NER and GRTE (in conjunction with the Wyoming Game and Fish Department: WGFD) to maintain the state's elk herd objective of 11,000; establish a bison population objective of 500; restore habitat on the NER and in GRTE; continue hunting bison and elk on the NER; continue the elk reduction program, when necessary, in GRTE; allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available; and develop a dynamic, structured framework and Step Down Management Plan for decreasing the need for supplemental feeding on the NER. ***This Bison and Elk Management Step Down Plan (~~SDP~~MSP) was developed to specifically addresses the criteria for a structured framework referenced in the Record of Decision.***

Background

Winter feeding of elk in Jackson was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. The loss of available winter range in Jackson Hole due to new ranching operations and a growing town resulted in significant numbers of elk dying during several severe winters in the late 1800s and early 1900s. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, established the National Elk Refuge. Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding.

Bison were extirpated outside Yellowstone National Park (YNP) by the mid-1880s but in 1948 were reintroduced to Jackson Hole when 20 bison from ~~(~~YNP~~)~~ were released near Moran, Wyoming. The herd remained small until discovering elk feedlines in 1980, when the population began sustained population growth. Bison and elk that winter on the NER are migratory and occupy summer ranges predominantly to the north.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands, thereby reducing other wildlife associated with woody vegetation, unusually low winter mortality, which affects predators and other species and requires intensive hunting programs.

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. The potential risk of catastrophic disease outbreaks and the need to mitigate this threat is a vital component in achieving the BEMP Sustainable Populations Goal.

Objectives

This ~~Step Down Plan~~MSP addresses several

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objectives under a broader BEMP goal of sustainable populations, which directed the agencies to: 1) dDevelop a dynamic, structured framework for reducing NER supplemental feeding; 2) {implement a} phased reduction of animals on feed: a) Phase 1, to 5,000 elk and 500 bison, and b) Phase 2, ~~[to a point where]~~ elk and bison rely predominantly on native habitat; 3) maintain natural elk bull-to-cow ratios in park summer herd; and 4) ~~Enhance~~ enhance public outreach/education. The BEMP further stated that consideration criteria for implementing the 2nd phase of reduced feeding would include some or all of: 1) the level of forage production and availability on the National Elk Refuge~~.~~, 2) desired herd sizes and age/sex ratios, 3) effective ~~mitigate~~ mitigation of bison and elk co-mingling with livestock on private lands , 4) winter distribution patterns of elk and bison, 5) prevalence of brucellosis, chronic wasting disease, and other wildlife diseases, and 6) public support. ~~-~~**In short, the overall objective of this plan is to provide a path for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives and public support.**

Strategies

Elk have been fed for some period during nearly every winter on the National Elk Refuge since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during a time of year when natural forage is typically most limited is powerful to both species, and their knowledge of its existence has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Attempting to modify this behavior on a large scale is unprecedented and will necessarily require investigation, constant evaluation, modifications to approach when indicated, and repeated trials.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into the~~-~~ 3 broad categories of 1) timing and intensity of winter feeding, 2) timing and intensity of hunting, and 3) herd segment specific and overall harvest levels.

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes. Rather than basing progress toward the number of elk on feed for the entire season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 were elk fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000. We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both species on supplemental winter feeding. However, these benchmarks are not the exclusive method to determine ~~Step-Down Plan~~ success of the MSP (see p. 21?; Elk Fed Days and Bison Fed Days).

Initial success of MSP implementation will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP did provide specific

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measurement criteria for the definition of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage" we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row.

Chronic Wasting Disease. CWD has been detected within 40 miles of the Jackson Elk Herd (JEH) in moose, within 35 miles in deer, and within 175 miles in elk. Continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence will take place. Some aspects of CWD response planning could change depending on the outcome of the WGFD CWD management plan revision process.

Winter Feeding. Currently, the initiation of supplemental winter feeding occurs when available forage drops to 300 lbs./acre along transects in areas with highly preferred grasses. This protocol will change to delay the initiation of feeding.

The strategy of delaying the start of supplemental feeding is to encourage elk and bison to use native winter range, especially those individuals that have not previously received a food reward on the Refuge. Over time, it's anticipated a cohort of animals will develop that are not conditioned to the Refuge supplemental feeding program, which will reduce herd concentrations and the risk of disease transmission.

To reduce supplemental feeding overall, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk~~/~~ and bison fed days, the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require assistance with focused mitigation measures.

As bison and elk behavioral responses are better understood, feeding delays will be extended to encourage a redistribution of elk and bison to native winter range.

There are a number of variables (Table 4, Fig. 10) which will be considered and will influence the feeding delay length and timing.

Time of season could influence this interval, most likely shortening it as the feeding initiation date gets later. During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Delaying feeding by two weeks in January, for example, is likely to be more successful in dispersing animals, than doing so in February, when food stress and tendency for animals to move to private lands is greater. Forage availability could also have an influence, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Both time of season and forage availability considerations would be affected by the numbers of elk and bison on the NER. And finally, the distribution of animals, particularly on private, livestock producing lands, would be considered.

Monitoring programs will include measures of calf mortality and it will be an influencing parameter in feedback mechanisms. The BEMP anticipated that current elk mortality (1-2%) could increase by ~~from 1-2% overall to 1-5~~0-3%.

Initially, the termination of feeding, which is now based on a snow cover index and subjective evaluation of available forage, is expected to occur about a week earlier.

Harvest. Few options for manipulating elk hunting are currently available because the JEH is at or near the 11,000 WGFD objective. Proposed changes include allowing limited any elk permits

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and consideration of a bow season near developments on the NER, and shifting the season later to better coincide with migration timing.

Based on bull ratios in the park summer herd that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless~~ only unless bull ratios consistently exceed 35:100 cows~~. Park and refuge officials will work together to support this goal as expanded refuge hunting opportunities are considered.

Recent trends of reduced use of traditional winter range and increases in short-distance migrant summer herd segments have led to significant increases of winter elk concentrations on the NER. If efforts to encourage increased use of native winter range are unsuccessful, ~~serious consideration should be given to reducing the Jackson Elk Herd population objective in the future,~~ agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future ~~Jackson Elk Herd~~JEH population objective, ~~which would~~ to provide a level of harvest flexibility more commensurate with addressing these herd changes.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution or discouraging bison from attempting to leave the NER via the south boundary into the town of Jackson. Serious consideration should be given to reducing the bison herd population objective in the future to lower winter NER forage consumption and help reduce elk and bison winter concentrations. Genetic diversity could be addressed by periodically introducing bison from other herds.

Effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st in the future.

Private Lands Mitigation. Several strategies would be employed to mitigate likely changes in bison and elk distribution, including providing incentives for non-breeding cattle operations, increased fencing in some limited areas to separate elk and ~~/~~bison from livestock feed lines, hazing elk~~/~~ and bison away from livestock feed lines and purchasing private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal wildlife conflict technician positions supervised by WGFD.

Vegetation Restoration.

The varied approaches to restore the Kelly Hayfields in GRTE (4,500 acres) was initiated in 2008 and will likely be complete in 2035. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. The restoration process involves removal of non-native vegetation, collection and propagation of native seeds and plants, as well as the seeding of native plants.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres are currently under restoration treatment and 3,265 acres remain non-native pasture. Maintenance of restored ecological conditions will require management efforts in perpetuity to keep non-native species from colonizing restored areas. The park will continue to seek funding for restoration of the remaining areas as well as

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maintenance of the restored pastures.

Strategies Considered But Rejected

Strategies considered but rejected include fertility control in elk and bison, agency reduction of either elk or bison, and altering rations of supplemental feed.

Models and Monitoring

Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

A robust monitoring program will be necessary to track the effects of actions implemented under this plan. Critical monitoring components will include: 1) enhanced forage production and availability sampling; 2) measuring animal abundance and distribution including differences in some sex and age classes; determining elk and bison fed days each feeding season; 3) estimating winter mortality; 4) brucellosis seroprevalence rates; and 5) CWD surveillance. In many cases, attribute baselines for the period preceding implementation of this plan have been developed for comparison after the plan is implemented.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and~~,~~ sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented in an annual ~~Step Down Pplan~~MSP update/report, completed by NER staff by the end of June.

Public Outreach/Education

De-emphasizing the supplemental feeding program will be a major paradigm shift especially for the residents of Jackson Hole and~~,~~ Teton County~~, and the State of Wyoming~~ but will also be of interest to others in Wyoming and across the nation familiar with the long history of feeding elk on the National Elk Refuge. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk~~/~~ and bison herd management methods. A detailed communication plan has been developed that identifies key messages and utilizes a variety of outreach methods, including print, video, and voice material, utilizing social media, and meetings with elected officials, state and local governments, agency and tribal partners, community organizations, stakeholders, and the general public.

Schedule

Assuming adequate funding, actions under this plan will begin with radio-collaring elk in February 2016, followed by public outreach, private lands conflict mitigation and contacts, and enhanced forage monitoring in March 2016, and initiating supplemental feeding changes in January 2017.

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INTRODUCTION

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands. It included directives for forthcoming development of adaptive management practices to address several objectives in the plan, including a desired future condition of elk and bison relying predominantly on native forage. This ~~Bison and Elk Management Step Down Plan~~MSP has been developed expressly for that purpose.

Bison and Elk Populations

While Jackson Hole is probably best known for the splendor and ruggedness of the Teton Range, the Jackson bison and elk herds rank among the top characterizing features of the valley. Both figure prominently in Jackson Hole's history and culture, although bison were absent from the valley for about 100 years between the mid-1800s and mid-1900s.

The ~~Jackson elk herd~~JEH occupies approximately 8,000 km^2 in the upper Snake River watershed north of the town of Jackson (Fig. 1). Much of the herd is migratory, moving between distinct wintering and summer ranges. Primary wintering areas include the Buffalo Valley, lower elevations of the Gros Ventre River drainage, the ~~National Elk Refuge (NER~~ NER~~)~~, and areas adjacent to the NER on Bridger-Teton National Forest (BTNF) lands. Summering areas occur throughout the herd's range and for convenience are divided into five geographic regions that include ~~Grand Teton National Park (GRTE)~~GRTE, Yellowstone National Park (YNP), the Gros Ventre drainage, Teton Wilderness, and Southwest ~~Boundry~~Boundary area, which includes private and public lands in the vicinity of GRTE's southwest boundary.

In the late 1800s, when elk populations all over North America were being extirpated, the residents of Jackson Hole protected elk from "tusk hunters" and large-scale commercial hunting operations. Elk are just as important to today's residents of the valley. Thousands of people each year have the opportunity to see elk at close range on the refuge while riding on horse-drawn sleighs. Thousands of pounds of shed elk antlers are sold at an annual antler auction each spring in the town square. Elk are important to backcountry users as well as to people that never leave the road. Jackson Hole is a popular destination for instate and out-of-state elk hunters. The draw of elk to visitors contributes significantly to the local economy.

Winter feeding of elk in Jackson Hole began in 1910 and was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. According to historical reports, before Euro-American settlement some Jackson elk wintered in the southern portion of Jackson Hole (present location of the NER town of Jackson) and may have used areas outside Jackson Hole, including the Green River and Wind River basins to the south and east, respectively, and the Snake River basin to the southwest in what is now eastern Idaho (Allred 1950; Anderson 1958; Blair 1987; Barnes 1912; Sheldon 1927). Radio-collar studies have documented small numbers of Jackson elk wintering in each of these areas in recent times as well (NER and GRTE, unpublished data). Over time, changes in land use and development in these areas, over hunting, and establishment of feedgrounds probably reduced the use of these areas by Jackson elk.

By the end of the 19th century the ~~Jackson elk herd~~JEH was believed to be largely confined to Jackson Hole and the immediately surrounding area, where wintering conditions are often harsh. Significant numbers of elk died during several severe winters in the late 1800s and early 1900s>

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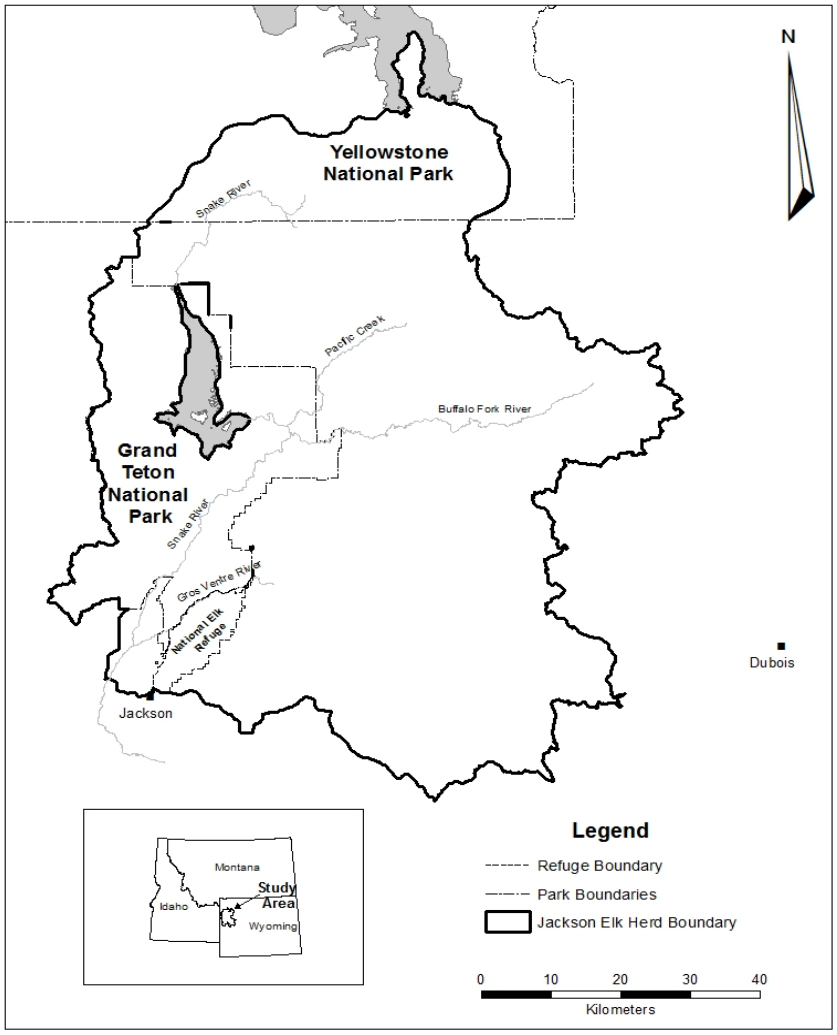


Figure 1. Jackson elk and bison herd ranges, including the National Elk Refuge, Grand Teton and Yellowstone National Parks, and Bridger-Teton National Forest. [include bison range, labels for continental divide and Bridger-Teton National Forest, and in Legend Jackson elk herd unit].

Primary reasons for these mortality events included~~Compounded by~~ the loss of available winter range in Jackson Hole ~~due to~~from new ranching operations and a ~~growing town~~and expansion of Jackson~~, significant numbers of elk died during several severe winters in the late 1800s and early 1900s~~. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded

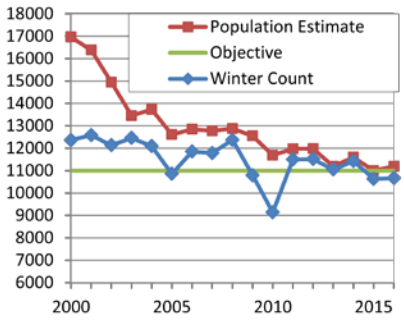


Figure 2. Winter Counts, population estimates, and herd objective for the Jackson elk herd, 2000-2016.

the appeals for assistance and on August 10, 1912, appropriated $45,000 for the purchase of lands and maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first winter census in the area was conducted in 1912 and showed about 20,000 elk residing in Jackson Hole and the Hoback River drainage (the latter is not within the ~~Jackson elk herd~~JEH's range).

Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding. Its population in recent times has fluctuated near its herd objective of 11,000 adopted by the WGFD (Fig. 2).

An iconic symbol of the American West, bison are also popular with visitors and residents. Because so few opportunities remain to see bison in the wild, viewing and photographing them in ~~Grand Teton National Park~~GRTE with the Teton Range in the background is a treasured opportunity for many of the valley's visitors. Similar to elk, there is also a high level of interest in bison hunting. Bison are of particular interest to nearby American Indian tribes and tribes in other parts of the United States because the animals are central to their culture and tradition.

Bison are native to Jackson Hole, as evidenced by the presence of prehistoric bison remains throughout the valley, but were extirpated outside Yellowstone National Park by the mid-1880s. In 1948, 20 bison from ~~Yellowstone National Park (YNP)~~ YNP were reintroduced to the 1,500-acre Jackson Hole Wildlife Park near Moran. The Jackson Hole Wildlife Park was a private, non-profit organization sponsored by the New York Zoological Society, the Jackson Hole Preserve, Inc., and the ~~Wyoming Game and Fish Department (WGFD)~~WGFD. A population of 15–30 bison was maintained in a large enclosure there until 1963, when brucellosis was discovered in the herd (likely transferred with the original 20 animals from YNP). At that time, all the adult animals were destroyed, but four vaccinated yearlings and five vaccinated calves were retained. In 1964 twelve certified brucellosis free bison from Theodore Roosevelt National Park were added to the herd. In 1968 the herd (down to 11 animals) escaped the confines of the wildlife park, and a year later the decision was made to allow them to range freely. The expansion of GRTE in 1950 had enveloped the Wildlife Park, and this ~~allowing~~ allowed the bison to ~~free~~ range freely and was ~~and remains~~ consistent with National Park Service wildlife management policy. The herd remained small and wintered mostly in the Snake River bottoms in GRTE until 1975, when it followed the winter environmental gradient to the NER and began wintering there. The use of standing forage by bison on the NER was viewed as natural behavior thus acceptable to managers. In 1980, however, bison discovered and utilized supplemental feed provided ~~for~~ to elk in winter, and they have continued to do so ever~~y winter~~ since.

The discovery of supplemental feed by bison has had several consequences, including a significant increase in the population's growth rate (Fig 3). Bison on the elk feedlines have at times disrupted feeding operations and displaced and injured elk. To minimize conflicts between bison and elk, managers have provided separate feedlines for bison since 1984~~.~~. As the population has grown, separating elk and bison on feedlines has become increasingly difficult, and a variety of feeding

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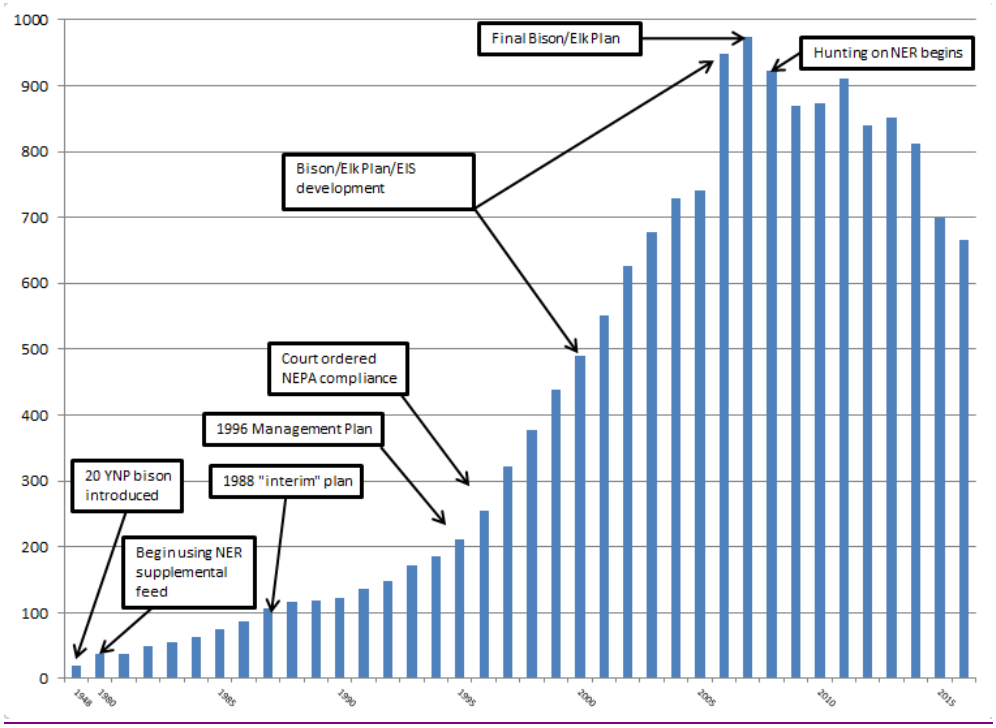


Figure 3. Population growth and planning history for the Jackson bison herd, 1948-2016.

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strategies are employed to help reduce displacement of elk.

As the herd has grown it has maintained fairly stable movement patterns, wintering almost entirely on the NER and summering within GRTE and adjacent lands on the BTNF (Fig. 1).

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands and ~~,~~ thereby reducing ~~other wildlife associated with~~availability of ~~woody vegetation~~these habitats to other wildlife~~,~~ as well as unusually low winter mortality, which has ~~affects~~ affected predators and other species and has required~~s~~ intensive hunting programs.

Planning History

Jackson's bison and elk populations have been the subject of previous planning efforts. Elk management and research has been guided by the Jackson Hole Cooperative Elk Studies Group since it was established in 1958. The group consists of biologists and agency administrators from the ~~National Elk Refuge~~NER, ~~Grand Teton~~GRTE, YNP ~~and Yellowstone National Parks~~, ~~the Bridger Teton National Forest~~BTNF, and ~~Wyoming Game and Fish Department~~WGFD, who meet at least annually to coordinate management of the population and its habitat. Coordination of bison management began soon

after they started frequenting the NER in 1976 and using supplemental feed provided to elk in 1980 (Fig. 3). Release of an "Interim" plan that called for maintaining a herd of 90-110 bison while data were gathered for a long term plan occurred in 1988. It was followed by implementation of a sport hunt outside GRTE, administered by WGFD. This plan was halted after litigation in which the plan's violation of NEPA was successfully argued by plaintiffs.

In 1996, after considerable herd growth, a new long term management plan and environmental assessment for the Jackson bison herd was released (Fig 3). This plan had strong support and called for maintaining a herd size of 350-400 bison, but it was shelved a year later when plaintiffs from the earlier litigation successfully argued that, because the plan failed to consider the effects of feeding elk on bison management, it also violated NEPA and was not sufficient. This led to development of the draft bison and elk management plan and environmental impact statement from 2000-2006 and release of the final plan in 2007 (Fig 3).

The 2007 Bison and Elk Management Plan (BEMP; USFWS 2007) considered six alternatives for bison and elk management focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The primary management scenarios presented in the alternatives included the status quo, terminating elk and bison hunting on the NER and the elk reduction program in GRTE, brucellosis vaccination options, restoring habitat, improving forage, and decreasing or phasing out supplemental winter feeding.

The final BEMP (USFWS 2007; www.fws.gov/bisonandelkplan) which set management direction for 15 years or until a subsequent plan is developed, proposed to maintain the state's elk herd objective of 11,000, establish a bison population objective of 500, restore habitat ~~on~~ in the NER and ~~in~~ GRTE, continue hunting bison and elk on the NER, continue the elk reduction program in GRTE in concert with the parks enabling legislatio~~,~~ n~~when necessary, in concert with the parks enabling legislation (citation)~~, allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available, and develop a dynamic framework of management actions which adaptively decrease the need for supplemental feeding on the NER. ***This Bison and Elk Management ~~Step Down Plan~~MSP was developed to address the latter and specifically addresses the criteria for a structured framework listed on page 5 of the Record of Decision*** **(Fig. 4).** It does not address other on-going bison and elk management actions already prescribed by the BEMP.

The BEMP scheduled the completion of the ~~Step Down Management Plan~~MSP for 2008. However, litigation challenging the BEMP in 2008 led to the decision to postpone its development until litigation was resolved. As of March 2015, two court rulings have upheld the 2007 BEMP and ROD. In a lawsuit against the BEMP and its author agencies (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2010), plaintiffs argued that the BEMP violated the National Wildlife Refuge System Improvement Act (National Wildlife Refuge System Improvement Act 1997) by disrupting the biological integrity of the Refuge, and that the plan and the accompanying EIS violated NEPA because they were insufficiently detailed to allow a reasonably complete discussion of mitigation. The crux of the plaintiff's argument was that the plan did not set a specific date for the cessation of supplemental feeding. In response, the agencies argued that the plan constituted a valid exercise of discretion and that it and the EIS were sufficiently detailed to satisfy the requirements of NEPA. In March 2010, the United States ~~-~~District Court for the District of Columbia sided in favor of the agencies in this case. In 2011, the plaintiffs appealed this ruling to the United States Court of Appeals for the District of Columbia Circuit. This Court affirmed the District Court ruling (Defenders of Wildlife et al. v. the U.S.

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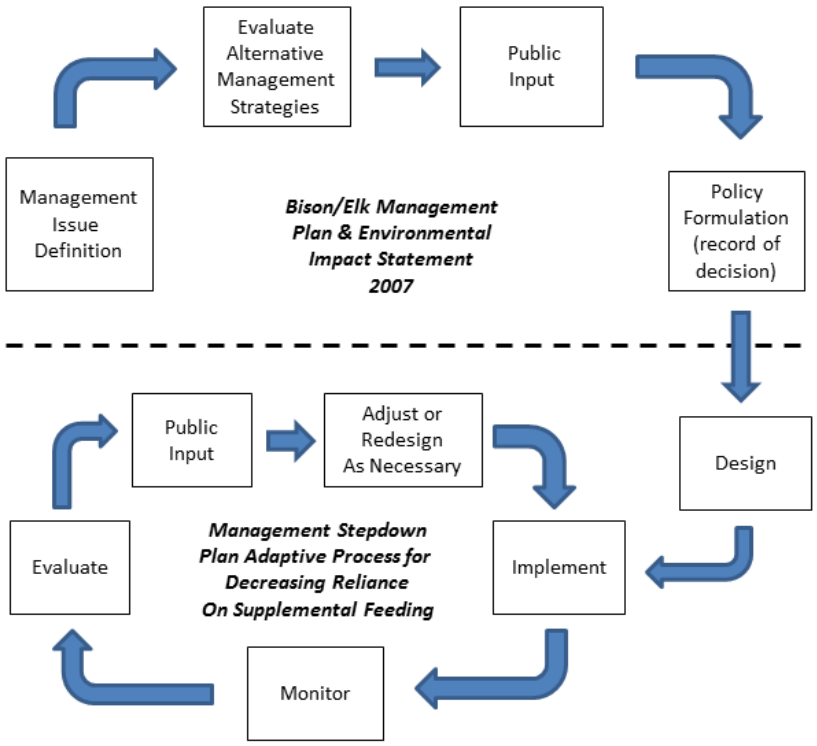


Figure 4. Management step down planning for supplemental feeding on the National Elk Refuge and its relationship to the 2007 Bison/Elk Management Plan and Environmental Assessment.

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Department of Interior and State of Wyoming 2011).

National Environmental Protection Act Compliance

The 2007 BEMP/EIS and ~~Final Record of Decision (ROD)~~ROD satisfied NEPA requirements for current bison and elk management through a detailed analysis of alternative management actions and their likely effect on the environment, and substantial involvement of the public in the process. This ~~Step Down Management Plan~~MSP ~~is~~ does not duplicate or add to this process. It is designed to tier off of the BEMP as a dynamic implementation guide to one part of the preferred alternative outlined in the BEMP ROD. As such, references to NEPA covered in the BEMP will be included where necessary in this document, and the discussion of any action that would require additional NEPA compliance will be explicitly stated as such in that context.

Management Step Down Planning

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The use of adaptive management plans has gained popularity in natural resource management planning because, by definition, they allow modifications of strategy based on monitoring results and outcomes toward

reaching specific goals or objectives. Four elements generally included in an adaptive management approach include: 1) well defined and mutually agreed upon objectives~~,~~; 2) knowledge (including descriptive models) of the dynamics of the system being managed~~,~~; 3) clearly articulated management actions and strategies~~,~~; and 4) a monitoring program to evaluate responses of the system to management actions (Walters 1986).

This ~~step-down plan~~MSP utilizes adaptive management planning principles but is not intended to include all of the adaptive management planning elements outlined in the Department of Interior Adaptive Management Technical Guide (2007). This ~~Step-Down Plan~~MSP is more accurately described as a "structured framework" of adaptive management actions that progressively transitions from supplemental winter feeding to greater reliance on free-standing forage (BEMP ROD p.5).

Table 1. 2007 Bison/Elk Management Plan Goals and Objectives (Step Down Plan objectives shaded)

Goal: Habitat Conservation

Objectives:

- Conserve important private lands.
- Increase forage production.
- Minimize non-native plants.
- Protect sagebrush grasslands.
- Restore willow, aspen, and cottonwood.
- Perpetuate natural mosaic of plant communities.

Goal: Sustainable Populations

Objectives (BEMP pages 135-136):

- Develop structured framework for reducing NER supplemental feeding.
- Phase reduction of animals on feed: 1) to 5,000 elk and 500 bison, and 2) elk and bison rely predominantly on native habitat.
- Maintain natural bull-to-cow ratios in park summer herd.
- Ensure a genetically viable bison herd with close to an even sex ratio.
- Enhance public outreach/education.

Goal: Elk and Bison Numbers

Objectives:

- Maintain state elk herd objective of 11,000.
- Maintain a genetically viable bison population of about 500 animals.

Goal: Disease Management

Objectives:

- Manage brucellosis transmission risk from elk and bison to livestock.
- Manage feeding to reduce brucellosis transmission among bison and elk.
- Educate hunters about wildlife disease human health hazards.

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OBJECTIVES

The management direction and desired conditions stated in the BEMP called for the NER and GRTE staffs to work with others (agencies, partners, etc.) to "adaptively manage elk and bison in a manner that contributes to the State's herd objectives yet allows for the biotic integrity and environmental health of the resources to be sustained," so that the public can enjoy a variety of compatible wildlife-dependent recreational opportunities. Under the BEMP's 4 primary goals, 20 associated objectives were identified (Table 1). This ~~Step-Down Plan~~MSP addresses four objectives under the goal of sustainable populations (Fig. 5).

The reduction of animals on feed at the NER was proposed to be spread over two phases. In Phase

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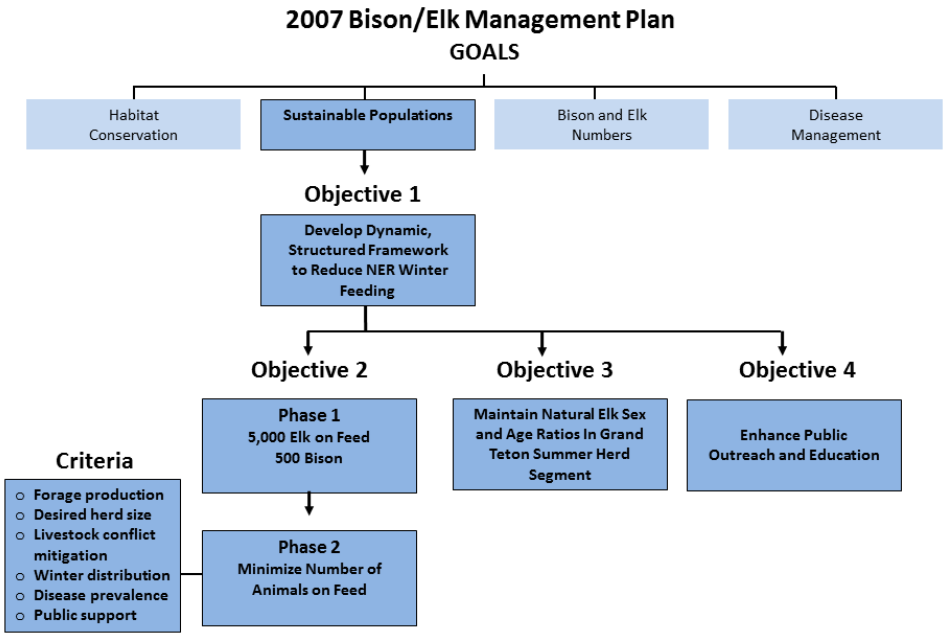


Figure 5. Relationship of ~~Step Down Management Plan~~ MSP to the 2007 Bison/Elk Management plan goals, phasing of objectives, and consideration criteria for reducing the reliance of elk and bison on supplemental

1~~-~~, the aim is to reduce the average number of elk on feed to 5,000 (while maintaining WGFD's 11,000 elk herd objective), and reduce the winter population of bison to the BEMP recommended, and WGFD adopted, objective of 500. In Phase 2, the overall objective is to reduce the reliance of bison and elk on supplemental feed (USFWS and USNPS 2007a). Desired conditions include animals relying predominantly on native habitat and cultivated forage. Important consideration criteria for implementing Phase 2 will include: 1) the level of forage production and availability on the ~~National Elk Refuge~~NER and adjacent winter ranges~~,~~ ; 2) maintenance of desired herd sizes and age/sex ratios~~,~~ ; 3) the ability to effectively mitigate bison and elk livestock conflicts~~,~~ ; such as co-mingling o~~n~~ ~~on~~ private lands during high risk disease transmission periods~~,~~ ; 4) maintaining desirable winter distribution patterns of elk and bison~~,~~ ; 5) the prevalence of brucellosis, chronic wasting disease, and other wildlife diseases~~,~~ ; and 6) public support. ~~-~~In short, the overall objective of this plan is to outline a framework for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives.

This Plan focuses on management actions to initially achieve Phase 1 objectives. However, if successful, these actions will continue to be used to achieve the Phase 2 objective of reducing reliance on supplemental feeding while considering the six criteria listed above.

MANAGEMENT ACTIONS AND STRATEGIES

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Background

The principle goal of reducing reliance on supplemental feeding is to limit transmission of density dependent diseases in elk and bison while simultaneously minimizing winter mortality in elk. We will attempt to achieve this goal by experimentally reducing feed season length and closely monitoring elk and bison distribution and winter mortality.

Elk have been fed on the ~~National Elk Refuge~~NER each year in all but 9 winters since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during winter months is powerful to both species, and their knowledge of ~~Refuge~~ NER feed grounds has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Because use of feed grounds is a learned behavior, decreasing feed season length will potentially reduce the likelihood of elk that winter on native range finding NER feed grounds. ~~-~~Over time this could result in a greater percentage of elk using native winter range relative to NER feed grounds. Because it is largely unprecedented, the concept of modifying this behavior on such a large scale is daunting and poses questions for which there are no immediate answers. In some cases, the likelihood a specific management strategy's success will only be able to be roughly estimated, and unanticipated results are likely. Closely monitoring forage availability, elk and bison distribution, and elk mortality will allow us to evaluate the effectiveness of management actions and adjust management actions as needed should unintended negative consequences arise.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into ~~the~~ 3 broad categories~~: s of~~ 1) timing and intensity of winter feeding~~,~~ ~~-~~; 2) timing and intensity of hunting~~,~~ ~~-~~; and 3) herd segment specific and overall harvest levels.

Important Changes Since 2007

The BEMP was developed based on data collected and knowledge that existed up until its ~~Record of Decision in 2007~~ROD. Since then, important changes have taken place, some of which are advantageous to this effort and some of which are not.

A primary change that will facilitate meeting objectives under this plan is the reduction of the bison population from nearly 1,200 animals in 2007 to about 666 during winter 2015-2016 (Fig. 3) through hunting programs administered by WGFD. Licensing changes enacted in 2014 included a reduction in the bison cow/calf license fee (from $416 to $263 for residents and $2522 to $1022 for non-residents) and eliminating the once-in-a-lifetime restriction on a successful bison hunter to only those that successfully harvested a bull. Continued progress toward the 500 animal herd objective will require sustained harvest success.

During the same period, the Jackson ~~elk~~ Elk ~~herd~~ Herd has declined from nearly 13,000 to its objective of 11,000, but because the proportion of the ~~Jackson Elk Herd~~JEH that winters on NER has increased dramatically (Fig. 6), this will make achieving the Phase I objective of 5,000 elk on feed and any future elk population reductions more difficult. ~~-~~Preliminary modeling suggests that the increasing proportion of the ~~Jackson Elk Herd~~JEH wintering on NER has been associated with 1) changes in elk winter distribution associated with wolves (NER, unpublished data) and 2) high numbers of elk that summer immediately adjacent to NER (Cole and Foley et al. 2015).

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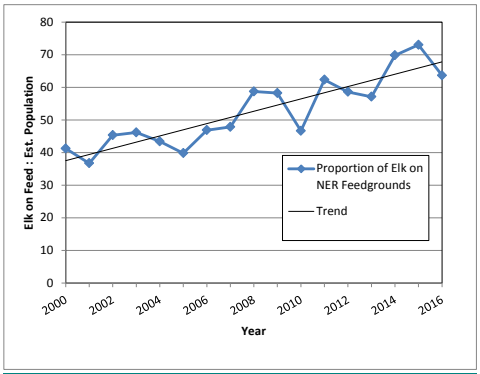


Figure- 6. Increasing trend of National Elk Refuge elk on feed as a proportion of the Jackson Elk Herd estimated population size.

Refuge-wide herbaceous forage production averaged 14,387 (SD = 4,125) tons during 1998–2013. In recent years irrigation of approximately 3,600 acres has increased refuge-wide forage production by approximately 10% compared to what would have been produced with precipitation alone, and by 15% in the southern portion of NER which receives the greatest use by elk and bison.

Since 2007, the general awareness of climate change among the public has greatly increased. A strong, credible body of scientific evidence shows that climate change is occurring, is caused largely by human activities, and poses significant risks for a broad range of human and natural systems (National Academy of Science 2010). Ecological systems in the GYE are likely to be affected and associated changes may have implications for elk and bison management.

Current Management

Ongoing primary management actions on the NER include winter feeding, harvest, irrigation, and hazing. In GRTE, harvest of elk during the Elk Reduction Program takes place, when necessary, in collaboration with WGFD, and restoration of previously cultivated and irrigated sagebrush-grasslands is ongoing. Fundamental components of each of these will be briefly described below to provide a basis for comparison to ~~Step Down~~ ~~management~~MSP strategies that will follow.

Chronic Wasting Disease

Supplemental feeding has occurred in all but 9 winters on NER since 1912, and although this strategy minimizes winter elk mortality from starvation and contributes to Wyoming state elk herd objectives, elk occur at numbers and densities well in excess of carrying capacity (Smith et al. 2004, Lubow and Smith 2004). Considerable evidence suggests that Chronic Wasting Disease (CWD) transmission and prevalence ~~are density dependent (Peters et al.~~ 2000, Williams et al. 2002). Monello et al. (2014) found that elk densities of 15-110/km^2 ~~per square km~~ (0.06 to 0.45/~~per~~ ac~~re~~) in Rocky Mountain National Park were associated with 13% CWD prevalence, and they predicted elk population declines when CWD prevalence exceeded 13%. NER elk densities range from 77-16,850/km^2 ~~per square km~~ (0.31-68/~~per~~ ac~~re~~; NER unpublished data)~~commonly exceed 160 per square km (0.65 per acre; NER unpublished data)~~, which suggests that the introduction of CWD to NER elk would have significant negative population effects over time.

Winter Feeding

Initiation of feeding has the primary objectives of 1) minimizing elk winter mortality, focusing on calves since they are the most susceptible age class, and 2) minimizing comingling of elk with cattle on nearby adjacent private lands. Winter feeding begins when available forage reaches approximately 300 lbs/ac. Historic radio telemetry data and observations of elk movements indicate that when available forage ~~delclines~~ declines below 300 lbs/ac., some elk leave NER for surrounding private lands. Therefore, the purpose of this feeding "trigger" is to keep elk on the NER and prevent them from searching for forage off the ~~refuge~~NER, ~~for forage~~ which would increase~~s~~ the potential of comingling with cattle a~~nd~~s well as damage to private lands. This trigger is not a warning that a significant nutritional deficit threshold has been

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reached. Available winter forage for elk and bison on the NER is largely determined by biomass of forage produced during the previous growing season, rate of forage consumption during fall and winter, and how snow conditions affect forage availability.

Index sites are used to sample forage biomass and determine when feeding should be initiated. These sites are selected annually to represent plant communities that are highly preferred by elk due to plant species composition and the persistence of green vegetation. Weekly sampling begins in late December to estimate available forage biomass at each index site. When average available forage across index sites is below 300 lbs/ac, biologists typically recommend that supplemental feeding be initiated.

During 1995–2013, the average initiation of winter feeding in NER occurred on 28 January (range = 30 December–28 February), and feeding was terminated on 3 April (range = 20 March–20 April). Variation in feeding initiation and termination dates has been based on winter conditions and a desire to avoid elk-cattle comingling on nearby private lands. Coordination of winter feeding dates on the NER and WGFD-operated Gros Ventre drainage feedgrounds (Alkali, Patrol Cabin, and Fish Creek) occurs annually to help minimize movement of elk between these areas. This coordination will continue regardless of the management strategy employed. The relationship of recent elk numbers and objectives for NER and WGFD-operated feedgrounds and native range is shown in Table 2.

Bison discovered refuge feeding operations in 1980, and since that time they have been fed each year to help minimize disruption to elk feeding operations. Because bison displace elk from feedlines, NER staff attempt to feed most bison in the northernmost refuge feedground and provide a heavy feed ration, which helps keep them in this area. This strategy prevents bison from mingling with elk and also prevents bison from moving to areas where conflicts with humans are more likely.

Harvest

Table 2. Annual distribution of wintering elk from the Jackson Elk Herd during February classification counts, 2011–2016, relative to the current objective.

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	OBJECTIVE	2011	2012	2013	2014	2015	2016	mean
NER	5,000	7,746	7,360	6,285	8,296	8,390	7,290	7,561
Gros Ventre	3,500	2,775	3,265	2,982	2,326	1,162	1,667	2,362
Native Range[1]	2,500	982	894	1,784	801	913	1,711	1,180
Total	11,000	11,503	11,519	11,051	11,423	10,465	10,668	11,105

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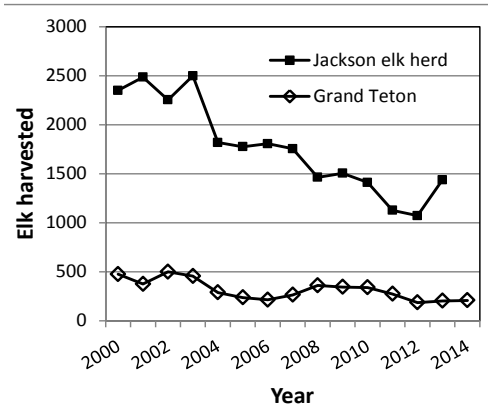


Figure 7. Estimated elk harvests for the Jackson Elk Herd and the amount of that harvest that occurs in ~~for~~ Grand Teton National Park ~~and the Jackson elk herd~~

Total hunter harvest of the JEH was gradually reduced over the last decade as the population neared objective (Fig. 7). Elk hunting on the NER (Hunt Area 77) typically begins in mid-October and ends in mid-December, with peak harvest in recent years occurring in late November to early December. F~~f~~rom 2005 to 2015, ~~an average of~~ 422 ± ~~(SD =~~ 102 (mean ± SD, range = 329-612) hunters harvested ~~an average of~~ 196 ± 95 (~~SD = 95,~~ range = 126-457) elk per year during the NER hunt.

The 1950 legislation that created ~~Grand Teton National Park~~ GRTE provided for a controlled reduction of elk, when necessary, in specific portions of the park, primarily east of the Snake River. Elk reduction programs have taken place in the park each year since 1950 except two (1959~~,~~ and 1960), when GRTE and WGFD officials agreed a reduction was not necessary (Figure 8). Season dates have varied over the years but recently have run from mid-October to early-December. The GRTE harvest accounts for about 25% of the JEH overall harvest, thus has been an important factor in regulating the population. Increased ~~natural regulation~~predation, likely a result of increases in grizzly bears and wolves over the last 20 years, has decreased the need for large harvests in ~~the park~~GRTE.

Bison hunting begins ~~on~~ 15 August ~~15~~ and ends in early to mid-January. Most harvest occurs on the NER, with some additional harvest on private and BTNF lands. Since resuming the bison hunt in 2007, ~~mean~~ harvest has been 210 ±~~(SD =~~ 45.5 (~~,~~ range 139-301) bison per year. This level of harvest has been sufficient to arrest the exponential growth of the population, reducing bison numbers from the peak in 2007 to about 700 animals in winter 2015 (Fig 3). Tribal bison harvest of up to 5 animals for ceremonial purposes was authorized in the BEMP. Translocation of wild bison to lands outside of Teton County is not currently permitted due to brucellosis concerns.

Bison hunting is not allowed in GRTE because of long standing ~~National Park Service~~NPS policy that prohibits most hunting in national parks. Bison quickly learned to take advantage of the ~~parks~~ safety of GRTE, which has made obtaining hunter harvest goals difficult. Many bison stay in ~~the park~~GRTE during the hunting season, with only occasional short term movements to the NER, until severe winter conditions occur. In response, NER and WGFD managers have attempted to ~~balance~~ extend~~ing~~ the hunt ~~as~~ to late ~~in~~ January ~~as practicable without~~while minimizing the conflict~~ing~~ with the initiation of winter feeding. The unpredictable nature of winter conditions that time of year makes this ~~a risky proposition~~challenging, and ~~can~~ has (or could) result in the use of emergency season extensions or reductions.

Hazing

NER staff haze elk and bison to conserve winter forage, prevent ~~year~~ year-round use of winter range, and in some cases to prevent elk and bison from moving to private lands or other areas where conflicts with humans are likely. Hazing using ATVs has proven most effective. The strategy is typically employed during 3 time periods: 1) ~~In~~ in May to move elk and bison off NER that are lingering on NER winter range; 2) i~~I~~n July when some bison typically return to NER; and 3) i~~I~~n the period just prior to feeding initiation when elk and bison are most likely to leave NER

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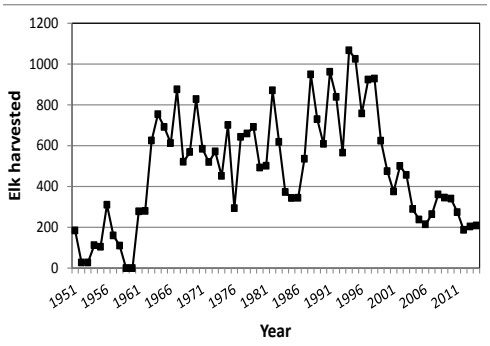


Figure 8. Elk harvest in Grand Teton National Park, 1950-2015.

for private lands.

Vegetation Restoration and Protection

The BEMP identified approximately 4,500 acres of previously irrigated and cultivated grasslands in GRTE in need of restoration to native sagebrush grasslands community. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. After 2 years of research and field studies, restoration efforts began in 2008. The restoration process involves several steps including: removal of non-native vegetation through repeated herbicide applications, collection and propagation of native grass, forb and shrub seeds and finally native seeding. Repeated herbicide treatments have been warranted prior to native seed planting as well as spot treatments of invasive weed species subsequent to native seeding. Substantial progress in this endeavor has been made since 2008, including: 1,235 acres of previously cultivated lands are under restoration treatment. Of the 1,235 acres undergoing treatment, 745 acres has been seeded with native grass, shrub, and select forb mixes, and 89 acres is considered fully restored. Two-hundred and seventy-five of these acres are currently fenced to reduce grazing pressure of early native vegetation establishment from bison and other ungulates. An additional 490 acres are targeted for native seeding in 2016 once removal of the invasive vegetation is successful. All treatments are monitored for native plant establishment and invasive plant infestations and treatments will be adjusted as necessary. Invasive plant treatments may have to continue indefinitely. The parkGRTE will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Private Lands Mitigation

Fencing of hay stacks and livestock feedlines has been historically used to mitigate particularly difficult conflicts on private lands. Targeted fencing of golf course greens and sand traps fall through spring has also been successful in some situations for mitigating elk and bison presence and associated damage in these areas. It is important to note that the county has a "wildlife-friendly' friendly" fence policy and does not support extensive fencing that is impermeable to wildlife in residential areas.

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Methods, Assumptions, and Constraints Common to All Strategies

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes, particularly population sizes. Measurements of the Jackson bison herd will be based on the annual mid-winter census and sex and age classification survey performed by NER, GRTE, and WGFD biologists. This survey occurs one day in early February and includes ground counts of animals on feed at the NER and aerial counts of outlying bison across their winter ranges on the refuge, park, and Bridger-Teton National Forest.

Elk population estimates will also be based on mid-winter aerial and ground counts. However, the mid-winter counts are undertaken during a single survey period and do not necessarily represent either peak or cumulative abundance of elk on feed. Rather than basing progress toward the number of elk on feed for the entire

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Table 3. Summary of potential Step Down Plan constraints.

Policy

- ESA[1] Lynx – limits on habitat impacts
- Greater Sage Grouse – core area protection
- 2007 BEMP/EIS (federal actions/lands)
  - o No fertility control
  - o No test and slaughter
  - o Limited tribal harvest
- Bison/elk hunt end date (Feb. 1st)
  - o WGFD, ~~brucelosis~~brucellosis safety
- Carcass disposal (Feb. 15th)
  - o WGFD, brucellosis safety
- Forest Service winter closure (Dec. 1st – April 30th)
- Easement limitation (NER boundary)

Winter Feeding

- Only during non-hunting periods

Harvest

- State regulations

Vegetation Restoration/Protection

- Bison/elk distribution
- Exotic plant species management

Private Lands

- Owner agreements

Social

- Hunter density (safety; hunt quality)
- Elk/bison winter mortality levels
- Public safety (ungulate/vehicle collisions)
- Disease
- Land-use conflicts (agricultural and residential)

Biological

- Disease (bison/elk/cattle commingling)
- Sage grouse habitat conflicts
- Fencing/wildlife conflicts
- Elk herd distribution
  - o summer segment distribution goals

Funding

- Easement purchase
- Plan implementation

[1]Endangered Species Act

season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 ~~were~~ elk were fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000.

We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both species on supplemental winter feeding.

Initial success of the ~~Step Down Plan~~MSP will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP does not provide specific measurement criteria to determine when the ~~Refuge~~ NER has successfully attained the objective of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage", we will consider this objective met~~–~~ when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row.

Several management constraints are common to the strategies discussed below (Table 3). Many law and policy constraints are applicable but we include here only those most pertinent. Endangered Species Act (16 USC 1531 et seq.) requirements for wolves, grizzly bears, lynx, and others apply. Lynx requirements for maintaining certain habitat types could limit methods used and areas considered for habitat improvements in GRTE. Similarly, compliance with the Wyoming greater sage-grouse core area protection

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executive order (2011-5 and supplement 2013-3) could restrict habitat manipulations. NEPA compliance conducted as part of the BEMP/EIS constrains what federal actions can be taken as a part of this plan. State regulations constrain late (winter) hunt and carcass disposal timing to protect against brucellosis contamination, since February-April represent the period bison and elk are most likely to transmit the disease. Restrictions on hunting timing also result from BTNF winter range closures, immediately east of the NER and elsewhere, December 1 to April 30. Additional details about these and other constraints will be included in discussions about specific strategies that follow.

Strategies

This section describes the management action this ~~SMP~~ MSP proposes to implement. As such, it unveils the heart of management changes proposed to begin the process of transitioning to greater reliance of bison and elk on native forage during winter. Fundamentally, the strategies discussed in this plan represent an experiment designed to achieve Phase I objectives of 5,000 elk and 500 bison on NER and are a first step towards reducing reliance on supplemental feeding while meeting the sustainable population goals identified in the ~~SMP~~MSP.

Initial strategies for achieving sustainable population goals identified in the BEMP (Table 1) are presented by the objectives below. The primary management actions available to the agencies to achieve ~~phase~~ Phase I objectives are modifications to winter feeding and hunting seasons. To a lesser extent, vegetation protection and restoration can be important, particularly for improving long-term ecological ~~balance~~ function and enhancing natural production of native forage. Private lands are also an integral component as changes in elk and bison distribution occur and new challenges develop. The likely consequences of implementing these strategies were evaluated in the BEMP. The most relevant of these are summarized in Appendix 1.

Objective: 1) ~~[~~*Implement*~~]~~ *a phased reduction of animals on NER feed* ~~; 1)~~ *to 5,000 elk and 500 bison, and*~~d, d 2)~~ ~~2) [to an extent where]~~*influence elk and bison to rely predominantly on native habitat* (Table 1).

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The first phase ~~objective~~ will be to reduce the number of elk on NER feed to approximately 5,000 and achieve a target population of about 500 bison. The second phase ~~objective~~ will be to adaptively manage bison and elk populations to achieve desired conditions, with animals relying predominately on available native habitat (~~on refuge~~NER, ~~park~~GRTE, and ~~forest~~ USFS lands) and cultivated forage (~~on the~~ NER).

As previously mentioned, the concept of reducing winter feeding after more than 100 years of the practice, and the associated behavioral conditioning of elk and bison to its presence, represents a formidable challenge that must be approached cautiously and systematically. The strategies discussed below have been developed in this context, with appropriate feedback mechanisms through rigorous monitoring and frequent evaluation. Inability to meet this objective under the strategies presented here would trigger a thorough evaluation and consideration of more aggressive strategies when the BEMP is updated in 2022.

Chronic Wasting Disease

Since 1997, NER has cooperated with ~~Wyoming Game and Fish Department (~~WGFD~~)~~ to conduct intensive surveillance for CWD in the JEH unit. GRTE has also collaborated with WGFD to collect samples from the ~~park's elk reduction program~~ERP and from road-killed cervids. Although this effort indicates that CWD is not currently found in the JEH, continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence annually will be critical to ensure a timely management response and limit the long-term population effects of the [USFWS and USNPS, 2007b]. Given that CWD has been detected within 40 miles of the JEH in moose, within 35 miles in deer, and within 175 miles in

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elk, this level of surveillance is warranted.

In 2016, the WGFD cooperated with federal agencies and other stakeholders to revise the 2006 Wyoming CWD Management Plan. The NER and USFWS Region 6 Wildlife Health Office staff participated in several meetings associated with this effort. The Wyoming CWD Plan lists several management responses for consideration ~~should~~ if CWD be is detected on or adjacent to State or NER elk feedgrounds. Early detection of CWD in the JEH is essential to allow implementation of management responses.

The BEMP (2007) identifies the management response to the arrival of CWD as following the State of Wyoming CWD Plan in effect in 2007. The Wyoming CWD Plan was updated and significantly changed in 2016. In light of changes in the Wyoming State CWD Plan, and the results of CWD Studies completed since 2007, the NER management response to CWD will be reviewed and updated in a NER Disease Contingency Plan, as identified in the NER Comprehensive Conservation Plan (2016). The CWD section of the NER Disease Contingency Plan will remain consistent with the goals of the BEMP. The NER Disease Contingency Plan is scheduled to be completed in 2017.

Winter Feeding

Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the long run, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning ~~them~~ animals to "expect" feed to be available later in the winter~~on average;~~ this could ~~with the desired outcome of~~ build~~ing a~~ cohorts of animals that rely primarily on native winter range ~~and are not food conditioned~~. To reduce supplemental feeding ~~overall~~, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, which is the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require assistance with focused mitigation measures.~~,~~

As bison and elk behavioral responses are better understood, feeding delays will be extended depending on several variables (Table 4, Fig. 9). Time of season could influence this interval, most likely shortening it as the feeding initiation date gets later. During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Delaying feeding by two weeks in January, for example, is likely to have fewer negative effects than doing so in February, when food stress and the tendency for animals to move towards private lands is greater. Forage availability could also have an influence, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Both time of season and forage availability considerations would be affected by the numbers of elk and bison on the NER. And finally, the distribution of animals, particularly on private, livestock producing lands, would be considered.

A primary concern of manipulating feeding is elk winter mortality, particularly among calves. As food becomes limited in winter, calves are usually the first to experience ~~nutitional~~nutritional deficit and winter mortality because of being displaced by more dominant animals. Monitoring programs will include measures of calf mortality and it will be an influencing parameter in feedback mechanisms. The BEMP anticipated that elk mortality could increase from 1-2% overall to 1-5% (Appendix 1).

Initially, the termination of feeding, which is now based on a snow cover index and subjective evaluation of available forage, will occur about a

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week earlier. The combination of a 2-week delay in feed initiation and 1-week advance in termination would shorten the feeding season by 3 weeks on average, or 32% based on an the average feeding season length of 9.3 weeks from 1995-2015.

The MSP winter feeding strategy would include the establishment of additional key forage index sites and on-going measurements at those sites throughout the winter.

Harvest

Currently the Jackson elk herdJEH is at the Wyoming Game and Fish Commission established objective of 11,000 animals, which means there is less flexibility in manipulation of harvest regimes than there would be if the herd was above objective. Initially there would be little change in elk harvest programs on the NER, with the exception of allowing a limited number of any elk permits throughout the season, considering allowing bow hunting near developed areas (roads and buildings) and shifting the season about a week later (Table 4). Allowing a limited number of any elk permits would be consistent with providing sport hunting recreation on National Wildlife Refuges (NWRS Improvement Act; 1997) and the NER CCP [USFWS, 2015] and possibly encourage more hunters to participate in antlerless elk hunts. Monitoring programs and consideration of bull ratios in the GRTE summer segment (since most park bulls migrate to the NER) would help inform levels of take proposed. Bow hunting in areas currently closed to firearms will likely increase harvest by eliminating "no-hunt" areas which can become sanctuaries for large numbers of elk. Shifting the hunt one week later is consistent with later migrations and will improve harvest effectiveness (Fig. 9).

General elk harvest patterns in GRTE would continue to be based on need for harvest, summer segment population estimates, herd status relative to population objective, herd demographic parameters, herd-wide distribution of harvest, and mitigation for impacts on other resources and visitor activities.

Elk herd population objectives are reviewed every five years by the Wyoming Game and Fish Commission and adjusted as necessary. Agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future Jackson Elk HerdJEH population objective. Serious cConsideration should be given to reducing the Jackson Elk HerdJEH population objective. Lowering the population would help compensate for reduced use of traditional native winter range and increased growth of short-distance migrants which has led to significant increases of winter elk concentrations on the NER.

The annual fall/winter arrival of elk to the NER during the past several decades has been occurring progressively later. This trend may necessitate extending the elk hunting season later into the year to achieve harvest objectives.

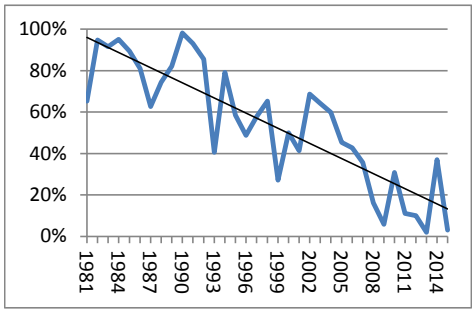


Figure 9. The percentage of elk that wintered on NER counted there on December 1, showing progressively later annual fall/winter arrival of elk to the NER during the past several decades.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates that are commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution. or

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Special limited hunts designed to discourage bison from attempting to leave the NER via the south boundary into the town of Jackson will also be considered~~d which will be designed to discourage bison from attempting to leave the NER via the south boundary into the town of Jackson~~. If progress toward reaching the herd objective of 500 animals continues and the objective is reached, WGFD ~~-~~will adjust harvest quotas in the context of the objective, as necessary, to address population changes through time.

A cattle guard was installed on the Refuge Road near the east end of Broadway Avenue to help prevent bison and elk herds from entering the Town of Jackson. This will reduce the potential for dangerous human/wildlife interactions.

Currently, the effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. ~~-~~ Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st in the future.

Annual herd-wide population estimates, elk summer herd segment estimates in GRTE and NER, temporal and spatial harvest patterns, and animal-fed-days would be monitored, and the resulting information would be used to inform ongoing evaluation of elk and bison management harvest programs (Figs. 9 and 10).

Hazing

No change in hazing practices is anticipated initially under this ~~Step Down~~MSP framework.

Private Lands Mitigation

Delaying the onset of NER feeding is likely to result in changes in bison and elk distribution (Appendix 1). Some elk or bison may move to private lands in search of forage. Of greatest concern is the potential for elk or bison to commingle with cattle of cow/calf operations, where brucellosis transmission could have considerable consequences, ~~in the worst case~~such as requiring depopulation of the cattle herd.

Several strategies would be employed to mitigate potential problems (Table 4), including providing incentives for non-breeding cattle operations (because brucellosis transmission to slaughter-bound cattle is not economically important), increased fencing in some limited areas to separate elk/bison from livestock feed lines, haze elk/bison away from livestock feed lines and purchase private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal Wildlife Conflict Technician positions which are supervised by the WGFD. These Technicians are also critical to the success of an expanded monitoring program vital to the MSP (see Monitoring section below).

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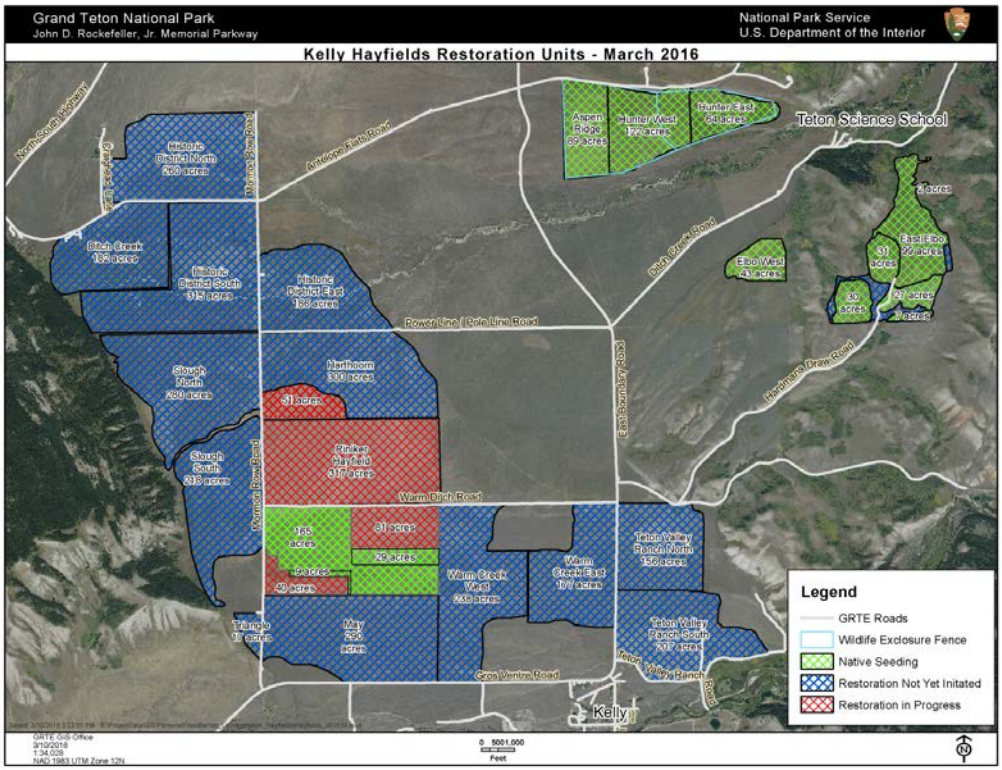


Figure 9. Units and status for the Kelly Hayfields ecological restoration effort in Grand Teton National Park, March 2016.

A database will be established to track non-agricultural conflicts on private lands to determine trends which will help evaluate the effectiveness of MSP mitigation efforts.

Preventing elk and especially bison from entering the Town of Jackson is essential in minimizing safety and private property conflicts. Currently, bison are hazed northward when they drift south of Miller Butte. A cattle guard was installed on the Refuge Road just north of Broadway Avenue. This barrier is designed to prevent elk/bison from entering the Town of Jackson.

Vegetation Restoration/Protection

The varied approaches to restore the Kelly Hayfields in GRTE (4,500 acres) was initiated in 2008 following 2 years of research and field studies (Moeny 2008). ~~Our~~ The approach to ecological restoration includes serial treatments to 1) remove non-native species (e.g., herbicide application and prescribed burning); 2) seed native shrub, grass, and forb species; and 3) treat subsequent invasive plants by applying herbicides and, where appropriate, construct temporary fences to protect recently seeded pastures from colonization of non-native species and damage from large herbivores during early phases of restoration.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres within 7 pasture units are currently under restoration treatment and 3,265 acres remain non-native grass pasture (as of 2016; Figure 9).

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The non-native grass pastures are divided into 13 pasture treatment areas and are projected to be likely restored by 2035. As of 2016, approximately 745 acres are seeded with native vegetation, and 89 acres are considered fully restored. Maintenance of restored ecological conditions, however, will likely require management efforts in perpetuity to keep non-native species from colonizing restored areas. All 1,235 acres that are underway toward ecological restoration are being monitored for native plant establishment, invasive plant infestations, including cheatgrass spread. Park staff will continue to monitor and adaptively adjust treatments and restoration strategies according to our results.

Objective: *Maintain natural bull-to-cow ratios in park summer herd* (Table 1).

National Park Service management policy (NPS 2006) provides guidance for maintaining naturally regulated wildlife populations, free from the impacts of humans, to the greatest extent possible. The final BEMP identified a goal of maintaining park elk bull:cow ratios (a common way of expressing sex and age ratios in wild ungulate populations) near 35 adult bulls per 100 adult cows, based on estimates of what this ratio would be in a herd free from the effects of human harvest. The sex and age ratios of most North American elk populations are affected by sport hunting and herd managers generally maintain lower bull ratios.

Harvest

~~Based on bull ratios in the park summer herd that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to antlerless only in 2012.~~ Based on bull ratios in the park summer herd that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded refuge hunting opportunities are considered.

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~~ERP permit structures in the park will remain antlerless only until the bull ratios consistently exceed 35:100 cows. Park and refuge officials will work together to support this goal, recognizing that bulls harvested on the NER are most likely from the park summer herd segment.~~

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~~Figure 9. Units and status for the Kelly Hayfields ecological restoration effort in Grand Teton National Park, March 2016~~

Table 4. Comparison of current and primary ~~Step Down Plan~~MSP components and parameters.

Action	Current Management	Management	Comment
Winter Feeding:			
Feed	Pelleted alfalfa	Pelleted alfalfa	No change
Ration	Full ration average: 8-12 lbs/day/elk	No Change ~~8 lbs/day/elk~~	No change, to minimiz mortality. Note avera ration over the entire season is lower than a ration because feed ra gradually increased at beginning of the feed and gradually reduced end to facilitate rume acclimation
	20-22 lbs/day/bison	20 lbs/day/bison	
Start criteria:			
Available standing forage	300 lbs/acre, as measured at traditional key index sites	Generally later; index sites to be increased in number and distribution	Influencing factors: -time of season -forage availability -number of elk/bison -elk/bison distribution
			~~-time of season~~
			~~-forage availability~~
			~~-numbers of elk/bison~~
			~~-elk/bison distribution~~
End criteria:			
Available forage	Based on a snow cover index and subjective estimate of when residual or new forage is adequate	Generally 1 week earlier than current management	Development of more objective criteria for fu implementation ongoi
Monitoring:			
Animals on feed	Mid-winter census	Elk/bison fed days[1]	
Proportion of JEH on NER	Mid-winter census	Mid-winter census	
feed			
Calf mortality	2008-2015 Average: 3.3% (range 1.1-9.0%)	~~<= 10%~~Potentially higher than current but less than native winter range	
	~~3.3% (range 1.1-9.0%)~~		
~~-Elk/bison distribution - visual~~			
Elk/bison distribution – collars	Almost no documented use of private lands during feeding operations	Unknown, but likely higher use of private lands than current management	
~~-collars~~			

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Table 4. Comparison of current and primary ~~Step Down Plan~~MSP components and parameters.

Action	Current Management	Management	Comment
Elk Winter mortality (all age classes)	2008-2015 Average:	<=3%	
	1.2% (range 0.6-1.9%)		
Elk summer range segment Proportions for NER wintering elk	Approximately -40% GTNP North of Moose -35% South Snake River -10% Gros Ventre/Flat Creek -10% Teton Wilderness -5% Southern Yellowstone	Unknown, but will be monitored based on summer distribution of radio collared elk	Based on summer dist of elk that were rando radio collared on NER.
~~Proportions for NER wintering elk~~	~~40% GTNP North of Moose~~		
	~~35% South Snake River~~		
	~~10%Gros Ventre/Flat Creek~~		
	~~10% Teton Wilderness~~		
	~~5% Southern Yellowstone~~[1]		
Harvest, National Elk Refuge elk:			
Frequency	Annual	Annual	
Begin Date	2nd week October	~~3rd week October~~No Change	Modified as necessary
End Date	~~3~~2nd week December	~~3rd week December~~No Change	Modified as necessary
Structure	- 1 week initial drawing	- 1 week initial drawing	
	- 1 week left over 1st served	- 1 week left over 1st served	
	- partial week alternate	- partial week alternate	
	-daily 1st served alternates	- daily 1st served alternates	
Refuge permit types	- 1st week any elk	- Primarily antlerless only	
	- Antlerless only remainder of season	- limited any elk permits throughout season	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries		Consider expanding to allow bow hunting near developed areas	
Harvest, National Elk Refuge bison:			
Frequency	Annual	Annual	
Begin date	August 15th	August 15th	Modified as necessary
End date	2nd or 3rd week January	Consider later dates as appropriate	Modified as necessary
Hunting Season Structure	As per WGFD	As per WGFD	

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Table 4. Comparison of current and primary ~~Step Down Plan~~MSP components and parameters.

Action	Current Management	Management	Comment
Refuge permit types	Any bison or cow/calf per state license	Any bison or cow/calf per state license	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries	Limited to north of Nowlin Creek area	Consider escorted hunting in South Unit as needed	Guided hunts in South when authorized
Harvest, Grand Teton NP elk:			
Frequency	As needed	As needed	
Begin Date	3rd week October	3rd week October	Modified as necessary
End Date	2nd week December	2nd week December	Modified as necessary
License types	Antlerless only	Antlerless only[2]	
Special regulations:	Cartridge limits	Cartridge limits	
	Bear spray required	Bear spray required	
	Hunter safety card required	Hunter safety card required	
Harvest, Bridger-Teton NF, Elk Hunt Area 80:			
Begin Date			
End Date		15-Dec	Would require change winter closure dates
Harvest, Elk Hunt Area 78			
Structure			Changes at discretion WGFD
License Types			
Private Lands Mitigation:			
Cattle commingling		Incentives for non-breeding operation	
Hay depredation		Increased fencing	
Landscape damage			
Easement acquisition			
Vegetation Restoration/ Protection: Elk Refuge			
Vegetation Restoration/ Protection: Grand Teton	Herbicide treatments, prescribed burning, native seed propagation and planting, and protection and maintenance of restored pastures	Same as Current Management for remaining non-native grasslands in Kelly Hayfields	

[1]Number elk and bison on feed per day, totaled by feeding season.

[2]Any elk licenses could be offered if bull ratios in the park consistently exceed BEMP criteria.

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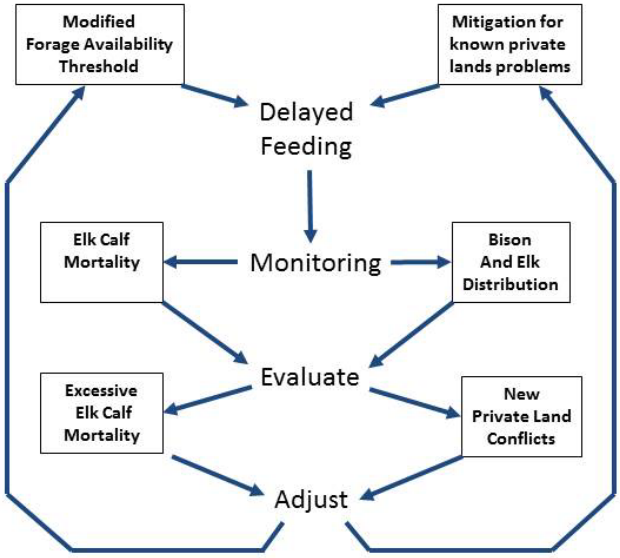


Figure 10. Framework for delayed feeding strategy under ~~Management Step Down Plan~~MSP.

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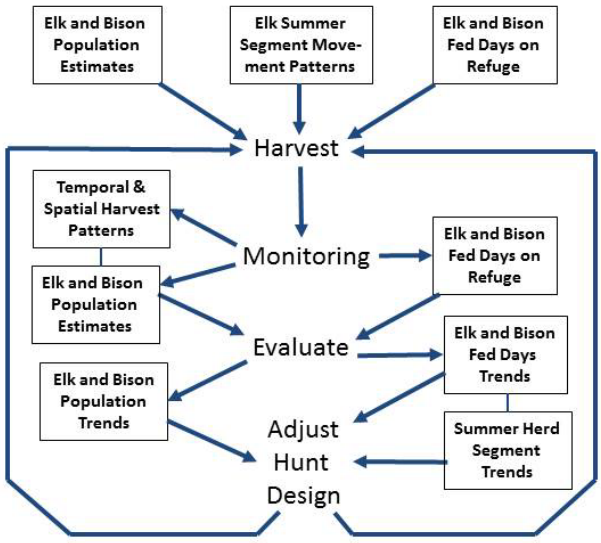


Figure -11. Framework for harvest strategy -under ~~Step Down Management Plan~~MSP.

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Strategies Considered But Rejected

The BEMP considered several additional strategies for elk and bison management that, for a variety of reasons, were not selected for implementation in the preferred alternative and Record of Decision. The agencies reconsidered a subset of these during the development of this MSP (Table 5). Since they were not part of the ROD, additional NEPA compliance would be necessary to incorporate any of them into this ~~Step Down Plan~~MSP, and thus they are not being considered at this time.

Table 5. Strategies considered but rejected.

Strategy Considered	Reason Rejected
Fertility control in elk	Judged not reasonable or feasible in BEMP, primarily due to major technical, social, and financial hurdles[1]. For MSP discussed primarily with regard to the difficult to harvest herd segment in Hunt Area 78 on private lands, where federal agencies have no jurisdiction.
Fertility control in bison	Impacts discussed at length in BEMP[2]. Not considered for MSP because current hunting programs appear effective at slowly moving the herd toward the 500 animal herd objective.
Agency reduction of bison or elk	Not considered necessary or desirable on federal lands because current hunting programs that utilize sport hunters are effective at meeting herd objectives.
Altering rations of supplemental feed	Rejected as a strategy because reducing daily feed ration below 8 lbs/elk would be enough feed to encourage elk to remain on NER but would result in unacceptably high elk calf mortality rates.
Private Lands Hunting Coordinator	The WGFD contacted private landowners and ranchers in the Spring Gulch area and discussed this concept to enhance elk harvest of short distance migrants. Generally, landowner interest was low.

MODELS OF SYSTEM DYNAMICS

Models provide a simplified representation of the biological system being managed. We will use modeling to quantify the effects of our management actions on 2 key ~~repsonses~~responses of interest, elk distribution and winter elk calf mortality.

(ADD: range of elk calf mortality in non-fed populations.)

~~Fig. 12 describes~~There are a suite of possible factors that affect ~~winter elk distribution (~~the proportion of elk on NER feedgrounds versus native winter range~~)~~. Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

An increase in calf elk winter mortality is a potential result of reduced feed season length. Several ~~Fig. 13 portrays~~ factors ~~that~~ influence winter calf elk survival on NER (Fig. 13).

Models will be used to assess the effects of

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available forage on winter calf elk survival (Appendix 4). Over time this will allow us to assess the effects of our principal management strategy (reducing feed season length) relative to winter elk calf survival.

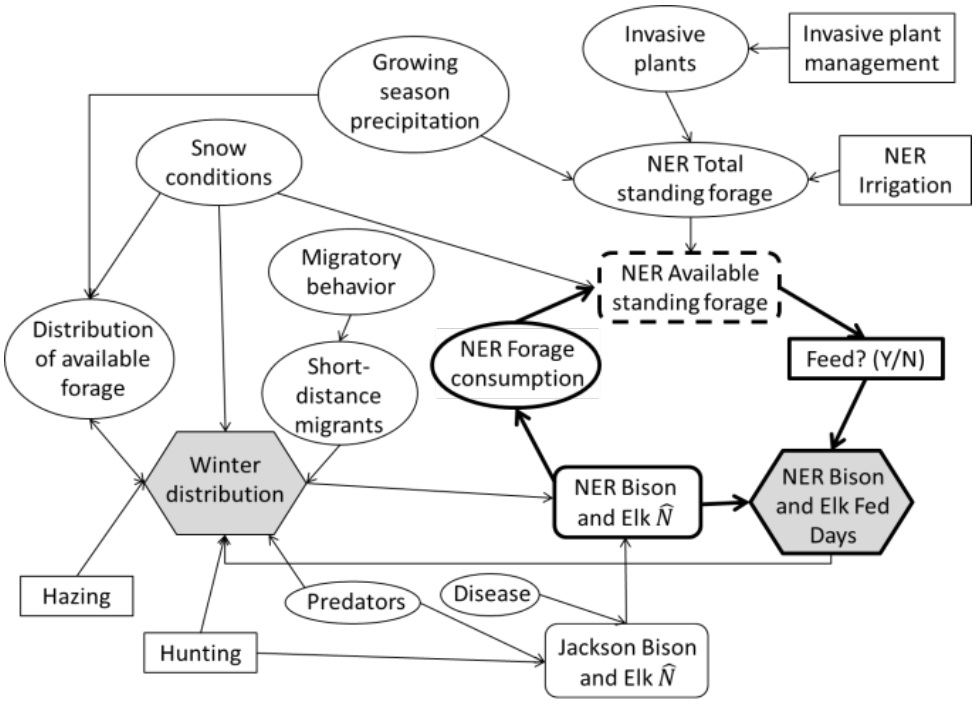


Figure 12. -Diagram depicting the factors that potentially influence outcomes identified in the Bison and Elk Management Plan (BEMP; USFWS 2007a). Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

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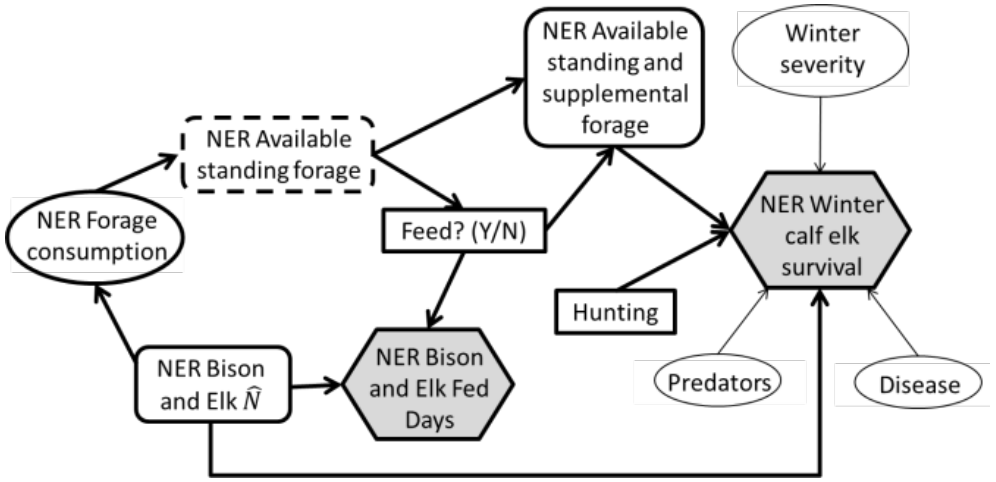


Figure 13. Diagram depicting the factors that potentially influence bison and elk fed days on the National Elk Refuge ~~(see text for description)~~ and winter calf elk survival. Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

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MONITORING

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Feeding Initiation Monitoring

NER uses weekly field estimates of the amount of forage available to elk to determine feeding initiation date. Currently measurements are taken at key index sites representing areas preferred by elk on NER (see supplemental materials at end of this section). These methods will be enhanced by 1) increasing the number of sampled sites to better represent the total amount of forage available to elk on the southern half of NER; 2) increasing the precision of estimates at each site by increasing the number of observers; and 3) extending the monitoring period later in the winter to assess the relationship between available forage and elk and bison distribution.

To better represent the total amount of forage available on the southern half of NER, a subsample of current key index sites will be retained to facilitate comparison with historic data, but additional random sample sites stratified by elk habitat preference will be added. Historic elk distribution mapping and elk GPS collar data (NER unpublished data) suggest that the areas most preferred by elk on southern NER are associated with moderate to high forage production and green vegetation. Because the distribution of forage production and greenness characteristics vary annually based on irrigation and precipitation patterns, we will annually map areas preferred and not preferred by elk and sample sites will be randomly selected within each of these mapped categories. At least 3 historic key index sites, 3 random sites in areas preferred by elk, and 3 sites in areas not preferred by elk will be sampled each week from late December through the initiation of supplemental feeding.

Currently the NER biologist is the only person trained in the techniques used to estimate available forage (see supplemental materials). At

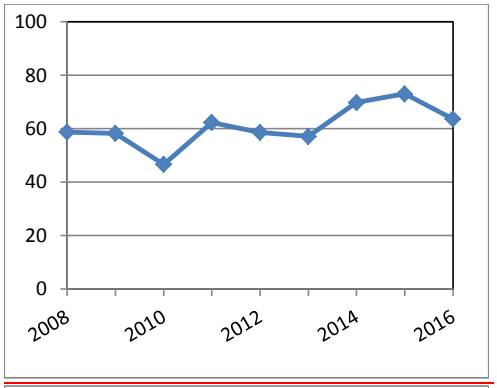
least 2 additional personnel will be trained in these techniques. This will provide a backup in the event of future personnel changes and will facilitate error estimates of the available forage measurements at each site.

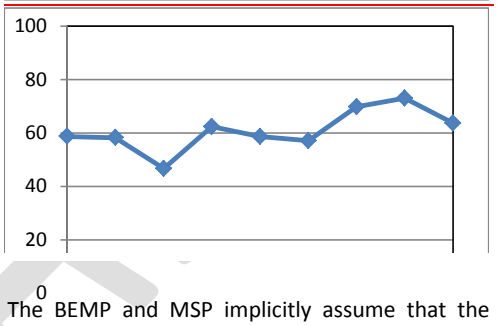
Currently NER and WYGFD biologists monitor available forage conditions at least weekly from late December until average available forage at key index sites nears the threshold level of 300 lbs. per acre and feeding is initiated. The principal MSP strategy is to delay the initiation of supplemental feeding after average forage production reaches the 300 lbs ~~per~~/ac~~re~~ level at key index sites. Therefore the monitoring period will be extended to include this period of delayed feeding.

Proportion of Elk Wintering on NER

A principal MSP goal is to reduce the number of elk wintering on NER. Our strategy will be to effect redistribution of elk to native winter range from NER over time via shortening the duration of the feed season, and thus slowly conditioning elk to seek food elsewhere. As feeding periods are shortened, the probability of younger elk age classes discovering NER feedgrounds will be reduced, and, hypothetically, that proportion of the JEH that utilizes NER feedgrounds will decline over time. We will measure this effect by examining changes in the winter distribution of the JEH. WGFD annual trend/classification count data provide a multi-year baseline data set to measure changes in the winter distribution of the JEH and categorizes observations by location. In each year, we will calculate the proportion of total classified elk in the JEH that are classified on NER feedgrounds. We will compare the 3-year running average post MSP implementation to the pre-implementation baseline. The pretreatment baseline will be comprised of data from 2008 - 2016, a time period that represents BEMP implementation prior to MSP actions (Figure 13).

Elk Fed Days and Bison Fed Days





The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. We further assume the variables elk-fed-days (EFD) and bison-fed-days (BFD) are a proxy for these conditions. EFD and BFD will be calculated annually for each species based on the following formulas:

EFD= ∑ Total elk counted on feed during daily feedground counts for duration of feed season

BFD= ∑ Total bison counted on feed during daily feedground counts for duration of feed season

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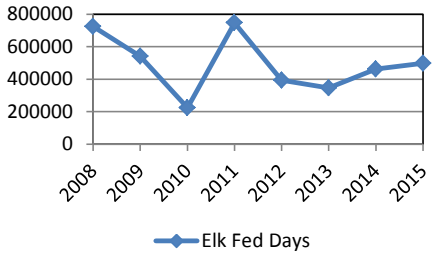
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Because EFD and BFD are influenced by feed season length and the number of animals on feed, the MSP strategy of delaying the initiation of supplemental feeding will inherently reduce the number of EFD and BFD through a reduction in average feed season length. We believe that EFD will be further reduced by encouraging a greater proportion of the ~~Jackson Elk Herd~~JEH to winter on native winter range, thereby reducing the number of elk occupying NER feedgrounds. We will evaluate changes in EFD and BFD by comparing the 3-year running average post MSP implementation compared to mean EFD and BFD from 2008-2015. The running average is an appropriate comparison because it will help account for wide annual variation in EFD and BFD associated with winter severity (Figure 15)



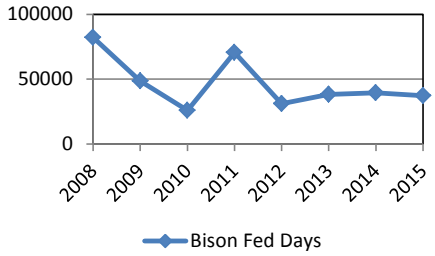


Figure 15. Elk Fed Days (EFD) and Bison Fed Days (BFD) in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the Management Step Down Plan (2008-2015). These values represent the pretreatment baseline which will be compared to the 3-year running average EFD and BFD post MSP implementation.

Elk Winter Mortality Monitoring

NER has used consistent methods to monitor winter elk mortality since 1982. Each winter NER biologists and other refuge staff conduct a survey of all non-hunting related winter elk mortalities that occur on NER from November through April. Mortalities are tallied by age/sex class and percent mortality is calculated using the corresponding number of elk classified on NER feedgrounds as the denominator. We will continue to monitor elk winter mortality using the same methods ~~post~~ post-MSP implementation, which will allow trend comparisons to the pre MSP baseline (Figure 15). Under the MSP framework, we believe the ~~3~~ 3-year running averages for total and calf winter elk mortality will be within the range of variation exhibited by the pre MSP baseline. Historic monitoring suggests that calf and total mortality are sensitive to winter severity and disease outbreaks, and that winter mortality occasionally exceeds >3% total mortality and >10% calf mortality. ~~Post~~ Post-MSP mortality in excess of these levels may warrant shortening the 2-week feeding initiation delay in subsequent years.

Elk Collaring

One of the MSP's principal strategies is to shorten the length of the feed season to encourage elk use of native winter range, but we anticipate that this strategy will also result in an increase in elk conflicts on surrounding private land in the town of Jackson and the Spring Gulch areas, potentially including large groups of elk. To quantify this effect and provide ~~real~~ real-time information to WGFD and NER managers to facilitate a response, we propose maintaining a sample of 50 ~~GPS~~ GPS-collar~~s on~~ ed elk that winter on NER throughout the MSP implementation period. Forty-five elk represents approximately 0.5% (1 in 200) of the NER winter elk population. This sample size will not be sufficient to detect all elk movements from NER to surrounding private lands, particularly movements by small groups of mature bull elk, but it will be sufficient to detect

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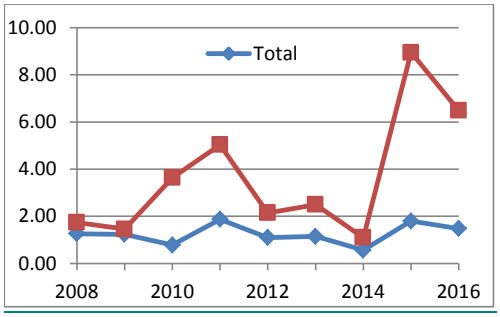


Figure16. Total and calf elk winter mortality (%) on NER in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the Management Step Down Plan (2008-2016). These values represent the pretreatment baseline which will be compared to the 3 year running average post MSP implementation.

and quantify significant movements of cow/calf/yearling elk groups compared to pre-MSP baseline data.

NER has elk ~~GPS~~ GPS collar data available from the 2008-2013, which represents the ~~post~~ post-BEMP, ~~pre~~ pre-MSP baseline period. We hypothesize that elk movements from NER to surrounding private lands will increase during the MSP implementation period compared to the pre-treatment baseline. This will be tested by comparing the number of incidents that elk left NER for surrounding private lands (per elk/per year), and the proportion of elk GPS fixes on NER versus private lands during time periods of interest. The principal time period of interest is late December–March because this represents the period after the NER elk hunting season, and prior to, and during, NER feeding operations. This is the season when changes to the NER feeding program would be most likely to result in elk distribution changes.

Fifty adult cow elk will be captured on NER feedgrounds during February-March ~~2016~~ 2017

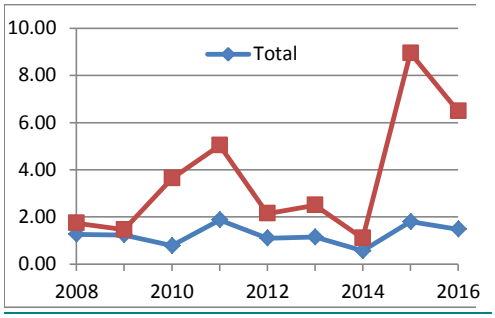


Figure 16. Total and calf elk winter mortality (%) on NER in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the ~~Management Step Down Plan~~MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the ~~3~~ 3-year running average post MSP implementation.

and Telonics Iridium GPS collars will be deployed with a 90 minute fix ~~collection~~ interval. Given 83% annual survival for adult cow elk in the ~~Jackson Elk Herd~~JEH (Cole and Foley et al. 2015) and ~~3~~ 3-year collar life, approximately 10 additional elk will need to be collared each year in winter 2017 and 2018 to maintain the 50 elk desired sample size.

Ancillary data that will be collected and analyzed during the elk capture and collar data analysis process includes brucellosis seroprevalence, pregnancy rate, and elk summer range determination for comparison to the findings of Cole and Foley et al. (2015).

Disease

The primary purpose of limiting reliance on supplemental feeding is to reduce the prevalence of endemic elk and bison diseases and mitigate transmission risk associated with the introduction of novel diseases. We hypothesize that brucellosis seroprevalence will decline post MSP implementation. There are no recent brucellosis seroprevalence data for elk on the NER, but >50 elk will be captured during elk collaring operations in winter 2016, and each elk will be

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tested for brucellosis exposure. The 2016 Brucellosis seroprevalence rate will be the pre-treatment baseline to evaluate post MSP change. Chronic wasting disease (CWD) has been monitored in the JEH since 1997, and since 2008 it has been monitored with sufficient sample size to detect 1% prevalence with 95% confidence. No CWD positive cases have been detected in the JEH, which given the long term persistence of the disease, provides overwhelming evidence that CWD is not currently endemic to the JEH. However, most evidence suggests that the distribution of CWD is increasing and that its introduction to the JEH is inevitable. – Early detection is critical to ensure an adequate management response, and therefore ongoing monitoring at sample sizes sufficient to detect 1% CWD prevalence with 95% confidence is necessary. CWD is sampled by testing tissues collected primarily from hunter harvested elk, and past experience suggests that 2 full time technicians working from September-December are necessary to ensure minimum sample size. Typical costs associated with 2 technicians are $32,000 per year.

Data Collected for Modeling

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To facilitate modeling, we will collect data on the following associated variables (Table 6). The table lists variables and how they relate to our efforts to use modeling to explain changes in elk distribution and elk calf mortality relative to our principal action of reducing feed season length.

Table 6. Variables to be used in models to explain elk winter distribution in the Jackson Elk Herd and elk calf mortality on NER.

VARIABLE	SOURCE	Elk Winter Distribution Model	Elk Calf Mortality Model
Proportion Jackson Elk Herd on NER Feedgrounds	WGFD/NER Jackson Elk Herd February Classification Count	Yes	No
Proportion Jackson Elk Herd from South Snake River summer segment	Determined from elk GPS collar data for elk captured on NER	Yes	No
Number of wolf packs in the Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated total wolf numbers in Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated number of wolves using NER in winter	NER observations	Yes	Yes
Total NER herbaceous forage biomass	NER forage production survey data	Yes	Yes
Snow Water Equivalent	NOAA snowtell site data	Yes	Yes
NER Winter elk Mortality (calf)	NER winter elk mortality survey	No	Yes
Snow Depth	NOAA Snowtell sites and NER measurements	Yes	Yes
Available Forage	NER and GTNP monitoring in winter months	Yes	Yes
NER Elk and Bison Fed Days	NER feeding records and daily feedground estimates of elk and bison	Yes	Yes
NER Feeding Start Date	NER feeding records	Yes	Yes
Gros Ventre Feeding Start date	WGFD feeding records	Yes	No
Elk Hunting Pressure by Hunt Area	Estimated number of hunter days from WGFD completion reports	Yes	Yes

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~~**Data Collected for Modeling**~~

~~To facilitate modeling, we will collect data on the following associated variables (Table 6). The table lists variables and how they relate to our efforts to use modeling to explain changes in elk distribution and elk calf mortality relative to our principal action of reducing feed season length.~~

EVALUATION/FUTURE MANAGEMENT

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term~~,~~ and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Consequently, we anticipate that the strategies outlined in this plan will be in place for a minimum of 5 years, after which an initial evaluation of the program will be made. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented ~~in~~ at an annual management ~~Step Down Plan~~MSP update/report, completed by NER staff by the end of March for the previous year.

Consistent with objectives outlined in the BEMP, the long-term goal of this plan is reduce the reliance of bison and elk on intensive supplemental feeding, using adaptive management principles through a structured framework of management actions, to achieve a desired condition of animals relying predominately on native habitat ~~on refuge~~NER, ~~park~~GRTE, and ~~forest~~ USFS lands, and on NER cultivated forage. But because there is no precedent for what this plan proposes, there are few responses to proposed management actions that can be predicted to a degree of certainty commensurate with establishing definable thresholds or other objective criteria for success in the short term.

Factors that will be considered in evaluating the success of the program will include the trend of EFD and BFD, type and frequency of private lands conflicts, the proportion of the ~~Jackson elk herd~~JEH wintering on the NER, presence or absence of CWD and other infectious diseases, elk and bison population size and distribution, elk calf winter mortality, and public support. These are complex, dynamic, and interwoven components

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that, together with the ~~management Step Down actions~~MSP, make up the framework for decreasing reliance on supplemental feeding. As such, the effects of changing biological, social, and political conditions on these components will be part of the evaluation process.

In the context of this larger framework, however, we believe evaluation of the trend in EFD and BFD will be most important after the first 5 years of MSP implementation. The direction and magnitude of the trend observed will provide a preliminary basis for evaluation and decisions about continued management actions. Initial success with reduced feeding will be associated with a declining trend, with greater magnitudes indicating higher degrees of success. However, determinations of overall program success will necessarily include evaluation of all system components. For example, gains in reduced feeding come could be accompanied by an increase in private land conflicts, which would affect overall success determinations. While the overriding strategy will be to decrease feeding as aggressively as possible while gauging effects on other system components, overall measures of program success through time will necessarily involve a complex matrix of component evaluation. ~~-~~These evaluations will be included in annual MSP reports.

As proposed and new management strategies are implemented and evaluated under this plan, at some point in the future it may become apparent that meeting reduced feeding goals will not possible without reducing elk and/or bison population objectives. Population objectives for both herds are set by Wyoming Game and Fish Commission and are evaluated regularly by WGFD personnel, including public review through annual season setting meetings. The BEMP supported the State herd objectives of 500 bison and 11,000 elk, and thus due to NEPA requirements any further consideration of reduced herd sizes by the NER or GRTE are beyond the scope of this plan. However, Wyoming Game and Fish Commission changes to Jackson bison or elk herd objectives are not constrained by the BEMP.

Investigating the potential effects of climate change on elk and bison management will also be important in the long-term. During implementation of this plan, we will collect a variety of data that could be drawn upon for this purpose.

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PUBLIC OUTREACH AND EDUCATION

The practice of winter feeding is inexorably woven into the historic fabric of Jackson Hole. Elk are identified with the rich and unique legacy for which Jackson Hole is known around the world. De-emphasizing the supplemental feeding program will be a major paradigm shift for the residents of Jackson Hole, Teton County, and the State of Wyoming.

An effective Public Outreach and Education program is essential for effective MSP implementation. The practice of feeding elk evokes passionate responses from those that oppose and those that support this practice. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk/bison herd management methods.

A detailed communication plan to guide outreach and education efforts can be found in Appendix 3.

SCHEDULE

Table ~~6~~7. ~~Step Down Plan p~~Proposed implementation schedule for the MSP.

Action	Date
Public outreach and education	November 2016
Initiate private lands conflicts mitigation contacts/actions	January, 2017
Implement enhanced forage monitoring	January, 2017
Initiate changes in supplemental feeding protocol	January/February 2017
~~GPS Collar 30-40 elk (Iridium platform)~~	~~March 2017~~
GPS Collar 30-40 elk (Iridium platform)~~Monitoring/Evaluation/Annual~~	March 2017~~June 2017~~

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BUDGET

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
National Elk Refuge:					
Monitoring:					
Seasonal Biological Technician (0.5 FTE, GS-7)	$24,000	$25,000	$26,000	$27,000	$28,000
Bison/elk fed days					
Mid-winter census					
Elk summer herd segment distribution[1]					
Expanded standing forage estimates[1]					
Chronic Wasting Disease, 2 seasonal bio.-techs	$32,000	$32,000	$32,000	$32,000	$32,000
Winter bison/elk distribution					
Irrigation					
50 Elk radio telemetry collars; Iridium Platform	$115,000	$25,000	$25,000	$25,000	$25,000
Bison barrier maintenance at NER south entrance	$500	$500	$500	$500	$500
Step Down Management Plan annual reporting	$2,000	$2,000	$2,000	$2,000	$2,000
Private lands:					
Easements / Leases (Private Foundations)	~~Unknown~~Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000
Conflict mitigation technicians (WGFD)	$91,000	$91,000	$91,000	$91,000	$91,000
Hazing (helicopter)	$6,000	$6,000	$6,000	$6,000	$6,000
Vegetation restoration/protection[1]					
Public Outreach and Education	$11,000	$1,000	$1,000	$1,000	$1,000
Subtotal					
Grand Teton National Park:					
Monitoring:					
Summer elk classification/distribution	$10,000	$11,000	$12,000	$13,000	$14,000
Collaborative elk monitoring (GRTE portion)	$5,000	$5,000	$5,000	$5,000	$5,000
Vegetation Restoration/Protection					
Monitoring	$16,000	$16,000	$18,000	$18,000	$12,000
Temporary bison fencing	$24,000				
Temporary fence maintenance	$6,000	$8,000	$8,000	$4,000	
Hayfields restoration	$84,000	$70,000	$70,000	$31,000	
Exotic plant mitigation	$50,000	$52,000	$46,000	$32,000	$16,000
Elk Reduction Program (subject to annual review)					
Hunter harvest evaluation	$1,500	$1,500	$1,500	$1,500	$1,500
Harvest age distribution	$2,000	$2,000	$2,000	$2,000	$2,000
CWD monitoring (0.15 FTE, GS-6)	$7,000	$7,000	$7,000	$7,000	$7,000
Law Enforcement and Visitor Protection (0.15 FTE for 20 LE and support staff;	Unknown				

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Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
supplies, and permitting)[3]					
Subtotal					
Wyoming Game and Fish Department:[2]					
Subtotal					
Grand Total					

[1]See detail in Appendix
[2] Dependent on size of elk reduction program; current annual expenditures are approx. $295,000 for 0.15 FTE for 20 LE and support staff; supplies, and permitting.
[3]Through Interagency Agreement

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APPENDIX 1. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007).

Populations

- Jackson elk herd objective of 11,000 would be maintained.
- New Jackson bison herd objective of 500 established.

Winter Feeding

- Supplemental feeding could be delayed or could occur earlier compared to current practices.
- Changes [to feeding program could] include alterations in the timing of feeding and providing supplemental feed in fewer years.
- Ration or pellet composition might need to be changed.
- Supplemental feeding would be initiated according to established criteria, including pre-winter forage production, assessments of forage utilization (done jointly by WGFD and NER personnel), elk condition and movements, and potentially on the January 1 index of winter severity calculations for elk (Farnes, Heydon, and Hansen 1999).
- Mechanical means could be used to increase forage access for elk after snow crusting events.
- Changes in the refuge supplemental feeding program could begin to affect elk nutrition (negligible adverse effect on NER elk from lower nutrition).
- Displacement of elk by bison during competition for standing forage would decrease as the bison herd is reduced.
- Aggressive social interactions involving competition for food among elk and bison would increase overall as feeding periods are reduced.

Winter Distribution

- Elk densities on the NER would decline due to more reliance on standing forage and wider distribution.
- Elk use of lands surrounding the NER would increase, including:
  - USFS lands east of the NER
  - Gros Ventre feedgrounds possibly
  - Southern GRTE
  - State feedgrounds south of the NER
- Most of winter distribution shift would involve elk in the Yellowstone, Teton Wilderness, and Gros Ventre segments.
- As ungulate numbers decreased and supplemental feeding was reduced, competition and aggressive social interactions on the refuge would also be reduced.
- Elk and bison distribution would increase as the animals relied more on native winter range.
- Fewer animals would be present on the refuge.

Mortality

- As supplemental feeding is reduced, natural factors such as climate and native forage availability would have a greater influence on numbers, movements, distribution, and mortality.
- More elk would be subject to natural factors affecting mortality, including loss of body condition, predation, and starvation.
- Increased mortality on and off the refuge would mainly affect older elk and calves, and some prime bulls entering the winter energetically stressed due to rut activities.
- Late winter calf ratios could decrease as a result of higher winter calf mortality

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- Average winter mortality on the refuge would increase from 1%–2% annually to an estimated 1%–5%.
- Overall, a higher total winter mortality rate of approximately 5% could be expected.

Disease

- Reductions in supplemental feeding or elk numbers would reduce the potential for impacts due to tuberculosis, septicemic pasturelosis, and CWD.
- The health and sustainability of the Jackson elk herd would be increased gradually as supplemental feeding was reduced and there was greater reliance on standing forage and wider ungulate distribution.
- Health and sustainability of the Jackson elk herd would be enhanced in the long term.
- Wider distribution of elk would result in moderate reductions in both the prevalence and potential transmission of brucellosis, as well as potential for spread of diseases not yet in the population.

Private Lands

- The agencies would work closely with the WGFD and landowners, including livestock producers, to coordinate actions that would prevent conflicts due to elk dispersal and to defray costs of managing potential conflicts. Preventing access to food/hay rewards on private lands would be vital for effective management.
- Private land conservation easements within NER boundaries would promote wider distribution.

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APPENDIX 2. Monitoring Supplemental Materials: Feeding Initiation Methods

At each sample site, 10 subplots will be measured at every 5 steps along the random bearing determined for each site. At each subplot a 13.27" diameter metal sampling ring will be placed on the ground. The amount of forage available to elk within the sampling ring (dry weight in grams) will be visually estimated. The 13.27" diameter subplot allows easy conversion from grams to lbs. per acre (each gram is equivalent to 100 lbs. per acre). During annual forage production sampling, refuge biologist Eric Cole has made approximately 1,000 of these visual estimates per year for 17 years, and 33% of Cole's estimates have been verified by clipping and weighing. Therefore, Cole will be the principal estimator, but additional personnel will be trained in these techniques to provide redundancy in the event of personnel changes, and to increase the number of observers to facilitate estimation of error.

Estimating available forage within the sample ring at each subplot is relatively straightforward when snow cover is limited, but estimating how much of the forage is accessible to elk when snow is dense, deep and crusted can be subjective. To decrease the subjectivity of the estimation process, if the area under the sample ring is covered with snow, only forage that can be exposed with a gloved hand will be included in the estimate of available forage. Forage that is fouled with manure and/or flush with the ground due to trampling and/or encrusted in ice will not be included in the estimate of available forage. At each subplot the estimate of available forage (dry weight g) will be converted to an equivalent lbs./acre value (1 gram=100 lbs./acre). The arithmetic mean of available forage (lbs./acre) for the 10 subplots provides an estimate of available forage for each index site. There are 3 sample site categories: 1) Historic Key Index Sites that have been used since 2007, 2) New randomly selected sites within areas preferred by elk, and 3) New randomly selected sites in areas not preferred by elk. Historic key index sites were not randomly selected, but were instead selected to represent areas most preferred by elk on the south end of NER. These were the sites used to determine when supplemental feeding would be initiated from 2007 until the implementation of the MSP. To facilitate comparison with pre-MSP data, we will continue to use mean lbs. per acre across historic key index sites to determine the 300 lbs. per acre threshold. However, post MSP implementation we will delay feeding initiation by 2 weeks once the 300 lbs./acre level has been reached. We will concurrently sample at randomly selected sites stratified on an annual basis between areas highly preferred and not highly preferred by elk. This will enable us to quantify the relationship between mean forage availability at historic key index sites and random sites over time.

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APPENDIX 3. Communication Plan

Communication Goals

Prior to the ~~Step Down Plan~~MSP's Implementation

- Utilize a variety of outreach methods to inform the public on the goals and timing of the ~~Step Down Plan~~ MSP implementation and possible effects on wintering herds.
- Utilize a variety of outreach methods to inform the public on public comment opportunities.
- Identify and coordinate key messages and outreach with USFWS regional and national offices, State and federal agency partners, non-profits, elected officials, and other identified audiences.

During the ~~Step Down Plan~~MSP's Implementation

- Continue to utilize a variety of outreach methods to describe current management actions as well as measurable and noticeable changes on the landscape, in animal behavior, or in animal health.
- Provide a comprehensive overview of the ~~Step Down Plan~~MSP by providing links and references to previous outreach and background information.

Communication Objectives

- Work with current media contacts to promote news of the ~~Step Down Plan~~MSP via print, radio, Web, and social media platforms.
- Utilize new media and social media tools to provide information on why the ~~Step Down Plan~~MSP was developed, what public comment opportunities exist, and how the plan is being implemented.
- Plan, coordinate, and execute public meetings to allow for public comment and questions on the plan.
- Develop and provide methods for the public to submit written comments on the ~~Step Down Plan~~MSP.
- Monitor print media on Refuge elk and bison management to see how the Step own Plan objectives and reactions are being portrayed to the public.

Current Outreach Resources

- National Elk Refuge web site
- National Elk Refuge news release list
- (approximately 300 contacts)
- National Elk Refuge Twitter site (1,039 followers)
- Bison and Elk Management Plan web site (http://www.fws.gov/bisonandelkplan/)
- Space for an 11" x 17" poster in the Visitor Center on Refuge management topics
- Display panels in the Visitor Center theater for temporary displays

Available Supporting Outreach Resources

- USFWS Mountain–Prairie External Affairs staff
- USFWS Mountain–Prairie web site, including the
- "Top Stories" feature
- USFWS Mountain–Prairie Twitter site USFWS Mountain-Prairie Region Facebook page

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- USFWS National Wildlife Refuge System
- Facebook page
- USFWS Facebook page

Previous Outreach Efforts

- NER routinely writes and disseminates news releases on Refuge management activities, including the Comprehensive Conservation Plan, supplemental feeding, herd health monitoring, and forage production.
- Post the above news stories as Content.
- Management System (CMS) articles.
- Post CMS news story promos so they prominently appear on the home page, linking readers to the articles.
- Send out Twitter messages linking viewers back to the news stories.
- Prepare, upload and provide links to Adobe PDF versions of news stories with additional photos where additional images are available and/or help understand or visualize the content.
- Utilized the Conservation link on the web Content
- Management System to post information about the Bison and Elk Management Plan and the draft Comprehensive Conservation Plan.
- Retained and provided a link to the original Bison and Elk Management web page (http://www.fws.gov/bisonandelkplan/) that was developed during the planning process. The web site includes links to the Final Plan/EIS, Record of Decision, Federal Register Notice of Availability for both the Record of Decision and Final Plan/EIS, associated news releases, public meeting highlights, and other related documents. Note: the National Elk Refuge does not manage the site.

Additional Outreach Opportunities

- Public meetings in Jackson and other identified locations.
- Service produced video; video could be posted to the National Elk Refuge's multimedia web page, or USFWS Mountain–Prairie home page "Top Video" feature.
- Live radio interview on KHOL (Jackson, WY radio)
- Wyoming Public Radio interview with Refuge management staff
- Interviews with local print media sources
- Updates at community leader meetings such as Rotary Club, Jackson Hole Chamber of Commerce board meetings, and interagency breakfast meetings (with Federal agencies and local elected officials).

Target Audiences

Internal

- Regional and National USFWS Leadership
- Refuge permanent staff
- Refuge seasonal staff
- Refuge volunteers

External

- Congressional representatives
- State of Wyoming leadership

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- Federal agency partners, ~~particulary~~particularly Grand Teton National Park and the Bridger–Teton National Forest
- Wyoming Game & Fish Department
- Other NER partners, including county and town agencies and local nonprofit organizations
- Local elected officials
- Private landowners in proximity to the National
- Elk Refuge or neighboring Federal lands
- Tribes
- Local and state media
- Local public

Key Outreach Topics

- Overview of BEMP objectives
- Strategy to change elk/bison behavior
- Threat of disease
- Natural mortality rates
- Anticipated winter distribution changes for bison/elk
- Mitigate negative effects on private lands
- Change elk behavior and distribution while avoiding increased mortality.
- Explain the historic reasons a supplemental feeding program began and why it was continued.
- Explain the NER's limited large ungulate carrying capacity and the disproportionate impact of bison on available forage; 3 elk = 1 bison.

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APPENDIX 4. Models

Elk winter distribution model

The proportion of the JEH that winter on the NER will be linked to factors hypothesized to influence elk winter distribution (Fig. 2) using a generalized linear mixed effects model (GLMM). A GLMM can account for a proportional response variable (i.e., constrained to the interval 0–1) using a log link and binomially-distributed errors. A GLMM also includes fixed and random effects, with the latter capturing residual model variance otherwise not explained by fixed effects. Year will be including as a random effect, providing several benefits. First, we don't assume years are independent and comprise all of the factor levels of interest. Instead, the effect of year is treated as a random variable, with individual year effects realizations of that distribution. This allows inference to non-sampled factor levels, i.e. years, by estimating a latent population-level proportion of elk expected to winter on the NER regardless of fixed effect influences. Thus, the random year effect can be considered a latent variable describing elk behavior manifested as observed winter distribution. Second, because year effects are not treated as independent, estimated effects of year on the proportion of JEH elk wintering on the NER are dependent on all factor levels, leading to greater precision when estimating individual year effects (Kéry 2010).

The full GLMM incorporating fixed effects for each factor identified as influencing elk winter distribution (Fig. 2) is:

$$P_t = \beta_{0(t)} + \beta_1 * AFI_t + \beta_2 * SDM_t + \beta_3 * WP_t + \beta_4 * GSP_t + \beta_5 * SWE_t + \varepsilon_t$$

where the random intercept and residual model variance are

$B_{0(t)} \sim N(\mu_{\beta_0}, \sigma^2_{\beta_0})$, and

$\varepsilon_t \sim N(0, \sigma^2)$, respectively.

Fixed effects include 1) per capita available forage at initiation of winter feeding (*AFI*) , 2) proportion of the JEH that are short-distance migrants (*SDM*), 3) number of wolf packs present on JEH native winter range (*WP*), 4) growing season (May–August) precipitation for the Wyoming Snake Drainage climate division (*GSP*; a proxy for available forage on native winter range), and 5) snow water equivalent on 1 January at Thumb Divide (*SWE*; a proxy for early winter severity).

Elk calf winter survival and forage deficits

The Forage Accounting Model of Hobbs et al. (2003) has as an output weekly available forage biomass for the NER (sum of predictions for 30 × 30 m cells). These predictions account for snow conditions using a proxy of SWE and decrement total available biomass by 35% to account for unpalatable plants within the total estimate.

While calf survival is a function of multiple factors (Fig. 3), the primary management action influencing calf survival is supplemental winter feeding. Current winter feeding initiation criteria lead to calf survival generally higher than in unfed populations. Proposed feeding initiation criteria will result in later initiation of supplemental feed, which will be most influential to calf survival. There is currently

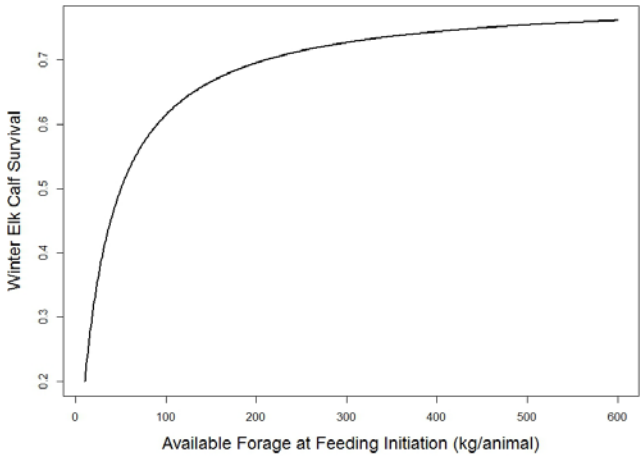
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little understanding regarding the relationship between initiation of winter feeding and calf survival, except that current feeding initiation criteria result in high calf survival. We believe a threshold level of available forage at initiation of winter feeding exists such that winter calf survival reaches an asymptote. Below this threshold, calf survival is hypothesized to decline quickly with reductions in available forage at winter feeding initiation. Available forage at the initiation of winter feeding will be related to on elk calf winter survival using a saturating function (i.e., Holling type-II functional response; Fig. 6) by

$$S_t = \frac{aAFI_t}{b + AFI_t}.$$

The parameters *a* and *b* determine how calf survival is related to available forage. Maximum calf survival is *a*, and *b* represents the value of available forage to an individual when survival is 50% of *a* (Hilborn and Mangel 1997).

Although this approach doesn't capture forage deficits *per se*, it does provide a potentially sensitive proxy for this concept. It is assumed that a forage deficit for calves would occur at a point on the curve of the relationship between calf survival and available forage at initiation of supplemental feeding. Modeling the response of winter calf elk survival to changes in feeding initiation criteria facilitates our ability to maximize the influence of feeding initiation criteria on winter distribution while minimizing the likelihood of a large mortality event.



-Hypothesized relationship between winter survival of elk calves and per capita available forage at initiation of winter feeding on the National Elk Refuge.

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From:	Cole, Eric
To:	Steve Kallin
Cc:	Dale Deiter; Murphy, Kerry M -FS; Sarah Dewey; David Gustine; Brad Hovinga; Doug Brimeyer; Steve Cain; Cris Dippel
Subject:	Re: Updated Draft BEMP Step Down Plan (v. 2.8)
Date:	Monday, July 25, 2016 10:54:51 AM

Hello to all,

Please send your edited copies directly to me. I will be compiling the changes and submitting the revised copy to peer reviewers as soon as possible to keep the process moving. Note, Dave, I have already received your copy.

Thanks,

Eric Cole
Refuge Biologist
U.S. Fish & Wildlife Service, National Elk Refuge
Jackson, WY
307.201.5432

On Thu, Jul 21, 2016 at 3:34 PM, Steve Kallin <steve_kallin@fws.gov> wrote:

> Hi All:
>
> Attached is the most recent version of the Draft BEMP Step Down Plan (v. 2.8), which includes the changes discussed at our last Team Meeting on Monday, July 18.
>
> Sorry I was unable to get this out sooner in the week. A BIG thank you to Dave Gustine for repairing troublesome Table #4 that delayed progress. Please review and make comments/changes using “track changes” and return to me at your earliest convenience. Our goal is to make updates based on your comments and then send it out for peer review on Monday, 7/25.
>
> Thank you for your help; sorry for the short turn around,
>
> **Steve Kallin**
>
> Project Leader
>
> National Elk Refuge
>
> PO Box 510

675 East Broadway

Jackson, WY 83001

Phone: (307) 201-5409

Fax: (307) 733-9729

steve_kallin@fws.gov

From:	Steve Kallin
To:	Dale Deiter; Murphy, Kerry M -FS; Sarah Dewey; David Gustine; Brad Hovinga; doug.brimeyer@wyo.gov; Steve Cain; Cris Dippel; Eric Cole
Subject:	Updated DRAFT Completion and Implementation Schedule for BEMP Step Down Plan
Date:	Wednesday, July 27, 2016 2:53:50 PM
Attachments:	DRAFT Step Down Plan Implementation Schedule 7-27-2016.docx

Hi Planning Team:

Attached is an updated schedule which incorporates the changes discussed at our last planning meeting on July 18, 2016.

Call if you have any questions,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

DRAFT Completion and Implementation Schedule for the BEMP Step Down Management Plan

July 27, 2016

	STEPDOWN PLAN COMPLETION AND APPROVAL PROCESS	INITIATE	COMPLETE	WORK DAYS
1	Final Step Down Plan Meeting	July 18, 2016	July 18, 2016	
2	Final 1st Draft Step Down Plan; Team reviews changes	July 19, 2016	July 27, 2016	7
3	Peer review panel	July 27, 2016	Aug. 11, 2016	11
4	Team meets to review Panel's suggested changes	Aug. 12, 2016	Aug. 12, 2016	1
5	Team changes finalized	Aug. 15, 2016	Aug. 17, 2016	3
6	Agency comments (Planning Team)	Aug. 17, 2016	Aug. 31, 2016	10
7	Incorporate agency comments; finalize draft	Sept. 1, 2016	Sept. 9, 2016	7
8	Release draft plan to public; Public outreach, meetings	Sept. 12, 2016		
9	Public review and comment period (60 days)	Sept. 12, 2016	Nov. 10, 2016	60 (calendar)
10	Review public comments and incorporate changes	Nov. 11, 2015	Nov. 18, 2016	6
11	Team review & comments	Nov. 21, 2016	Nov. 25, 2016	5
12	Agency Review of updated document	Nov. 28, 2015	Jan. 6, 2016	28
13	Update final document	Jan. 9, 2017	Jan. 13, 2017	5
14	Final FWS/NPS review and signatures.	Jan 16, 2017	Jan. 27, 2017	10
15	Release Final Step Down Plan. Continue Public outreach/meetings.	Jan. 30, 2017		
16	Initiate enhanced forage monitoring	Jan. 1, 2017	Feb. 1, 2017	30
17	Implement new feeding schedule (delay 1-5 days)	Feb. 1, 2017	Feb. 15, 2016	
18	Feedground tours for elected officials, key stakeholders	Feb. 15, 2017	March 22, 2017	22
19	GPS collar 30 elk	March 1, 2017	March 15, 2017	10
20	Initiate early termination of supplemental feeding	April 2, 2017		

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From:	Cole, Eric
To:	Steve Kallin
Cc:	Cris Dippel
Subject:	version of step down plan sent for Peer Review
Date:	Friday, July 29, 2016 5:06:11 PM
Attachments:	Draft NER Step Down Plan Peer Review Copy_7_25_2016.docx

---

Steve and Cris,

For your records, the version of the step down plan that I sent out to peer reviewers today is attached.

Eric Cole
Refuge Biologist
U.S. Fish & Wildlife Service, National Elk Refuge
Jackson, WY
307.201.5432

BISON AND ELK MANAGEMENT STEP DOWN PLAN

A Structured Framework for Reducing Reliance on Supplemental Winter Feeding

National Elk Refuge
Grand Teton National Park

DRAFT

July 28, 2016

BISON AND ELK
MANAGEMENT STEP DOWN PLAN

For the

National Elk Refuge,
Grand Teton National Park,
John D. Rockefeller, Jr. Memorial Parkway

Teton County, Wyoming

DRAFT

***Suggested Citation**:* U.S. Fish and Wildlife Service: 2015. Bison and Elk Management Step Down Plan, National Elk Refuge and Grand Teton National Park. U.S. Department of the Interior, Washington D.C. Available online at:

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Appendix I. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section

DRAFT

of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007)**. .....**
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EXECUTIVE SUMMARY

Overview

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands, focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The final plan directed the NER and GRTE (in conjunction with the Wyoming Game and Fish Department: WGFD) to maintain the state's elk herd objective of 11,000; establish a bison population objective of 500; restore habitat on the NER and in GRTE; continue hunting bison and elk on the NER; continue the elk reduction program, when necessary, in GRTE; allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available; and develop a dynamic, structured framework and Step Down Management Plan for decreasing the need for supplemental feeding on the NER. ***This Bison and Elk Management Step Down Plan (MSP) was developed to specifically addresses the criteria for a structured framework referenced in the Record of Decision.***

Background

Winter feeding of elk in Jackson was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. The loss of available winter range in Jackson Hole due to new ranching operations and a growing town resulted in significant numbers of elk dying during several severe winters in the late 1800s and early 1900s. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, established the National Elk Refuge. Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding.

Bison were extirpated outside Yellowstone National Park (YNP) by the mid-1880s but in 1948 were reintroduced to Jackson Hole when 20 bison from YNP were released near Moran, Wyoming. The herd remained small until discovering elk feedlines in 1980, when the population began sustained population growth. Bison and elk that winter on the NER are migratory and occupy summer ranges predominantly to the north.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands, thereby reducing other wildlife associated with woody vegetation, unusually low winter mortality, which affects predators and other species and requires intensive hunting programs.

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. The potential risk of catastrophic disease outbreaks and the need to mitigate this threat is a vital component in achieving the BEMP Sustainable Populations Goal.

Objectives

This MSP addresses several objectives under a broader BEMP goal of sustainable populations,

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which directed the agencies to: 1) develop a dynamic, structured framework for reducing NER supplemental feeding; 2) implement a phased reduction of animals on feed: a) Phase 1, to 5,000 elk and 500 bison, and b) Phase 2, elk and bison rely predominantly on native habitat; 3) maintain natural elk bull-to-cow ratios in park summer herd; and 4) enhance public outreach/education. The BEMP further stated that consideration criteria for implementing the 2nd phase of reduced feeding would include some or all of: 1) the level of forage production and availability on the National Elk Refuge, 2) desired herd sizes and age/sex ratios, 3) effective mitigation of bison and elk co-mingling with livestock on private lands , 4) winter distribution patterns of elk and bison, 5) prevalence of brucellosis, chronic wasting disease, and other wildlife diseases, and 6) public support. **In short, the overall objective of this plan is to provide a path for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives and public support.**

Strategies

Elk have been fed for some period during nearly every winter on the National Elk Refuge since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during a time of year when natural forage is typically most limited is powerful to both species, and their knowledge of its existence has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Attempting to modify this behavior on a large scale is unprecedented and will necessarily require investigation, constant evaluation, adaptive modifications to the approach when indicated, and repeated trials.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into the 3 broad categories of 1) timing and intensity of winter feeding, 2) timing and intensity of hunting, and 3) herd segment specific and overall harvest levels.

Measuring the success of MSP strategies will require knowledge of several bison and elk herd attributes. Because we are interested in reducing the intensity of elk and bison feeding throughout the entire winter season, which includes both the number of animals on feed and the duration of feeding, we will use measurements of elk-fed-days (EFD; the total number of elk fed per day per season derived from daily feedground estimates) and bison-fed-days (BFD; the total number of bison fed per day derived from daily feedground estimates) to evaluate feeding intensity. For example, if 5,000 elk were fed for 100 days during a given winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD. Average baseline feeding intensity during the post-BEMP to pre-MSP period from 2008-2016 was 487,838 EFD (range = 223,614-746,800), and 45,224 BFD (range = 26,035-82,124). Reductions in EFD and BFD compared to these baselines will represent progress in meeting feeding reduction objectives under the MSP. Reductions in EFD and BFD could be achieved through reducing the length of the feed season, reducing the number of elk and bison on feed, or some combination of both factors.

Initial success of MSP implementation will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP did not provide specific measurement criteria for the definition of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage" we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. These levels of reduction are consistent with elk and bison predominantly relying on free

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standing forage rather than supplemental feed.

Similarly there are population-specific objectives derived from the BEMP and Phase 1 of the MSP for 5,000 elk wintering on NER and 500 bison wintering in the Jackson Hole area. Progress towards these objectives will be measured using annual classification counts and the average number of elk and bison counted during daily feedground estimates.

Chronic Wasting Disease. As of 2016, CWD has been detected within 40 miles of the Jackson Elk Herd (JEH) in moose, within 35 miles in deer, and within 175 miles in elk. Continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence will take place. Some aspects of CWD response planning could change based on implementation of WGFD's CWD management plan (WGFD 2016).

Winter Feeding. Currently, the initiation of supplemental winter feeding occurs when available forage drops to 300 lbs/acre along transects in areas with highly preferred grasses. This protocol will change to delay the initiation of feeding.

The strategy of delaying the start of supplemental feeding is to encourage elk and bison to use native winter range, especially those individuals that have not previously received a food reward on the Refuge. Over time, it's anticipated a cohort of animals will develop that are not conditioned to the Refuge supplemental feeding program, which will reduce herd concentrations and the risk of disease transmission.

To reduce supplemental feeding overall, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk and bison fed days, the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years of MSP implementation, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require focused mitigation measures.

As bison and elk behavioral responses are better understood, feeding delays will be extended to encourage a redistribution of elk and bison to native winter range. However other factors outside of the scope of this plan such as wolf numbers and distribution could reduce the effectiveness of this strategy.

Variables that influence feeding initiation date will be considered (Table 4, Fig. 10). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. And finally, the distribution of animals, particularly on private, livestock producing lands, would be considered prior to delaying feeding initiation date.

Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years.

In the early years of MSP implementation, the

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seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date as the MSP is implemented.

Harvest. Few options for manipulating elk hunting are currently available because the JEH is at or near the 11,000 WGFD objective. Proposed changes include allowing limited any elk permits, allowing a bow season near developments on the NER, delaying the elk season so it will better coincide with migration timing, and alternating areas that are closed and open to hunting over time to encourage animal movements or facilitate harvest.

Based on summer bull ratios in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded hunting opportunities are considered.

The proportion of the Jackson Elk Herd that winters on NER has increased in the past 2 decades. This trend is correlated with a decline in elk use of native winter range and an increase in the proportion of NER elk that occupy winter ranges immediately adjacent to the Refuge. If efforts to encourage increased use of native winter range are unsuccessful, agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. This will provide a level of harvest flexibility more commensurate with addressing changes in herd distribution.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution or discouraging bison from attempting to leave the NER via the south boundary into the town of Jackson. Serious consideration will be given to reducing the bison herd population objective in the future through collaboration with WGFD. Lowering the Jackson Bison Herd objective and population would reduce winter NER forage consumption and further reduce the need for supplemental feed. Genetic diversity could be addressed by periodically introducing bison from other herds.

The effectiveness of NER late-season harvest regimes is influenced by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could help reduce winter elk numbers on the Refuge. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st .

Private Lands Mitigation. Several strategies would be employed to mitigate likely changes in bison and elk distribution, including providing incentives for non-breeding cattle operations, increased fencing in limited areas to separate elk and bison from livestock feed lines, hazing elk and bison away from livestock feed lines, and purchasing private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal wildlife conflict technician positions supervised by WGFD.

Vegetation Restoration. Various approaches to restore the Kelly Hayfields in GRTE (4,500 acres) were initiated in 2008. Work will likely be complete in 2035. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and providing visitor opportunities to enjoy wildlife viewing within a

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natural setting. The restoration process involves removal of non-native vegetation, collecting and propagating native seeds and plants, as well as the seeding of native plants.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres are currently under restoration treatment and 3,265 acres remain non-native pasture. Maintenance of restored ecological conditions will require management efforts in perpetuity to keep non-native species from colonizing restored areas. The park will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Strategies Considered But Rejected

Strategies considered but rejected include fertility control in elk and bison, agency reduction of either elk or bison, and altering rations of supplemental feed. These strategies were rejected because they were not included in the BEMP preferred alternative and/or because there was not support for them by cooperating agencies.

Models and Monitoring

Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

A robust monitoring program will be necessary to track the effects of actions implemented under this plan. Critical monitoring components will include: 1) enhanced forage production and availability sampling; 2) measuring animal abundance and distribution including differences in some sex and age classes; 3) determining elk and bison fed days each feeding season; 4) estimating winter mortality; 5) brucellosis seroprevalence rates; and 6) CWD surveillance. In many cases, attribute baselines for the period preceding implementation of this plan have been developed for comparison after the plan is implemented.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Actions completed each year, the results of monitoring programs, and any proposed changes in management direction will be presented in an annual MSP update/report, completed by NER staff by the end of June.

Public Outreach/Education

De-emphasizing the supplemental feeding program will be a major paradigm shift especially for the residents of Jackson Hole and Teton County, but will also be of interest to others in Wyoming and across the nation familiar with the long history of feeding elk on the National Elk Refuge. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk and bison herd management methods. A detailed communication plan has been developed that identifies key messages and utilizes a variety of outreach methods, including print, video, and voice material, utilizing social media, and meetings with elected officials, state and local governments, agency and tribal partners, community organizations, stakeholders, and the general public.

Schedule

GPS collars were deployed on 30 adult cow elk in February 2016. Assuming adequate funding, , additional GPS collars will be deployed in winter 2017. Public outreach, private lands conflict mitigation and contacts, and enhanced forage monitoring will occur in fall 2016 through January 2017. Reductions in feed season length will begin in winter 2017.

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INTRODUCTION

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands. It included directives for forthcoming development of adaptive management practices to address several objectives in the plan, including a desired future condition of elk and bison relying predominantly on native forage. This MSP has been developed expressly for that purpose.

Bison and Elk Populations

While Jackson Hole is probably best known for the splendor and ruggedness of the Teton Range, the Jackson bison and elk herds rank among the top characterizing features of the valley. Both figure prominently in Jackson Hole's history and culture, although bison were absent from the valley for about 100 years between the mid-1800s and mid-1900s.

The JEH occupies approximately 8,000 km^2 in the upper Snake River watershed north of the town of Jackson (Fig. 1). Much of the herd is migratory, moving between distinct wintering and summer ranges. Primary wintering areas include the Buffalo Valley, lower elevations of the Gros Ventre River drainage, the NER, and areas adjacent to the NER on Bridger-Teton National Forest (BTNF) lands. Summering areas occur throughout the herd's range and for convenience are divided into five geographic regions that include GRTE, Yellowstone National Park (YNP), the Gros Ventre drainage, Teton Wilderness, and Southwest Boundary area, which includes private and public lands in the vicinity of GRTE's southwest boundary.

In the late 1800s, when elk populations all over North America were being extirpated, the residents of Jackson Hole protected elk from "tusk hunters" and large-scale commercial hunting operations. Elk are just as important to today's residents of the valley. Thousands of people each year have the opportunity to see elk at close range on the refuge while riding on horse-drawn sleighs. Thousands of pounds of shed elk antlers are sold at an annual antler auction each spring in the town square. Elk are important to backcountry users as well as to people that never leave the road. Jackson Hole is a popular destination for instate and out-of-state elk hunters. The draw of elk to visitors contributes significantly to the local economy.

Winter feeding of elk in Jackson Hole began in 1910 and was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. According to historical reports, before Euro-American settlement some Jackson elk wintered in the southern portion of Jackson Hole (present location of the NER town of Jackson) and may have used areas outside Jackson Hole, including the Green River and Wind River basins to the south and east, respectively, and the Snake River basin to the southwest in what is now eastern Idaho (Allred 1950; Anderson 1958; Blair 1987; Barnes 1912; Sheldon 1927). Radio-collar studies have documented small numbers of Jackson elk wintering in each of these areas in recent times as well (NER and GRTE, unpublished data). Over time, changes in land use and development in these areas, over hunting, and establishment of feedgrounds probably reduced the use of these areas by Jackson elk.

By the end of the 19th century the JEH was believed to be largely confined to Jackson Hole and the immediately surrounding area, where wintering conditions are often harsh. Significant numbers of elk died during several severe winters in the late 1800s and early 1900s> Primary reasons for these mortality events included the loss of available winter range in Jackson Hole from new ranching operations and a and

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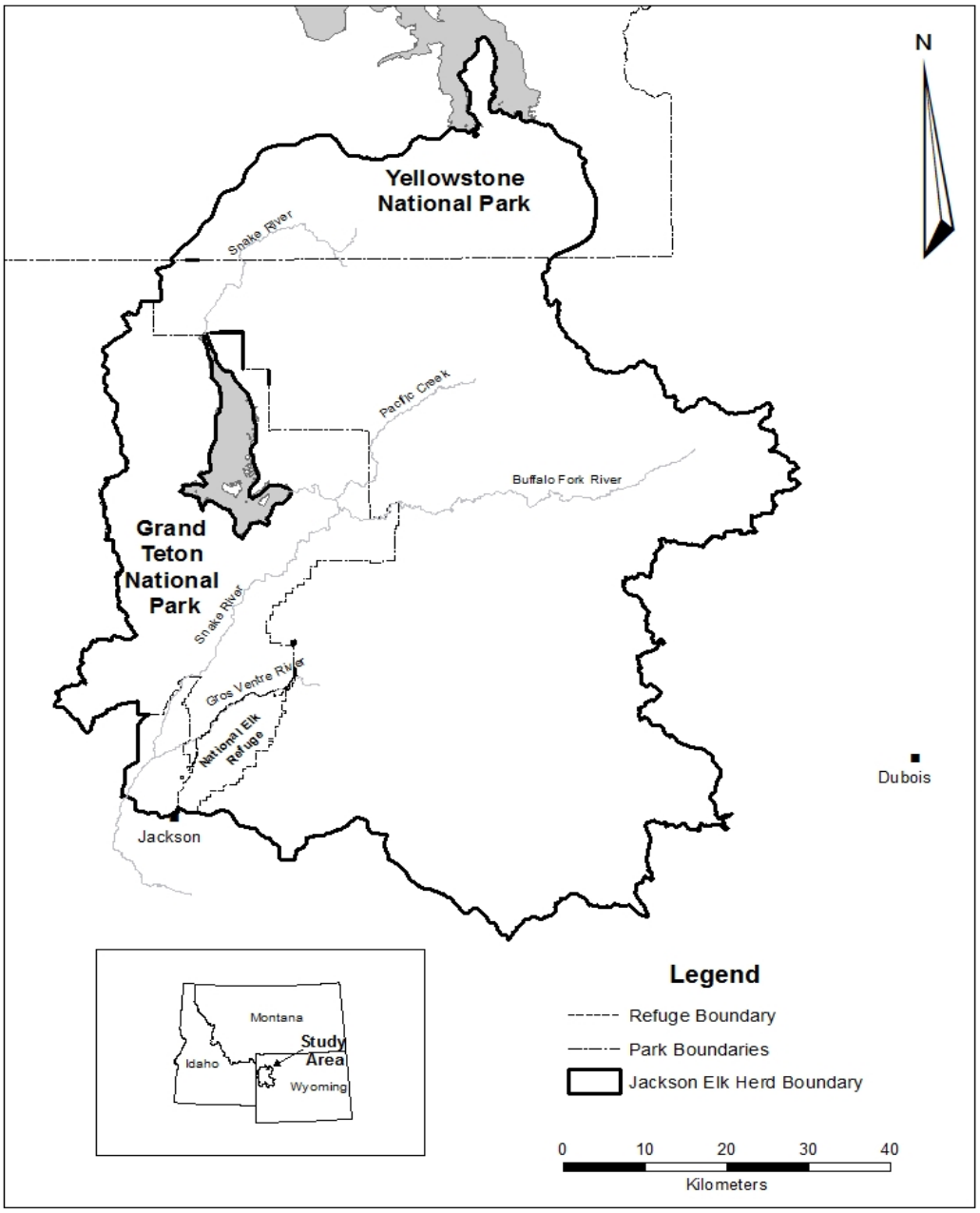


Figure 1. Jackson elk and bison herd ranges, including the National Elk Refuge, Grand Teton and Yellowstone National Parks, and Bridger-Teton National Forest. [include bison range, labels for continental divide and Bridger-Teton National Forest, and in Legend Jackson elk herd unit].

expansion of Jackson. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, appropriated $45,000 for the purchase of lands and maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first winter census in the area was conducted in 1912 and showed about 20,000 elk residing in Jackson Hole and the

Hoback River drainage (the latter is not within the JEH's range).

Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding. In recent times the population has fluctuated near the herd objective of 11,000 that was adopted by the WGFD (Fig. 2).

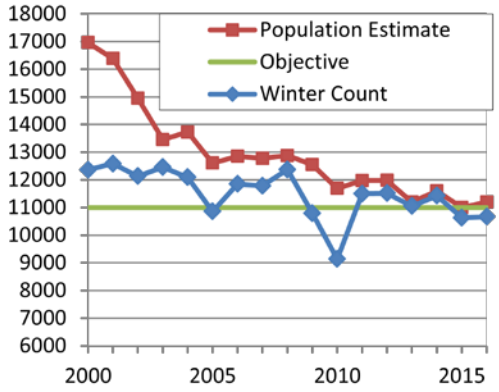


Figure 2. Winter Counts, population estimates, and herd objective for the Jackson elk herd, 2000-2016.

An iconic symbol of the American West, bison are also popular with visitors and residents. Because so few opportunities remain to see bison in the wild, viewing and photographing them in GRTE with the Teton Range in the background is a treasured opportunity for many of the valley's visitors. Similar to elk, there is also a high level of interest in bison hunting. Bison are of particular interest to nearby American Indian tribes and tribes in other parts of the United States because the animals are central to their culture and tradition.

Bison are native to Jackson Hole, as evidenced by the presence of prehistoric bison remains throughout the valley, but were extirpated outside Yellowstone National Park by the mid-1880s. In 1948, 20 bison from YNP were reintroduced to the 1,500-acre Jackson Hole Wildlife Park near Moran. The Jackson Hole Wildlife Park was a private, non-profit organization sponsored by the New York Zoological Society, the Jackson Hole Preserve, Inc., and the WGFD. A population of 15–30 bison was maintained in a large enclosure there until 1963, when brucellosis was discovered in the herd (likely transferred with the original 20 animals from YNP). At that time, all the adult animals were destroyed, but four vaccinated yearlings and five vaccinated calves were retained. In 1964 twelve certified brucellosis free bison from Theodore Roosevelt National Park were added to the herd. In 1968 the herd (down to 11 animals) escaped the confines of the wildlife park, and a year later the decision was made to allow them to range freely. The expansion of GRTE in 1950 had enveloped the Wildlife Park, and this allowed the bison to range freely and was consistent with National Park Service wildlife management policy. The herd remained small and wintered mostly in the Snake River bottoms in GRTE until 1975, when it followed the winter environmental gradient to the NER and began wintering there. The use of standing forage by bison on the NER was viewed as natural behavior thus acceptable to managers. In 1980, however, bison discovered and utilized supplemental feed provided to elk in winter, and they have continued to do so ever since.

The discovery of supplemental feed by bison has had several consequences, including a significant increase in the population's growth rate (Fig 3). Bison on the elk feedlines have at times disrupted feeding operations and displaced and injured elk. To minimize conflicts between bison and elk, managers have provided separate feedlines for bison since 1984. As the population has grown, separating elk and bison on feedlines has become increasingly difficult, and a variety of feeding strategies are employed to help reduce displacement of elk.

As the herd has grown it has maintained fairly stable movement patterns, wintering almost entirely on the NER and summering within GRTE and adjacent lands on the BTNF (Fig. 1).

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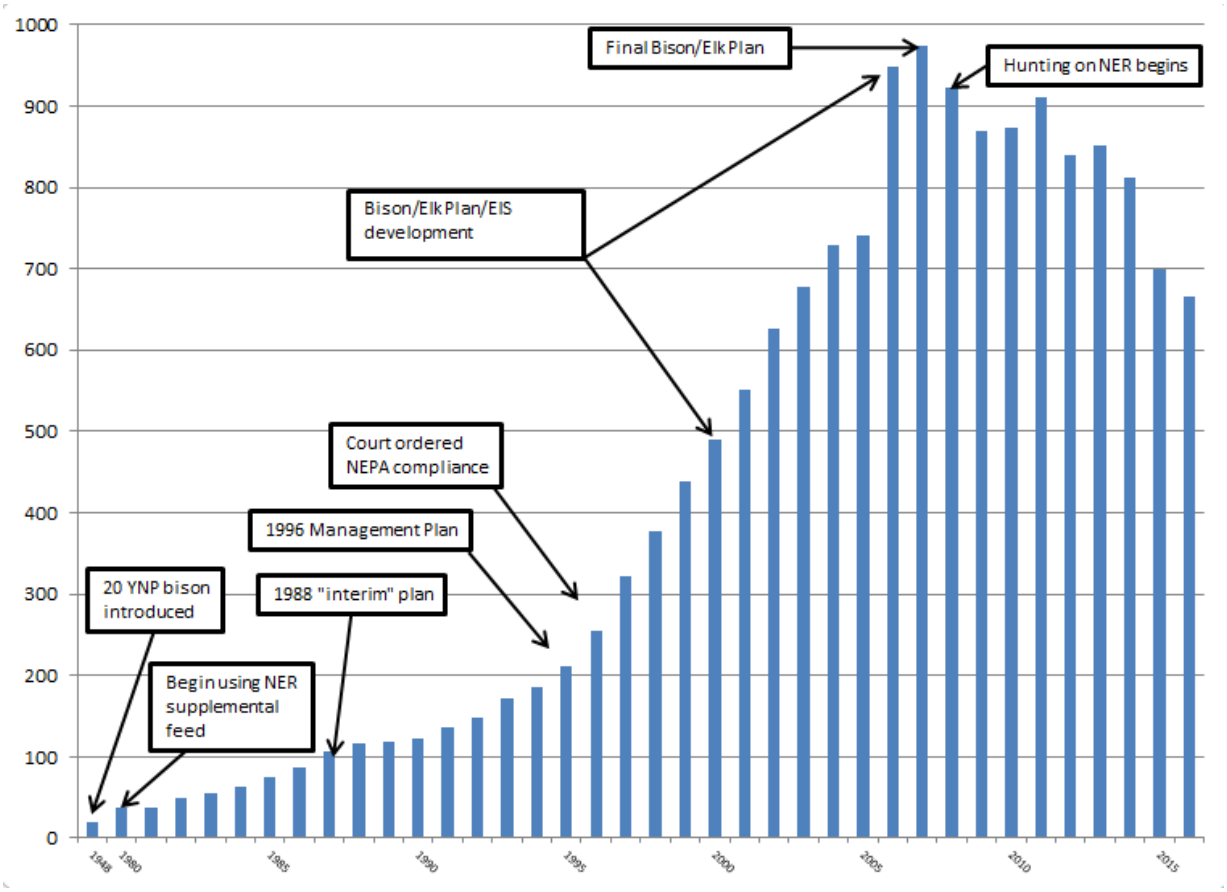


Figure 3. Population growth and planning history for the Jackson bison herd, 1948-2016.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands and thereby reducing availability of these habitats to other wildlife as well as unusually low winter mortality, which has affected predators and other species and has required intensive hunting programs.

Planning History

Jackson's bison and elk populations have been the subject of previous planning efforts. Elk management and research has been guided by the Jackson Hole Cooperative Elk Studies Group since it was established in 1958. The group consists of biologists and agency administrators from the NER, GRTE, YNP, BTNF, and WGFD, who meet at least annually to coordinate management of the population and its habitat. Coordination of bison management began soon after they started frequenting the NER in 1976 and using supplemental feed provided to elk in 1980 (Fig. 3). Release of an "Interim" plan that called for maintaining a herd of 90-110 bison while data were gathered for a long term plan occurred in 1988. It was followed by implementation of a sport hunt outside GRTE, administered by WGFD. This plan was halted after litigation in which the plan's violation of NEPA was successfully argued by plaintiffs.

In 1996, after considerable herd growth, a new long term management plan and environmental

assessment for the Jackson bison herd was released (Fig 3). This plan had strong support and called for maintaining a herd size of 350-400 bison, but it was shelved a year later when plaintiffs from the earlier litigation successfully argued that, because the plan failed to consider the effects of feeding elk on bison management, it also violated NEPA and was not sufficient. This led to development of the draft bison and elk management plan and environmental impact statement from 2000-2006 and release of the final plan in 2007 (Fig 3).

The 2007 Bison and Elk Management Plan (BEMP; USFWS 2007) considered six alternatives for bison and elk management focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The primary management scenarios presented in the alternatives included the status quo, terminating elk and bison hunting on the NER and the elk reduction program in GRTE, brucellosis vaccination options, restoring habitat, improving forage, and decreasing or phasing out supplemental winter feeding.

The final BEMP (USFWS 2007; www.fws.gov/bisonandelkplan) which set management direction for 15 years or until a subsequent plan is developed, proposed to maintain the state's elk herd objective of 11,000, establish a bison population objective of 500, restore habitat in the NER and GRTE, continue hunting bison and elk on the NER, continue the elk reduction program in GRTE in concert with the parks enabling legislation, allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available, and develop a dynamic framework of management actions which adaptively decrease the need for supplemental feeding on the NER. ***This Bison and Elk Management MSP was developed to address the latter and specifically addresses the criteria for a structured framework listed on page 5 of the Record of Decision*** **(Fig. 4).** It does not address other on-going bison and elk management actions already prescribed by the BEMP.

The BEMP scheduled the completion of the MSP for 2008. However, litigation challenging the BEMP in 2008 led to the decision to postpone its development until litigation was resolved. As of March 2015, two court rulings have upheld the 2007 BEMP and ROD. In a lawsuit against the BEMP and its author agencies (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2010), plaintiffs argued that the BEMP violated the National Wildlife Refuge System Improvement Act (National Wildlife Refuge System Improvement Act 1997) by disrupting the biological integrity of the Refuge, and that the plan and the accompanying EIS violated NEPA because they were insufficiently detailed to allow a reasonably complete discussion of mitigation. The crux of the plaintiff's argument was that the plan did not set a specific date for the cessation of supplemental feeding. In response, the agencies argued that the plan constituted a valid exercise of discretion and that it and the EIS were sufficiently detailed to satisfy the requirements of NEPA. In March 2010, the United States District Court for the District of Columbia sided in favor of the agencies in this case. In 2011, the plaintiffs appealed this ruling to the United States Court of Appeals for the District of Columbia Circuit. This Court affirmed the District Court ruling (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2011).

National Environmental Protection Act Compliance

The 2007 BEMP/EIS and ROD satisfied NEPA requirements for current bison and elk management through a detailed analysis of alternative management actions and their likely effect on the environment, and substantial involvement of the public in the process. This MSP does not duplicate or add to this process. It is designed to tier off of the BEMP as a dynamic implementation guide to one part of the preferred alternative outlined in the BEMP ROD. As such, references to NEPA covered in the BEMP

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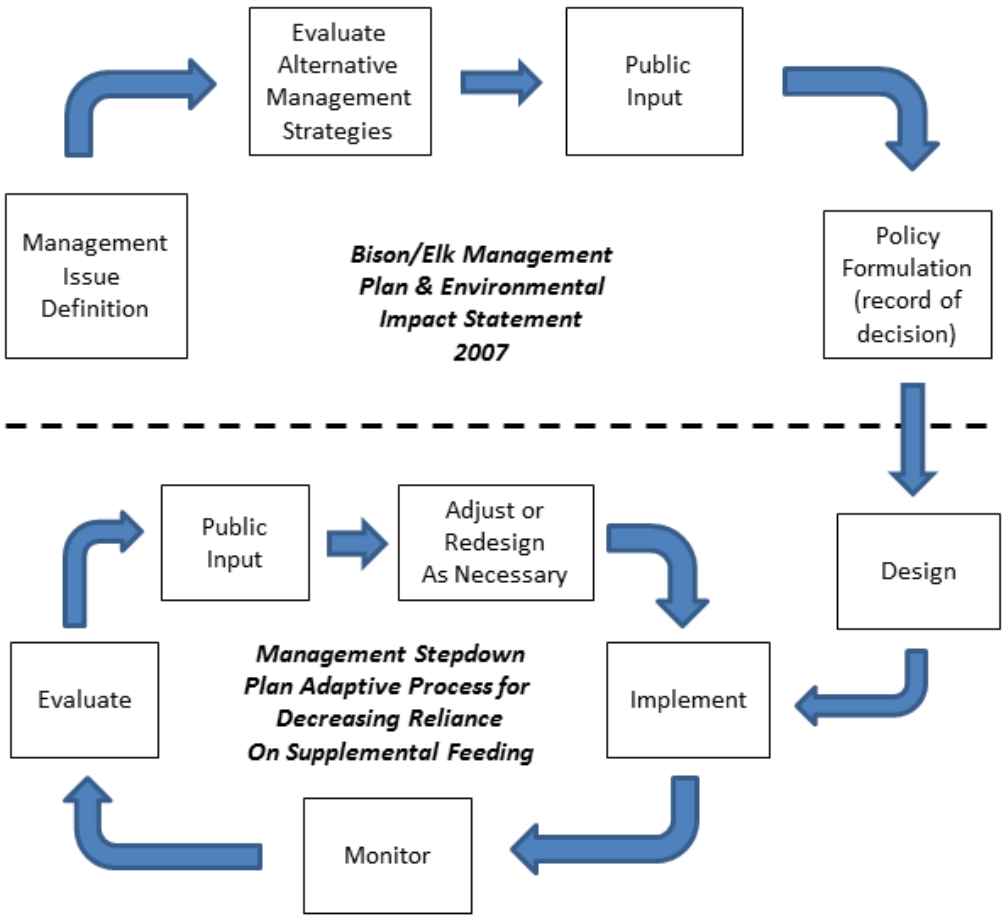


Figure 4. Management step down planning for supplemental feeding on the National Elk Refuge and its relationship to the 2007 Bison/Elk Management Plan and Environmental Assessment.

will be included where necessary in this document, and the discussion of any action that would require additional NEPA compliance will be explicitly stated as such in that context.

Management Step Down Planning

The use of adaptive management plans has gained popularity in natural resource management planning because, by definition, they allow modifications of strategy based on monitoring results and outcomes toward reaching specific goals or objectives. Four elements generally included in an adaptive management approach include: 1) well defined and mutually agreed upon objectives; 2) knowledge (including descriptive models) of the dynamics of the system being managed; 3) clearly articulated management actions and strategies; and 4) a monitoring program to evaluate responses of the system to management actions (Walters 1986).

This MSP utilizes adaptive management planning principles but is not intended to include all of the adaptive management planning elements outlined in the Department of Interior Adaptive Management Technical Guide (2007). This MSP is more accurately described as a "structured framework" of adaptive management actions that progressively transitions from supplemental winter feeding to greater reliance on free-standing forage (BEMP ROD p.5).

Table 1. 2007 Bison/Elk Management Plan Goals and Objectives (Step Down Plan objectives shaded)

Goal: Habitat Conservation

Objectives:

- Conserve important private lands.
- Increase forage production.
- Minimize non-native plants.
- Protect sagebrush grasslands.
- Restore willow, aspen, and cottonwood.
- Perpetuate natural mosaic of plant communities.

Goal: Sustainable Populations

Objectives (BEMP pages 135-136):

- Develop structured framework for reducing NER supplemental feeding.
- Phase reduction of animals on feed: 1) to 5,000 elk and 500 bison, and 2) elk and bison rely predominantly on native habitat.
- Maintain natural bull-to-cow ratios in park summer herd.
- Ensure a genetically viable bison herd with close to an even sex ratio.
- Enhance public outreach/education.

Goal: Elk and Bison Numbers

Objectives:

- Maintain state elk herd objective of 11,000.
- Maintain a genetically viable bison population of about 500 animals.

Goal: Disease Management

Objectives:

- Manage brucellosis transmission risk from elk and bison to livestock.
- Manage feeding to reduce brucellosis transmission among bison and elk.
- Educate hunters about wildlife disease human health hazards.

OBJECTIVES

The management direction and desired conditions stated in the BEMP called for the NER and GRTE staffs to work with others (agencies, partners, etc.) to "adaptively manage elk and bison in a manner that contributes to the State's herd objectives yet allows for the biotic integrity and environmental health of the resources to be sustained," so that the public can enjoy a variety of compatible wildlife-dependent recreational opportunities. Under the BEMP's 4 primary goals, 20 associated objectives were identified (Table 1). This MSP addresses four objectives under the goal of sustainable populations (Fig. 5).

The reduction of animals on feed at the NER was proposed to be spread over two phases. In Phase 1, the aim is to reduce the average number of elk on feed to 5,000 (while maintaining WGFD's 11,000 elk herd objective), and reduce the winter

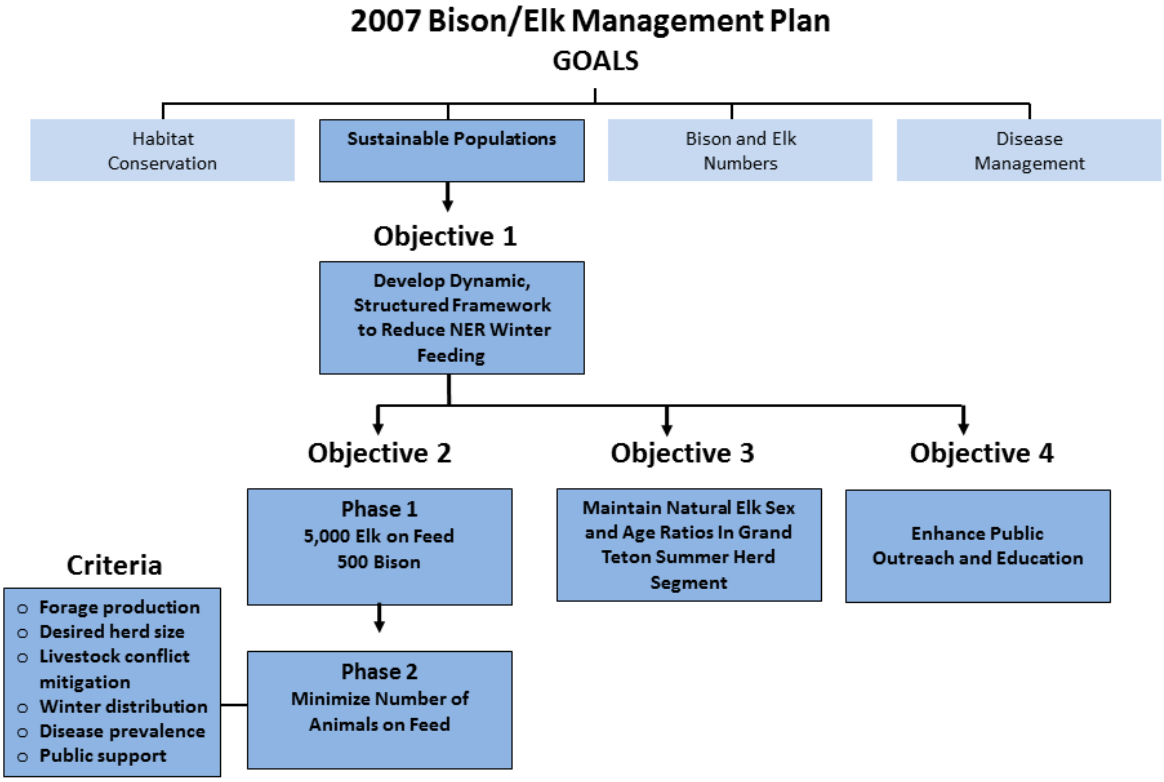


Figure 5. Relationship of MSP to the 2007 Bison/Elk Management plan goals, phasing of objectives, and consideration criteria for reducing the reliance of elk and bison on supplemental feed during Phase 2.

population of bison to the BEMP recommended, and WGFD adopted, objective of 500. In Phase 2, the overall objective is to reduce the reliance of bison and elk on supplemental feed (USFWS and USNPS 2007a). Desired conditions include animals relying predominantly on native habitat and cultivated forage. Important consideration criteria for implementing Phase 2 will include: 1) the level of forage production and availability on the NER and adjacent winter ranges; 2) maintenance of desired herd sizes and age/sex ratios; 3) the ability to effectively mitigate bison and elk livestock conflicts; such as co-mingling on private lands during high risk disease transmission periods; 4) maintaining desirable winter distribution patterns of elk and bison; 5) the prevalence of brucellosis, chronic wasting disease, and other wildlife diseases; and 6) public support. In short, the overall objective of this plan is to outline a framework for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives.

This Plan focuses on management actions to initially achieve Phase 1 objectives. However, if successful, these actions will continue to be used to achieve the Phase 2 objective of reducing reliance on supplemental feeding while considering the six criteria listed above.

MANAGEMENT ACTIONS AND STRATEGIES

Background

The principle goal of reducing reliance on

supplemental feeding is to limit transmission of density dependent diseases in elk and bison while simultaneously minimizing winter mortality in elk. We will attempt to achieve this goal by experimentally reducing feed season length and closely monitoring elk and bison distribution and winter mortality.

Elk have been fed on the NER each year in all but 9 winters since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during winter months is powerful to both species, and their knowledge of NER feed grounds has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Because use of feed grounds is a learned behavior, decreasing feed season length will potentially reduce the likelihood of elk that winter on native range finding NER feed grounds. Over time this could result in a greater percentage of elk using native winter range relative to NER feed grounds. Because it is largely unprecedented, the concept of modifying this behavior on such a large scale is daunting and poses questions for which there are no immediate answers. In some cases, the likelihood a specific management strategy's success will only be able to be roughly estimated, and unanticipated results are likely. Closely monitoring forage availability, elk and bison distribution, and elk mortality will allow us to evaluate the effectiveness of management actions and adjust management actions as needed should unintended negative consequences arise.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into 3 broad categories: 1) timing and duration of winter feeding; 2) timing and intensity of hunting; and 3) herd segment specific and overall harvest levels.

Important Changes Since 2007

The BEMP was developed based on data collected and knowledge that existed up until its ROD. Since then, important changes have taken place, some of which are advantageous to this effort and some of which are not.

A primary change that will facilitate meeting objectives under this plan is the reduction of the bison population from nearly 1,200 animals in 2007 to about 666 during winter 2015-2016 (Fig. 3) through hunting programs administered by WGFD. Licensing changes enacted in 2014 included a reduction in the bison cow/calf license fee (from $416 to $263 for residents and $2522 to $1022 for non-residents) and eliminating the once-in-a-lifetime restriction on a successful bison hunter to only those that successfully harvested a bull. Continued progress toward the 500 animal herd objective will require sustained harvest success.

During the same period, the Jackson Elk Herd has declined from nearly 13,000 to its objective of 11,000, but because the proportion of the JEH that winters on NER has increased dramatically (Fig. 6), this will make achieving the Phase I objective of 5,000 elk on feed and any future elk population reductions more difficult. Preliminary modeling suggests that the increasing proportion of the JEH wintering on NER has been associated with 1) changes in elk winter distribution associated with wolves (NER, unpublished data) and 2) high numbers of elk that summer immediately adjacent to NER (Cole and Foley et al. 2015).

Refuge-wide herbaceous forage production averaged 14,387 (SD = 4,125) tons during 1998–2013. In recent years irrigation of approximately 3,600 acres has increased refuge-wide forage production by approximately 10% compared to what would have been produced with precipitation alone, and by 15% in the southern

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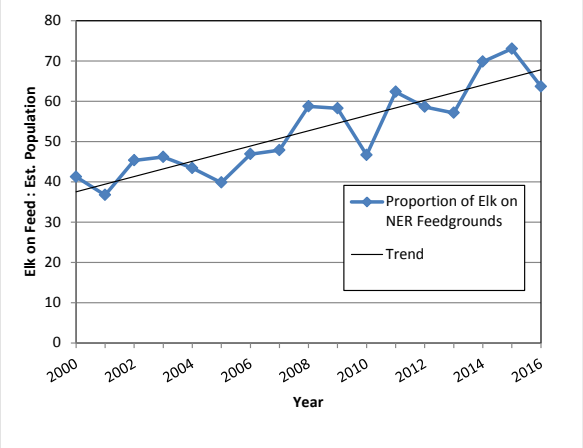


Figure 6. Increasing trend of National Elk Refuge elk on feed as a proportion of the Jackson Elk Herd estimated population size.

portion of NER which receives the greatest use by elk and bison.

Since 2007, the general awareness of climate change among the public has greatly increased. A strong, credible body of scientific evidence shows that climate change is occurring, is caused largely by human activities, and poses significant risks for a broad range of human and natural systems (National Academy of Science 2010). Ecological systems in the GYE are likely to be affected and associated changes may have implications for elk and bison management. Moderate term to long term effects of climate change in Jackson Hole will likely include increases in average temperature, a reduction in the duration and distribution of snow cover, an increase in the number of frost free days, increased wildfire frequency, and changes in plant community composition and structure including loss of forest and shrub cover and an increase in invasive plants (Riginos and Newcomb 2015). The net effect of these changes relative to the implementation of the MSP remains uncertain.

Current Management

Ongoing primary management actions on the NER include winter feeding, harvest, irrigation, and hazing. In GRTE, harvest of elk during the Elk Reduction Program takes place, when necessary, in collaboration with WGFD, and restoration of previously cultivated and irrigated sagebrush-grasslands is ongoing. Fundamental components of each of these will be briefly described below to provide a basis for comparison to MSP strategies that will follow.

Chronic Wasting Disease

Supplemental feeding has occurred in all but 9 winters on NER since 1912, and although this strategy minimizes winter elk mortality from starvation, contributes to Wyoming state elk herd objectives, eliminates commingling with livestock, and keep elk off adjacent roadways, elk occur at numbers and densities well in excess of carrying capacity (Smith et al. 2004, Lubow and Smith 2004). Considerable evidence suggests that Chronic Wasting Disease (CWD) transmission and prevalence are density dependent (Peters et al. 2000, Williams et al. 2002). Monello et al. (2014) found that elk densities of 15-110/km^2 (0.06 to 0.45/ac) in Rocky Mountain National Park were associated with 13% CWD prevalence, and they predicted elk population declines when CWD prevalence exceeded 13%. NER elk densities range from 77-16,850/km^2 (0.31-68/ac; NER unpublished data), which suggests that the introduction of CWD to NER elk would have significant negative population effects over time.

Winter Feeding

Initiation of feeding has the primary objectives of 1) minimizing elk winter mortality, focusing on calves since they are the most susceptible age class, and 2) minimizing comingling of elk with cattle on nearby adjacent private lands. Winter feeding begins when available forage reaches approximately 300 lbs/ac. Historic radio telemetry data and observations of elk movements indicate that when available forage declines below 300 lbs/ac., some elk leave NER for surrounding private lands. Therefore, the purpose of this feeding "trigger" is to keep elk on the NER and prevent them from searching for forage off the NER, which would increase the potential of comingling with cattle causing damage to private lands, and moving across Highway 89 where the risk of vehicles hitting elk

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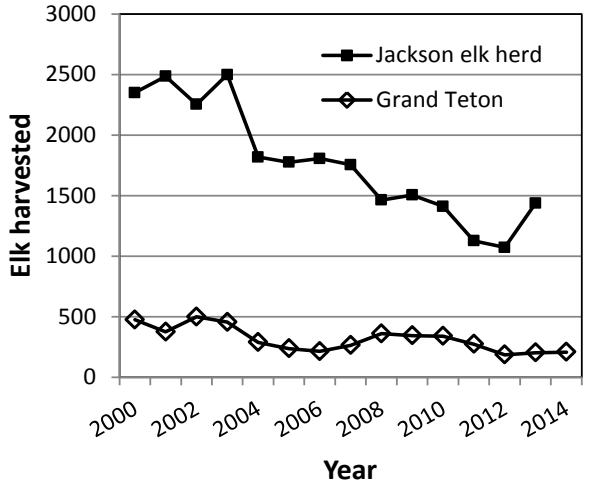


Figure 7. Estimated elk harvests for the Jackson Elk Herd and the amount of that harvest that occurs in Grand Teton National Park, 2000–2014.

is high. This trigger is not a warning that a significant nutritional deficit threshold has been reached. Available winter forage for elk and bison on the NER is largely determined by biomass of forage produced during the previous growing season, rate of forage consumption during fall and winter, and how snow conditions affect forage availability.

Index sites are used to sample forage biomass and determine when feeding should be initiated. These sites are selected annually to represent plant communities that are highly preferred by elk due to plant species composition and the persistence of green vegetation. Weekly sampling begins in late December to estimate available forage biomass at each index site. When average available forage across index sites is below 300 lbs/ac, biologists typically recommend that supplemental feeding be initiated.

During 1995–2013, the average initiation of winter feeding in NER occurred 28 January (range = 30 December–28 February), and feeding was terminated on 3 April (range = 20 March–20 April). Variation in feeding initiation and termination dates has been based on winter conditions and a desire to avoid elk-cattle comingling on nearby private lands. Coordination of winter feeding dates on the NER and WGFD-operated Gros Ventre drainage feedgrounds (Alkali, Patrol Cabin, and Fish Creek) occurs annually to help minimize movement of elk between these areas. This coordination will continue regardless of the management strategy employed. The relationship of recent elk numbers and objectives for NER and WGFD-operated feedgrounds and native range is shown in Table 2.

Bison discovered refuge feeding operations in 1980, and since that time they have been fed each year to help minimize disruption to elk feeding operations. Because bison displace elk from feedlines, NER staff attempt to feed most bison in the northernmost refuge feedground and provide a heavy feed ration, which helps keep them in this area. This strategy prevents bison from mingling with elk and also prevents bison from moving to areas where conflicts with humans are more likely.

Harvest

Total hunter harvest of the JEH was gradually

Table 2. Annual distribution of wintering elk from the Jackson Elk Herd during February classification counts, 2011–2016, relative to the current objective.

	OBJECTIVE	2011	2012	2013	2014	2015	2016	mean
NER	5,000	7,746	7,360	6,285	8,296	8,390	7,290	7,561
Gros Ventre	3,500	2,775	3,265	2,982	2,326	1,162	1,667	2,362
Native Range[1]	2,500	982	894	1,784	801	913	1,711	1,180
Total	11,000	11,503	11,519	11,051	11,423	10,465	10,668	11,105

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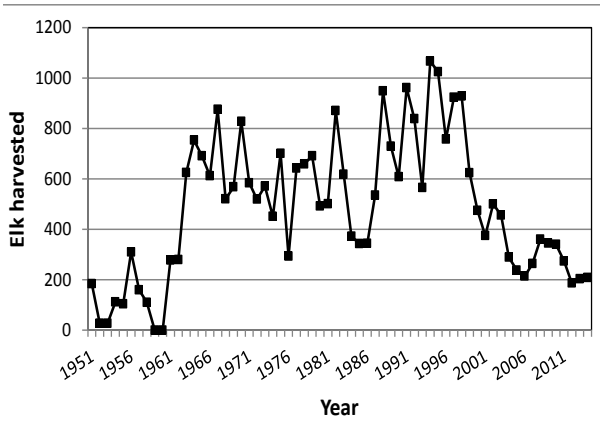


Figure 8. Elk harvest in Grand Teton National Park, 1950-2015.

reduced over the last decade as the population neared objective (Fig. 7). Elk hunting on the NER (Hunt Area 77) typically begins in mid-October and ends in mid-December, with peak harvest in recent years occurring in late November to early December. From 2005 to 2015, 422 ± 102 (mean ± SD, range = 329-612) hunters harvested 196 ± 95 (range = 126-457) elk per year during the NER hunt.

The 1950 legislation that created GRTE provided for a controlled reduction of elk, when necessary, in specific portions of the park, primarily east of the Snake River. Elk reduction programs have taken place in the park each year since 1950 except two (1959 and 1960), when GRTE and WGFD officials agreed a reduction was not necessary (Figure 8). Season dates have varied over the years but recently have run from mid-October to early-December. The GRTE harvest accounts for about 25% of the JEH overall harvest, thus has been an important factor in regulating the population. Increased predation, likely a result of increases in grizzly bears and wolves over the last 20 years, has decreased the need for large harvests in GRTE.

Bison hunting begins 15 August and ends in early to mid-January. Most harvest occurs on the NER, with some additional harvest on private and BTNF lands. Since resuming the bison hunt in 2007, harvest has been 210 ± 45.5 (range 139-301) bison per year. This level of harvest has been sufficient to arrest the exponential growth of the population, reducing bison numbers from the peak in 2007 to about 700 animals in winter 2015 (Fig 3). Tribal bison harvest of up to 5 animals for ceremonial purposes was authorized in the BEMP. Translocation of wild bison to lands outside of Teton County is not currently permitted due to brucellosis concerns.

Bison hunting is not allowed in GRTE because of long standing NPS policy that prohibits most hunting in national parks. Bison quickly learned to take advantage of the safety of GRTE, which has made hunter harvest goals difficult to achieve. Many bison stay in GRTE during the hunting season, with only occasional short term movements to the NER, until severe winter conditions occur. In response, NER and WGFD managers have attempted to extend the hunt to late January while minimizing the conflict with the initiation of winter feeding. The unpredictable nature of winter conditions that time of year makes this challenging, and has (or could) result in the use of emergency season extensions or reductions.

Hazing

NER staff haze elk and bison to conserve winter forage, prevent year-round use of winter range, and in some cases to prevent elk and bison from moving to private lands or other areas where conflicts with humans are likely. Hazing using ATVs has proven most effective. The strategy is typically employed during 3 time periods: 1) in May to move elk and bison off NER that are lingering on NER winter range; 2) in July when some bison typically return to NER; and 3) in the period just prior to feeding initiation when elk and bison are most likely to leave NER for private lands. Hazing of elk and bison by WGFD staff also occurs on private lands adjacent to NER periodically throughout the year.

Vegetation Restoration and Protection

The BEMP identified approximately 4,500 acres of previously irrigated and cultivated grasslands in GRTE in need of restoration to native sagebrush grasslands community. Objectives of ecological

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restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. After 2 years of research and field studies, restoration efforts began in 2008. The restoration process involves several steps including: removal of non-native vegetation through repeated herbicide applications, collection and propagation of native grass, forb and shrub seeds and finally native seeding. Repeated herbicide treatments have been warranted prior to native seed planting as well as spot treatments of invasive weed species subsequent to native seeding. Substantial progress in this endeavor has been made since 2008, including 1,235 acres of previously cultivated lands under restoration treatment. Of the 1,235 acres undergoing treatment, 745 acres has been seeded with native grass, shrub, and select forb mixes, and 89 acres is considered fully restored. Two-hundred and seventy-five of these acres are currently fenced to reduce grazing pressure of early native vegetation establishment from bison and other ungulates. An additional 490 acres are targeted for native seeding in 2016 once removal of the invasive vegetation is successful. All treatments are monitored for native plant establishment and invasive plant infestations and treatments will be adjusted as necessary. Invasive plant treatments may have to continue indefinitely. GRTE will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Private Lands Mitigation

Fencing of hay stacks and livestock feedlines has been historically used to mitigate particularly difficult conflicts on private lands. Targeted fencing of golf course greens and sand traps fall through spring has also been successful in some situations for mitigating elk and bison presence and associated damage in these areas. It is important to note that the county has a "wildlife-friendly" fence policy and does not support extensive fencing that is impermeable to wildlife in residential areas.

Methods, Assumptions, and Constraints Common to All Strategies

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes, particularly population sizes. Measurements of the Jackson bison herd will be based on the annual mid-winter census and sex and age classification survey performed by NER, GRTE, and WGFD biologists. This survey occurs one day in February and includes ground counts of animals on feed at the NER and aerial counts of outlying bison across their winter ranges on the refuge, park, and Bridger-Teton National Forest.

Elk population estimates will also be based on mid-winter aerial and ground counts. However, the mid-winter counts are undertaken during a single survey period and do not necessarily represent either peak or cumulative abundance of elk on feed. Rather than basing progress toward the number of elk on feed for the entire season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 elk were fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000.

We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both

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Table 3. Summary of potential Step Down Plan constraints.

Policy

- ESA[1] Lynx – limits on habitat impacts
- Greater Sage Grouse – core area protection
- 2007 BEMP/EIS (federal actions/lands)
  - No fertility control
  - No test and slaughter
  - Limited tribal harvest
- Bison/elk hunt end date (Feb. 1st)
  - WGFD, brucellosis safety
- Carcass disposal (Feb. 15th)
  - WGFD, brucellosis safety
- Forest Service winter closure (Dec. 1st – April 30th)
- Easement limitation (NER boundary)

Winter Feeding

- Only during non-hunting periods

Harvest

- State regulations

Vegetation Restoration/Protection

- Bison/elk distribution
- Exotic plant species management

Private Lands

- Owner agreements

Social

- Hunter density (safety; hunt quality)
- Elk/bison winter mortality levels
- Public safety (ungulate/vehicle collisions)
- Disease
- Land-use conflicts (agricultural and residential)

Biological

- Disease (bison/elk/cattle commingling)
- Sage grouse habitat conflicts
- Fencing/wildlife conflicts
- Elk herd distribution
  - summer segment distribution goals

Funding

- Easement purchase
- Plan implementation

[1]Endangered Species Act

species on supplemental winter feeding.

Initial success of the MSP will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP does not provide specific measurement criteria to determine when the NER has successfully attained the objective of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage", we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. This level was chosen to define success because it suggests that elk and bison will be predominately foraging on free standing natural and cultivated forage rather than on supplemental feed.

Several management constraints are common to the strategies discussed below (Table 3). Many law and policy constraints are applicable but we include here only those most pertinent. Endangered Species Act (16 USC 1531 et seq.) requirements for wolves, grizzly bears, lynx, and others apply. Lynx requirements for maintaining certain habitat types could limit methods used and areas considered for habitat improvements in GRTE and the BTNF. Such improvements could increase elk and bison use of native winter range off the Refuge while simultaneously reducing use of feedlines. Similarly, compliance with the 2015 sage grouse amendment to the 1990 Bridger-Teton National Forest Land and Resource Management Plan and the Wyoming greater sage-grouse core area protection executive order (2011-5 and supplement 2013-3) could affect habitat manipulations. NEPA compliance conducted as part of the BEMP/EIS constrains what federal actions can be taken as a part of this plan. State regulations constrain late (winter) hunt and carcass disposal timing to protect against brucellosis contamination, since February-April represent the period bison and elk are most likely to transmit the disease. Restrictions on hunting timing also result from BTNF winter range closures, immediately east of the NER and elsewhere, December 1 to April 30. Additional details about these and other

constraints will be included in discussions about specific strategies that follow.

Strategies

This section describes the management action this MSP proposes to implement. As such, it unveils the heart of management changes proposed to begin the process of transitioning to greater reliance of bison and elk on native forage during winter. Fundamentally, the strategies discussed in this plan represent an experiment designed to achieve Phase I objectives of 5,000 elk and 500 bison on NER and are a first step towards reducing reliance on supplemental feeding while meeting the sustainable population goals identified in the BEMP.

Initial strategies for achieving sustainable population goals identified in the BEMP (Table 1) are presented by the objectives below. The primary management actions available to the agencies to achieve Phase I objectives are modifications to winter feeding and hunting seasons. To a lesser extent, vegetation protection and restoration can be important, particularly for improving long-term ecological function and enhancing natural production of native forage. Private lands are also an integral component as changes in elk and bison distribution occur and new challenges develop. The likely consequences of implementing these strategies were evaluated in the BEMP. The most relevant of these are summarized in Appendix 1.

Objective: 1) *Implement a phased reduction of animals on NER feed to 5,000 elk and 500 bison, and, 2) influence elk and bison to rely predominantly on native habitat* (Table 1).

The first phase will be to reduce the number of elk on NER feed to approximately 5,000 and achieve a target population of about 500 bison. The second phase will be to adaptively manage bison and elk populations to achieve desired conditions, with animals relying predominately on available native habitat (NER, GRTE, and USFS lands) and cultivated forage (NER).

As previously mentioned, the concept of reducing winter feeding after more than 100 years of the practice, and the associated behavioral conditioning of elk and bison to its presence, represents a formidable challenge that must be approached cautiously and systematically. Efforts to scale back elk supplemental feeding operations in other parts of North America have been rare and fraught with controversy (Smith 2001). The strategies discussed below have been developed in this context, with appropriate feedback mechanisms through rigorous monitoring and frequent evaluation. Inability to meet this objective under the strategies presented here would trigger a thorough evaluation and consideration of more aggressive strategies when the BEMP is updated in 2022.

Chronic Wasting Disease

Since 1997, NER has cooperated with WGFD to conduct intensive surveillance for CWD in the JEH unit. GRTE has also collaborated with WGFD to collect samples from the ERP and from road-killed cervids. Although this effort indicates that CWD is not currently found in the JEH, continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence annually will be critical to ensure a timely management response and limit the long-term population effects of the [USFWS and USNPS, 2007b]. Given that CWD has been detected within 40 miles of the JEH in moose, within 35 miles in deer, and within 175 miles in elk, this level of surveillance is warranted.

In 2016, the WGFD cooperated with federal agencies and other stakeholders to revise the 2006 Wyoming CWD Management Plan. The NER and USFWS Region 6 Wildlife Health Office staff participated in several meetings associated with this effort. The Wyoming CWD Plan lists several management responses for consideration if CWD be is detected on or adjacent to State or NER elk feedgrounds. Early detection of CWD in the JEH is essential to allow implementation of management responses.

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The BEMP (2007) identifies the management response to the arrival of CWD as following the State of Wyoming CWD Plan in effect in 2007. The Wyoming CWD Plan was updated and significantly changed in 2016. In light of changes in the Wyoming State CWD Plan, and the results of CWD Studies completed since 2007, the NER management response to CWD will be reviewed and updated in a NER Disease Contingency Plan, as identified in the NER Comprehensive Conservation Plan (2016). The CWD section of the NER Disease Contingency Plan will remain consistent with the goals of the BEMP. The NER Disease Contingency Plan is scheduled to be completed in 2017.

Winter Feeding

Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the long run, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning animals to "expect" feed to be available later in the winter; this could build cohorts of animals that rely primarily on native winter range. To reduce supplemental feeding, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, which is the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require assistance with focused mitigation measures.

As bison and elk behavioral responses are better understood, and targeted mitigation on private lands is achieved as needed, feeding delays will be extended depending on several variables (Table 4, Fig. 9). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence on feeding initiation date, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Forage availability would also be affected by the numbers of elk and bison on the NER. And finally, the distribution of animals, particularly on private, livestock producing lands would be considered in determining feeding initiation date.

A primary concern of manipulating feeding is elk winter mortality, particularly among calves. As food becomes limited in winter, calves are usually the first to experience nutritional deficit and winter mortality because they are displaced by more dominant animals, they have limited fat reserves, and are more susceptible to cold temperatures than larger animals. Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years (Appendix 1).

In the early years of MSP implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date during the period of MSP implementation.

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The MSP winter feeding strategy would include the establishment of additional key forage index sites and on-going measurements at those sites throughout the winter.

Harvest

Currently the JEH is at the Wyoming Game and Fish Commission established objective of 11,000 animals, which means there is less flexibility in manipulation of harvest regimes than there would be if the herd was above objective. Initially there would be little change in elk harvest programs on the NER, with the exception of allowing a limited number of any elk permits throughout the season, considering allowing bow hunting near developed areas (roads and buildings) and shifting the season about a week later (Table 4). Allowing a limited number of any elk permits would be consistent with providing sport hunting recreation on National Wildlife Refuges (NWRS Improvement Act; 1997) and the NER CCP [USFWS, 2015] and possibly encourage more hunters to participate in antlerless elk hunts. Monitoring programs and consideration of bull ratios in the GRTE summer segment (since most park bulls migrate to the NER) would help inform levels of proposed take. Bow hunting in areas currently closed to firearms will likely increase harvest by eliminating "no-hunt" areas which can become sanctuaries for large numbers of elk. Shifting the hunt one week later is consistent with later migrations and will improve harvest effectiveness (Fig. 9).

General elk harvest patterns in GRTE would continue to be based on need for harvest, summer segment population estimates, herd status relative to population objective, herd demographic parameters, herd-wide distribution of harvest, and mitigation for impacts on other resources and visitor activities.

Elk herd population objectives are reviewed every five years by the Wyoming Game and Fish Commission and adjusted as necessary. Agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. Lowering the population would help compensate for reduced use of traditional native winter range and increased growth of short-distance migrants which has led to significant increases of winter elk concentrations on the NER.

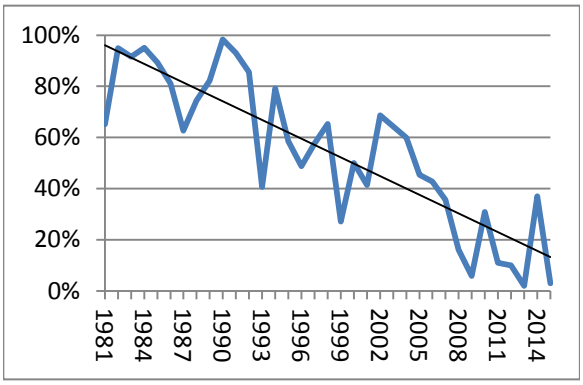


Figure 9. The percentage of elk that wintered on NER counted there on December 1, showing progressively later annual fall/winter arrival of elk to the NER during the past several decades.

The annual fall/winter arrival of elk to the NER during the past several decades has been occurring progressively later. This trend may necessitate extending the elk hunting season later into the year to achieve harvest objectives.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later end dates that are commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution. Special limited hunts designed to discourage bison from attempting to leave the NER via the south boundary into the town of Jackson will also be considered. If progress toward reaching the herd objective of 500 animals continues and the objective is reached, WGFD will adjust harvest quotas in the context of the objective, as necessary, to address population changes through time.

A cattle guard was installed on the Refuge Road

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near the east end of Broadway Avenue to help prevent bison and elk herds from entering the Town of Jackson. This will reduce the potential for dangerous human/wildlife interactions.

Currently, the effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives, but also that elk are sensitive to hunting pressure which can cause elk movements to areas that cause management issues for WGFD. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st in the future.

Annual herd-wide population estimates, elk summer herd segment estimates in GRTE and NER, temporal and spatial harvest patterns, and animal-fed-days would be monitored, and the resulting information would be used to inform ongoing evaluation of elk and bison management harvest programs (Figs. 9 and 10).

Hazing

No change in hazing practices is anticipated initially under this MSP framework.

Private Lands Mitigation

Delaying the onset of NER feeding is likely to result in changes in bison and elk distribution (Appendix 1). Some elk or bison may move to private lands in search of forage. Of greatest concern is the potential for elk or bison to commingle with cattle of cow/calf operations, where brucellosis transmission could have considerable consequences, such as requiring depopulation of the cattle herd.

Several strategies would be employed to mitigate potential problems (Table 4), including providing incentives for non-breeding cattle operations (because brucellosis transmission to slaughter-bound cattle is not economically important), increased fencing in some limited areas to separate elk/bison from livestock feed lines, haze elk/bison away from livestock feed lines and purchase private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal Wildlife Conflict Technician positions which are supervised by the WGFD. These Technicians are also critical to the success of an expanded monitoring program vital to the MSP (see Monitoring section below).

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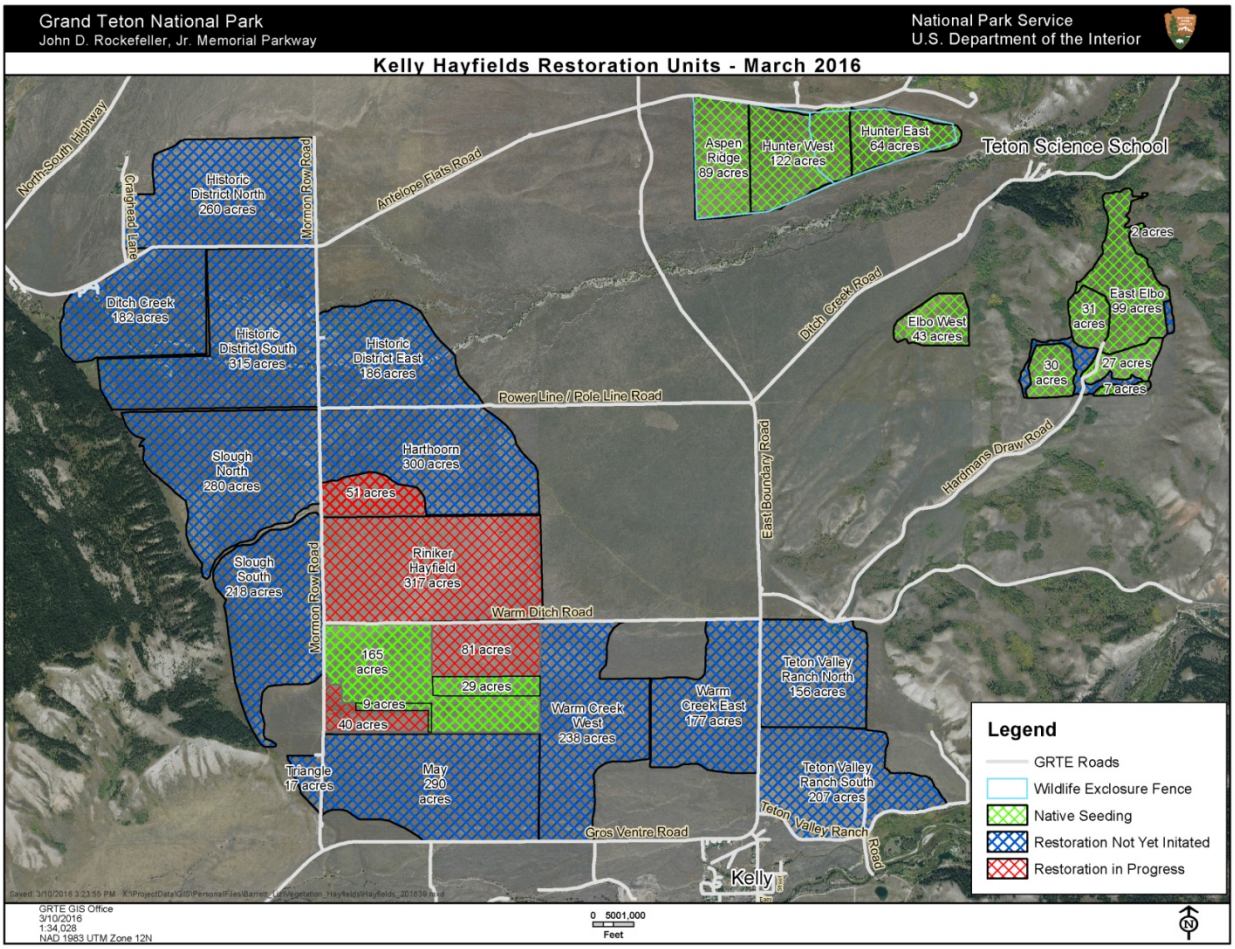


Figure 9. Units and status for the Kelly Hayfields ecological restoration effort in Grand Teton National Park, March 2016.

A database will be established to track non-agricultural conflicts on private lands to determine trends which will help evaluate the effectiveness of MSP mitigation efforts.

Preventing elk and especially bison from entering the Town of Jackson is essential in maximizing publicsafety and minimizing private property conflicts. Currently, bison are hazed northward when they drift south of Miller Butte. A cattle guard was installed on the Refuge Road just north of Broadway Avenue. This barrier is designed to prevent elk/bison from entering the Town of Jackson.

Vegetation Restoration/Protection

The varied approaches to restore the Kelly Hayfields in GRTE (4,500 acres) was initiated in 2008 following 2 years of research and field studies (Moeny 2008). The approach to ecological restoration includes serial treatments to 1) remove non-native species (e.g., herbicide application and prescribed burning); 2) seed native shrub, grass, and forb species; and 3) treat subsequent invasive plants by applying herbicides and, where appropriate, construct temporary fences to protect recently seeded pastures from colonization of non-native species and damage from large herbivores during early phases of restoration.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres within 7 pasture units are currently under restoration treatment and 3,265 acres remain non-native grass pasture (as of 2016; Figure 9).

The non-native grass pastures are divided into 13 pasture treatment areas and are projected to be likely restored by 2035. As of 2016, approximately 745 acres are seeded with native vegetation, and 89 acres are considered fully restored. Maintenance of restored ecological conditions, however, will likely require management efforts in perpetuity to keep non-native species from colonizing restored areas. All 1,235 acres that are underway toward ecological restoration are being monitored for native plant establishment, invasive plant infestations, including cheatgrass spread. Park staff will continue to monitor and adaptively adjust treatments and restoration strategies according to our results.

Objective: *Maintain natural bull-to-cow ratios in park summer herd* (Table 1).

National Park Service management policy (NPS 2006) provides guidance for maintaining naturally regulated wildlife populations, free from the impacts of humans, to the greatest extent possible. The final BEMP identified a goal of maintaining park elk bull:cow ratios (a common way of expressing sex and age ratios in wild ungulate populations) near 35 adult bulls per 100 adult cows, based on estimates of what this ratio would be in a herd free from the effects of human harvest. The sex and age ratios of most North American elk populations are affected by sport hunting and herd managers generally maintain lower bull ratios.

Harvest

Based on summer bull ratios for elk in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded refuge hunting opportunities are considered.

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Table 4. Comparison of current and primary MSP components and parameters.

Action	Current Management	Management	Comment
Winter Feeding:			
Feed	Pelleted alfalfa	Pelleted alfalfa	No change
Ration	Full ration average: 8-12 lbs/day/elk	No Change	No change, to minimize calf mortality. Note average daily ration over the entire feed season is lower than a full ration because feed rate is gradually increased at the beginning of the feed season and gradually reduced at the end to facilitate rumen acclimation
	20-22 lbs/day/bison	20 lbs/day/bison	
Start criteria:			
Available standing forage	300 lbs/acre, as measured at traditional key index sites	Generally later; index sites to be increased in number and distribution	Influencing factors: -time of season -forage availability -number of elk/bison on NER -elk/bison distribution
End criteria:			
Available forage	Based on a snow cover index and subjective estimate of when residual or new forage is adequate	Generally 1 week earlier than current management	Ongoing development of more objective criteria for future implementation ongoing
Monitoring:			
Animals on feed	Mid-winter census	Elk/bison fed days[1]	
Proportion of JEH on NER	Mid-winter census	Mid-winter census	
feed			
Calf mortality	2008-2015 Average: 3.3% (range 1.1-9.0%)	Potentially higher than current levels but less than native winter range	
Elk/bison distribution – collars	Almost no documented use of private lands during feeding operations	Unknown, but likely higher use of private lands than current management	
Elk Winter mortality (all age classes)	2008-2015 Average:	<=3%	
	1.2% (range 0.6-1.9%)		

Table 4. Comparison of current and primary MSP components and parameters.

Action	Current Management	Management	Comment
Elk summer range segment Proportions for NER wintering elk	Approximately -40% GTNP North of Moose -35% South Snake River -10% Gros Ventre/Flat Creek -10% Teton Wilderness -5% Southern Yellowstone	Unknown, but will be monitored based on summer distribution of radio collared elk	Based on summer distribution of elk that were randomly radio collared on NER.
Harvest, National Elk Refuge elk:			
Frequency	Annual	Annual	
Begin Date	2nd week October	No Change	Modified as necessary
End Date	3nd week December	No Change	Modified as necessary
Structure	- 1 week initial drawing	- 1 week initial drawing	
	- 1 week left over 1st served	- 1 week left over 1st served	
	- partial week alternate	- partial week alternate	
	-daily 1st served alternates	- daily 1st served alternates	
Refuge permit types	- 1st week any elk	- Primarily antlerless only	
	- Antlerless only remainder of season	- limited any elk permits throughout season	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries		Consider expanding to allow bow hunting near developed areas	
Harvest, National Elk Refuge bison:			
Frequency	Annual	Annual	
Begin date	August 15th	August 15th	Modified as necessary
End date	2nd or 3rd week January	Consider later dates as appropriate	Modified as necessary
Hunting Season Structure	As per WGFD	As per WGFD	
Refuge permit types	Any bison or cow/calf per state license	Any bison or cow/calf per state license	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries	Limited to north of Nowlin Creek area	Consider escorted hunting in South Unit as needed	Guided hunts in South Unit when authorized
Harvest, Grand Teton NP elk:			
Frequency	As needed	As needed	
Begin Date	3rd week October	3rd week October	Modified as necessary
End Date	2nd week December	2nd week December	Modified as necessary
License types	Antlerless only	Antlerless only[2]	
Special regulations:	Cartridge limits	Cartridge limits	

Table 4. Comparison of current and primary MSP components and parameters.

Action	Current Management	Management	Comment
	Bear spray required	Bear spray required	
	Hunter safety card required	Hunter safety card required	
Harvest, Bridger-Teton NF, Elk Hunt Area 80:			
Begin Date			
End Date		15-Dec	Would require change in winter closure dates
Harvest, Elk Hunt Area 78			
Structure			Changes at discretion of WGFD
License Types			
Private Lands Mitigation:			
Cattle commingling		Incentives for non-breeding operation	
Hay depredation		Increased fencing	
Landscape damage			
Easement acquisition			
Vegetation Restoration/ Protection: Elk Refuge			
Vegetation Restoration/ Protection: Grand Teton	Herbicide treatments, prescribed burning, native seed propagation and planting, and protection and maintenance of restored pastures	Same as Current Management for remaining non-native grasslands in Kelly Hayfields	

[1]Number elk and bison on feed per day, totaled by feeding season.

[2]Any elk licenses could be offered if bull ratios in the park consistently exceed BEMP criteria.

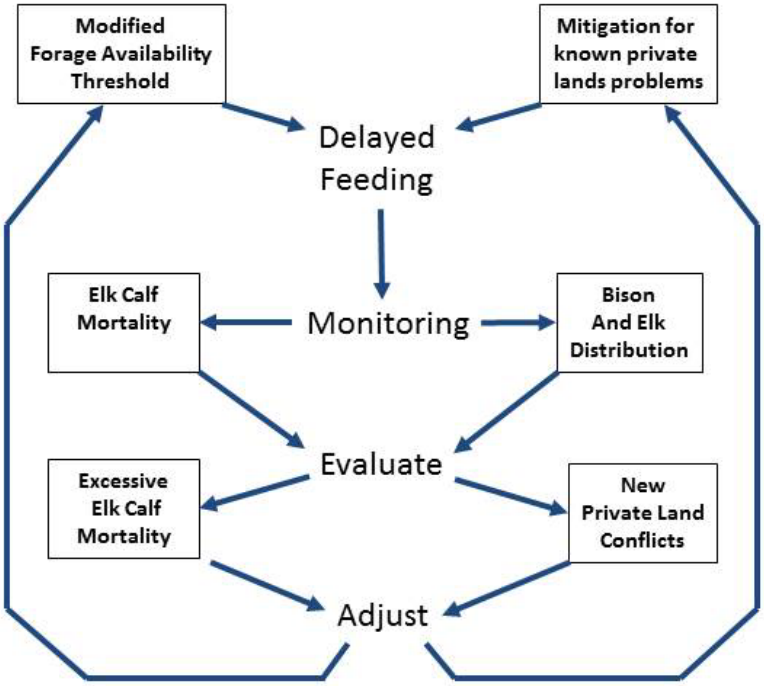


Figure 10. Framework for delayed feeding strategy under MSP.

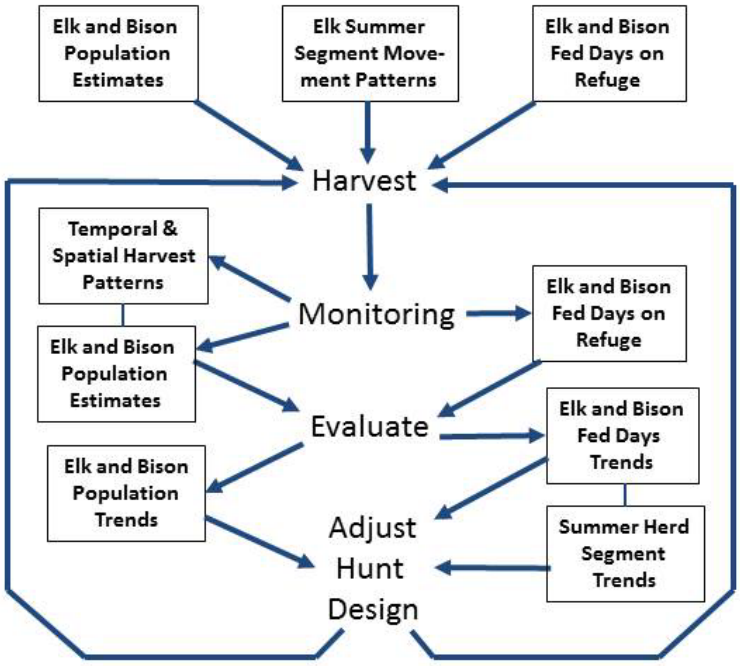


Figure 11. Framework for harvest strategy under MSP.

Strategies Considered But Rejected

The BEMP considered several additional strategies for elk and bison management that, for a variety of reasons, were not selected for implementation in the preferred alternative and Record of Decision. The agencies reconsidered a subset of these during the development of this MSP (Table 5). Since they were not part of the ROD, additional NEPA compliance would be necessary to incorporate any of them into this MSP, and thus they are not being considered at this time.

Table 5. Strategies considered but rejected.

Strategy Considered	Reason Rejected
Fertility control in elk	Judged not reasonable or feasible in BEMP, primarily due to major technical, social, and financial hurdles[1]. For MSP discussed primarily with regard to the difficult to harvest herd segment in Hunt Area 78 on private lands, where federal agencies have no jurisdiction.
Fertility control in bison	Impacts discussed at length in BEMP[2]. Not considered for MSP because current hunting programs appear effective at slowly moving the herd toward the 500 animal herd objective.
Agency reduction of bison or elk	Not considered necessary or desirable on federal lands because current hunting programs that utilize sport hunters are effective at meeting herd objectives.
Altering rations of supplemental feed	Rejected as a strategy because reducing daily feed ration below 8 lbs/elk would be enough feed to encourage elk to remain on NER but would result in unacceptably high elk calf mortality rates.
Private Lands Hunting Coordinator	The WGFD contacted private landowners and ranchers in the Spring Gulch area and discussed this concept to enhance elk harvest of short distance migrants. Generally, landowner interest was low.

MODELS OF SYSTEM DYNAMICS

Models provide a simplified representation of the biological system being managed. We will use modeling to quantify the effects of our management actions on 2 key responses of interest, elk distribution and winter elk calf mortality. (ADD: range of elk calf mortality in non-fed populations.)

There are a suite of possible factors that affect the proportion of elk on NER feedgrounds versus native winter range. Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

An increase in calf elk winter mortality is a potential result of reduced feed season length. Several factors influence winter calf elk survival on NER (Fig. 13). Models will be used to assess the effects of available forage on winter calf elk survival (Appendix 4). Over time this will allow us to assess the effects of our principal management strategy (reducing feed season length) relative to winter elk calf survival.

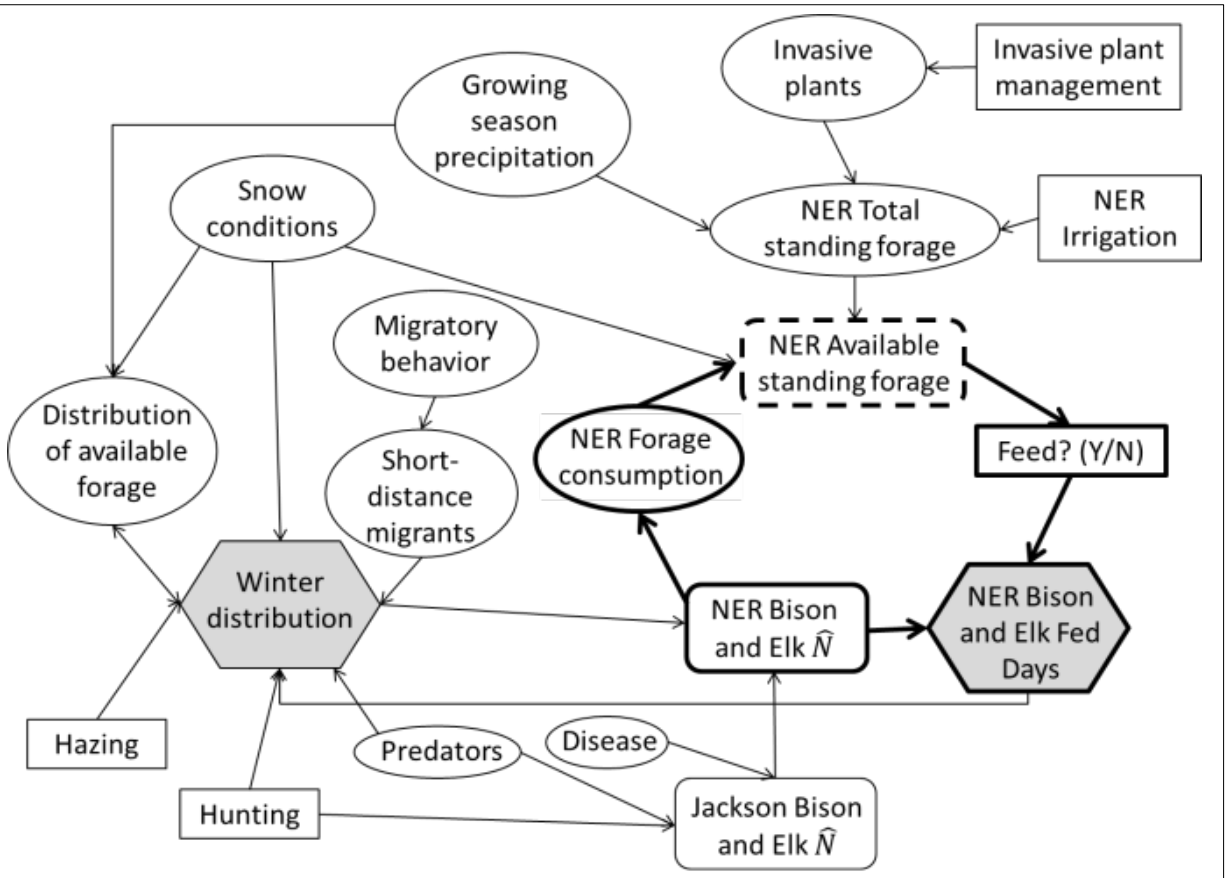


Figure 12. Diagram depicting the factors that potentially influence outcomes identified in the Bison and Elk Management Plan (BEMP; USFWS 2007a). Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

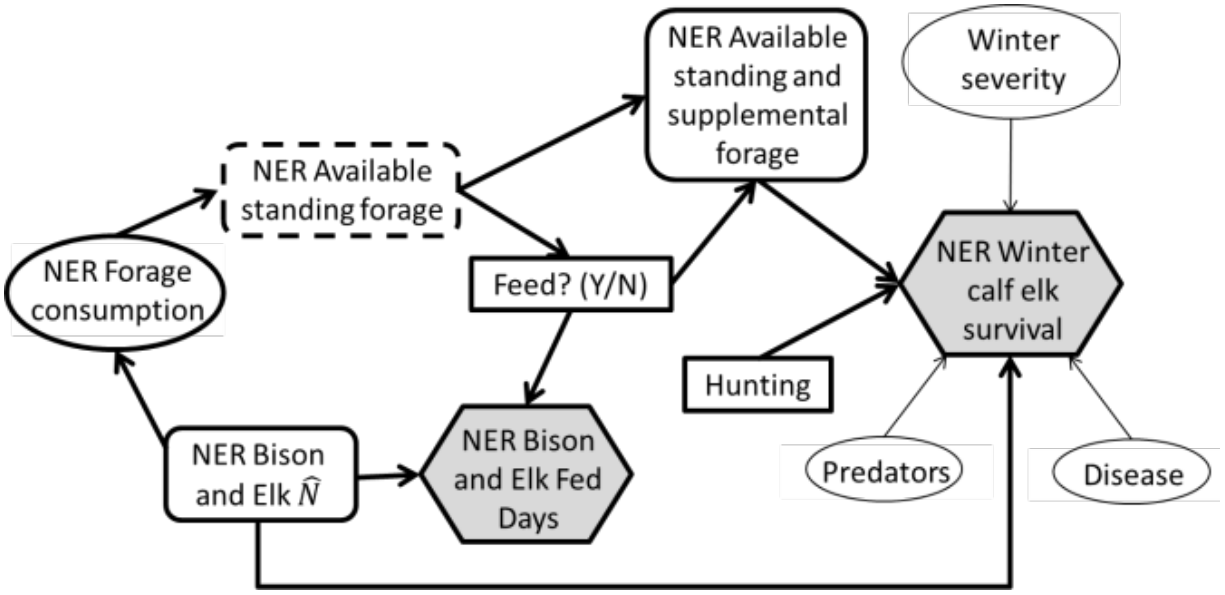


Figure 13. Diagram depicting the factors that potentially influence bison and elk fed days on the National Elk Refuge and winter calf elk survival. Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

MONITORING

Feeding Initiation Monitoring

NER uses weekly field estimates of the amount of forage available to elk to determine feeding initiation date. Currently measurements are taken at key index sites representing areas preferred by elk on NER (see supplemental materials at end of this section). These methods will be enhanced by 1) increasing the number of sampled sites to better represent the total amount of forage available to elk on the southern half of NER; 2) increasing the precision of estimates at each site by increasing the number of observers; and 3) extending the monitoring period later in the winter to assess the relationship between available forage and elk and bison distribution.

To better represent the total amount of forage available on the southern half of NER, a subsample of current key index sites will be retained to facilitate comparison with historic data, but additional random sample sites stratified by elk habitat preference will be added. Historic elk distribution mapping and elk GPS collar data (NER unpublished data) suggest that the areas most preferred by elk on southern NER are associated with moderate to high forage production and green vegetation. Because the distribution of forage production and greenness characteristics vary annually based on irrigation and precipitation patterns, we will annually map areas preferred and not preferred by elk and sample sites will be randomly selected within each of these mapped categories. At least 3 historic key index sites, 3 random sites in areas preferred by elk, and 3 sites in areas not preferred by elk will be sampled each week from late December through the initiation of supplemental feeding.

Currently the NER biologist is the only person trained in the techniques used to estimate available forage (see supplemental materials). At least 2 additional personnel will be trained in these techniques. This will provide a backup in the event of future personnel changes and will facilitate error estimates of the available forage measurements at each site.

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Currently NER and WYGFD biologists monitor available forage conditions at least weekly from late December until average available forage at key index sites nears the threshold level of 300 lbs. per acre and feeding is initiated. The principal MSP strategy is to delay the initiation of supplemental feeding after average forage production reaches the 300 lbs/ac level at key index sites. Therefore the monitoring period will be extended to include this period of delayed feeding.

Proportion of Elk Wintering on NER

A principal MSP goal is to reduce the number of elk wintering on NER. Our strategy will be to effect redistribution of elk to native winter range from NER over time via shortening the duration of the feed season, and thus slowly conditioning elk to seek food elsewhere. As feeding periods are shortened, the probability of younger elk age classes discovering NER feedgrounds will be reduced, and, hypothetically, that proportion of the JEH that utilizes NER feedgrounds will decline over time. We will measure this effect by examining changes in the winter distribution of the JEH. WGFD annual trend/classification count data provide a multi-year baseline data set to measure changes in the winter distribution of the JEH and categorizes observations by location. In each year, we will calculate the proportion of total classified elk in the JEH that are classified on NER feedgrounds. We will compare the 3-year running average post MSP implementation to the pre-implementation baseline. The pretreatment baseline will be comprised of data from 2008 2016, a time period that represents BEMP implementation prior to MSP actions (Figure 13).

Elk Fed Days and Bison Fed Days

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. We further assume the variables elk-fed-days (EFD) and bison-fed-days (BFD) are a proxy for these conditions. EFD and BFD will be calculated annually for each species based on the following formulas:

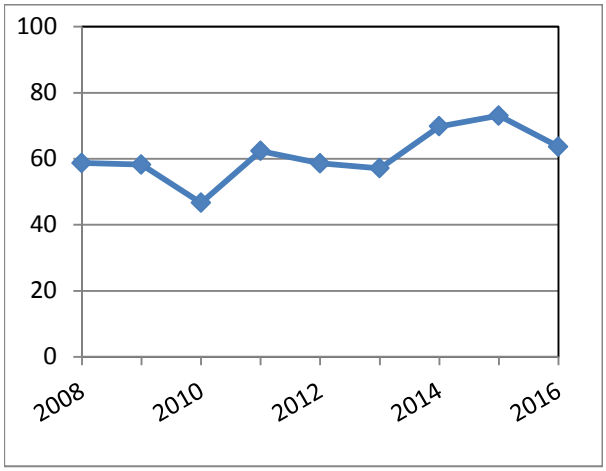


Figure 14. Proportion of the Jackson Elk Herd that was classified on NER feedgrounds in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

EFD= ∑ Total elk counted on feed during daily feedground counts for duration of feed season

BFD= ∑ Total bison counted on feed during daily feedground counts for duration of feed season

Because EFD and BFD are influenced by feed season length and the number of animals on feed, the MSP strategy of delaying the initiation of supplemental feeding will inherently reduce the number of EFD and BFD through a reduction in average feed season length. We believe that EFD will be further reduced by encouraging a greater proportion of the JEH to winter on native winter range, thereby reducing the number of elk occupying NER feedgrounds. We will evaluate changes in EFD and BFD by comparing the 3-year running average post MSP implementation compared to mean EFD and BFD from 2008–2015. The running average is an appropriate comparison because it will help

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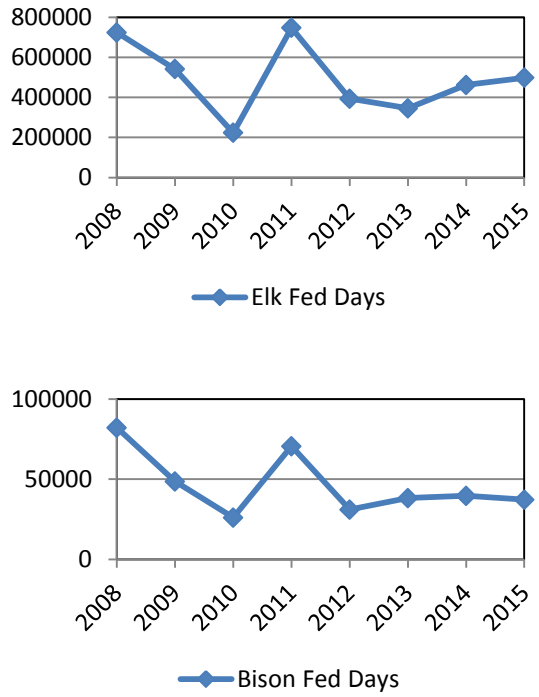


Figure 15. Elk Fed Days (EFD) and Bison Fed Days (BFD) in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the Management Step Down Plan (2008-2015). These values represent the pretreatment baseline which will be compared to the 3-year running average EFD and BFD post MSP implementation.

account for wide annual variation in EFD and BFD associated with winter severity (Figure 15)

Elk Winter Mortality Monitoring

NER has used consistent methods to monitor winter elk mortality since 1982. Each winter NER biologists and other refuge staff conduct a survey of all non-hunting related winter elk mortalities that occur on NER from November through April. Mortalities are tallied by age/sex class and percent mortality is calculated using the corresponding number of elk classified on NER feedgrounds as the denominator. We will continue to monitor elk winter mortality using the same methods post-MSP implementation, which will allow trend comparisons to the pre MSP baseline (Figure 15). Under the MSP framework, we believe the 3-year running averages for total and calf winter elk mortality will be within the range of variation exhibited by the pre MSP baseline. Historic monitoring suggests that calf and total mortality are sensitive to winter severity and disease outbreaks, and that winter mortality occasionally exceeds >3% total mortality and >10% calf mortality. Post-MSP mortality in excess of these levels may warrant shortening the feeding initiation delay in subsequent years.

Elk Collaring

One of the MSP's principal strategies is to shorten the length of the feed season to encourage elk use of native winter range, but we anticipate that this strategy will also result in an increase in elk conflicts on surrounding private land in the town of Jackson and the Spring Gulch areas, potentially including large groups of elk. To quantify this effect and provide real-time information to WGFD and NER managers to facilitate a response, we propose maintaining a sample of 50 GPS-collared elk that winter on NER throughout the MSP implementation period. Forty-five elk represents approximately 0.5% (1 in 200) of the NER winter elk population. This sample size will not be sufficient to detect all elk movements from NER to surrounding private lands, particularly movements by small groups of mature bull elk, but it will be sufficient to detect and quantify significant movements of cow/calf/yearling elk groups compared to pre-MSP baseline data.

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NER has elk GPS-collar data available from the 2008-2013, which represents the post-BEMP, pre-MSP baseline period. We hypothesize that elk movements from NER to surrounding private lands will increase during the MSP implementation period compared to the pre-treatment baseline. This will be tested by comparing the number of incidents that elk left NER for surrounding private lands (per elk/per year), and the proportion of elk GPS fixes on NER versus private lands during time periods of interest. The principal time period of interest is late December–March because this represents the period after the NER elk hunting season, and prior to, and during, NER feeding operations. This is the season when changes to the NER feeding program would be most likely to result in elk distribution changes.

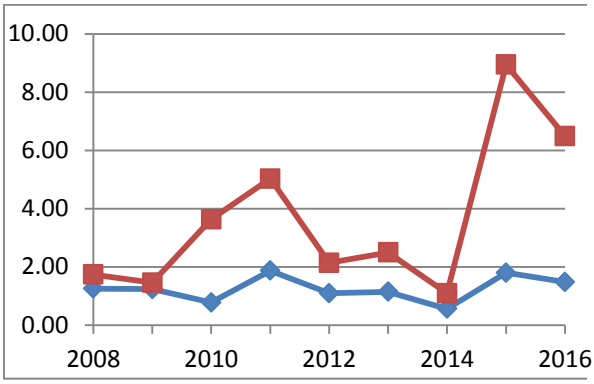


Figure 16. Total (blue) and calf (red) elk winter mortality (%) on NER in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

Thirty adult cow elk were captured on NER feedgrounds in February 2016 and Telonics Iridium GPS collars were deployed with a 90 minute fix interval. Collars will be deployed on up to 50 additional adult cow elk in February-March 2017. Given 83% annual survival for adult cow elk in the JEH (Cole and Foley et al. 2015) and 3-year collar life, approximately 10 additional elk will need to be collared each year in winter 2018 and 2019 to maintain the 50 elk desired sample size over the life of the MSP implementation period.

Ancillary data that will be collected and analyzed during the elk capture and collar data analysis process includes brucellosis seroprevalence, pregnancy rate, and elk summer range determination for comparison to the findings of Cole and Foley et al. (2015).

Disease

The primary purpose of limiting reliance on supplemental feeding is to reduce the prevalence of endemic elk and bison diseases and mitigate transmission risk associated with the introduction of novel diseases. We hypothesize that brucellosis seroprevalence will decline post MSP implementation. There are no recent brucellosis seroprevalence data for elk on the NER, but >50 elk will be captured during elk collaring operations in winter 2016, and each elk will be tested for brucellosis exposure. The 2016 Brucellosis seroprevalence rate will be the pre-treatment baseline to evaluate post MSP change. Chronic wasting disease (CWD) has been monitored in the JEH since 1997, and since 2008 it has been monitored with sufficient sample size to detect 1% prevalence with 95% confidence. No CWD positive cases have been detected in the JEH, which given the long term persistence of the disease, provides overwhelming evidence that CWD is not currently endemic to the JEH. However, most evidence suggests that the distribution of CWD is increasing and that its introduction to the JEH is inevitable. Early detection is critical to ensure an adequate management response, and therefore ongoing monitoring at sample sizes sufficient to detect 1% CWD prevalence with 95% confidence is necessary. CWD is sampled by testing tissues collected primarily from hunter harvested elk, and past experience suggests that 2 full time technicians working from September-December are necessary to ensure minimum sample size. Typical costs associated with 2 technicians are $32,000 per year.

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Data Collected for Modeling

Table 6. Variables to be used in models to explain elk winter distribution in the Jackson Elk Herd and elk calf mortality on NER.

VARIABLE	SOURCE	Elk Winter Distribution Model	Elk Calf Mortality Model
Proportion Jackson Elk Herd on NER Feedgrounds	WGFD/NER Jackson Elk Herd February Classification Count	Yes	No
Proportion Jackson Elk Herd from South Snake River summer segment	Determined from elk GPS collar data for elk captured on NER	Yes	No
Number of wolf packs in the Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated total wolf numbers in Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated number of wolves using NER in winter	NER observations	Yes	Yes
Total NER herbaceous forage biomass	NER forage production survey data	Yes	Yes
Snow Water Equivalent	NOAA snowtell site data	Yes	Yes
NER Winter elk Mortality (calf)	NER winter elk mortality survey	No	Yes
Snow Depth	NOAA Snowtell sites and NER measurements	Yes	Yes
Available Forage	NER and GTNP monitoring in winter months	Yes	Yes
NER Elk and Bison Fed Days	NER feeding records and daily feedground estimates of elk and bison	Yes	Yes
NER Feeding Start Date	NER feeding records	Yes	Yes
Gros Ventre Feeding Start date	WGFD feeding records	Yes	No
Elk Hunting Pressure by Hunt Area	Estimated number of hunter days from WGFD completion reports	Yes	Yes

To facilitate modeling, we will collect data on the following associated variables (Table 6). The table lists variables and how they relate to our efforts to use modeling to explain changes in elk distribution and elk calf mortality relative to our principal action of reducing feed season length.

EVALUATION/FUTURE MANAGEMENT

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Consequently, we anticipate that the strategies outlined in this plan will be in place for a minimum of 5 years, after which an initial evaluation of the program will be made. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented at an annual management MSP update/report, completed by NER staff by the end of March for the previous year.

Consistent with objectives outlined in the BEMP, the long-term goal of this plan is reduce the reliance of bison and elk on intensive supplemental feeding, using adaptive management principles through a structured framework of management actions, to achieve a desired condition of animals relying predominately on native habitat on NER, GRTE, and USFS lands, and on NER cultivated forage. But because there is no precedent for what this plan proposes, there are few responses to proposed management actions that can be predicted to a degree of certainty commensurate with establishing definable thresholds or other objective criteria for success in the short term.

Factors that will be considered in evaluating the success of the program will include the trend of EFD and BFD, type and frequency of private lands conflicts, the proportion of the JEH wintering on the NER, presence or absence of CWD and other infectious diseases, elk and bison population size and distribution, elk calf winter mortality, and public support. These are complex, dynamic, and interwoven components that, together with the MSP, make up the framework for decreasing reliance on supplemental feeding. As such, the effects of changing biological, social, and political conditions on these components will be part of the evaluation process.

In the context of this larger framework, however, we believe evaluation of the trend in EFD and BFD will be most important after the first 5 years of MSP implementation. The direction and magnitude of the trend observed will provide a preliminary basis for evaluation and decisions about continued management actions. Initial success with reduced feeding will be associated with a declining trend in EFD and BFD, with greater magnitudes indicating higher degrees of success. However, determinations of overall program success will necessarily include evaluation of all system components. For example, gains in reduced feeding come could be accompanied by an increase in private land conflicts, which would affect overall success determinations. While the overriding strategy will be to decrease feeding as aggressively as possible while gauging effects on other system components, overall measures of program success through time will necessarily involve evaluating a matrix of effects. These evaluations will be included in annual MSP reports.

As proposed and new management strategies are implemented and evaluated under this plan, at some point in the future it may become apparent that meeting reduced feeding goals will not possible without reducing elk and/or bison population objectives. Population objectives for both herds are set by Wyoming Game and Fish Commission and are evaluated regularly by WGFD personnel, including public review through annual season setting meetings. The BEMP supported the State herd objectives of 500 bison and 11,000 elk, and thus due to NEPA requirements any further consideration of reduced herd sizes by the NER or GRTE are beyond the scope of this plan. However, Wyoming Game and Fish Commission changes to Jackson bison or elk herd objectives are not constrained by the BEMP.

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Investigating the potential effects of climate change on elk and bison management will also be important in the long-term. During implementation of this plan, we will collect a variety of data that could be drawn upon for this purpose.

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PUBLIC OUTREACH AND EDUCATION

The practice of winter feeding is inexorably woven into the historic fabric of Jackson Hole. Elk are identified with the rich and unique legacy for which Jackson Hole is known around the world. De-emphasizing the supplemental feeding program will be a major paradigm shift for the residents of Jackson Hole, Teton County, and the State of Wyoming.

An effective Public Outreach and Education program is essential for effective MSP implementation. The practice of feeding elk evokes passionate responses from those that oppose and those that support this practice. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk/bison herd management methods.

A detailed communication plan to guide outreach and education efforts can be found in Appendix 3.

SCHEDULE

Table 7. Proposed implementation schedule for the MSP.

Action	Date
Public outreach and education	November 2016
Initiate private lands conflicts mitigation contacts/actions	January, 2017
Implement enhanced forage monitoring	January, 2017
Initiate changes in supplemental feeding protocol	January/February 2017
GPS Collar 30-40 elk (Iridium platform)	March 2017
Monitoring/Evaluation/Annual Report	June 2017

BUDGET

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
National Elk Refuge:					
Monitoring:					
Seasonal Biological Technician (0.5 FTE, GS-7)	$24,000	$25,000	$26,000	$27,000	$28,000
Bison/elk fed days					
Mid-winter census					
Elk summer herd segment distribution[1]					
Expanded standing forage estimates[1]					
Chronic Wasting Disease, 2 seasonal bio.-techs	$32,000	$32,000	$32,000	$32,000	$32,000
Winter bison/elk distribution					
Irrigation					
50 Elk radio telemetry collars; Iridium Platform	$115,000	$25,000	$25,000	$25,000	$25,000
Bison barrier maintenance at NER south entrance	$500	$500	$500	$500	$500
Step Down Management Plan annual reporting	$2,000	$2,000	$2,000	$2,000	$2,000
Private lands:					
Easements / Leases (Private Foundations)	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000
Conflict mitigation technicians (WGFD)	$91,000	$91,000	$91,000	$91,000	$91,000
Hazing (helicopter)	$6,000	$6,000	$6,000	$6,000	$6,000
Vegetation restoration/protection[1]					
Public Outreach and Education	$11,000	$1,000	$1,000	$1,000	$1,000
Subtotal					
Grand Teton National Park:					
Monitoring:					
Summer elk classification/distribution	$10,000	$11,000	$12,000	$13,000	$14,000
Collaborative elk monitoring (GRTE portion)	$5,000	$5,000	$5,000	$5,000	$5,000
Vegetation Restoration/Protection					
Monitoring	$16,000	$16,000	$18,000	$18,000	$12,000
Temporary bison fencing	$24,000				
Temporary fence maintenance	$6,000	$8,000	$8,000	$4,000	
Hayfields restoration	$84,000	$70,000	$70,000	$31,000	
Exotic plant mitigation	$50,000	$52,000	$46,000	$32,000	$16,000
Elk Reduction Program (subject to annual review)					
Hunter harvest evaluation	$1,500	$1,500	$1,500	$1,500	$1,500
Harvest age distribution	$2,000	$2,000	$2,000	$2,000	$2,000
CWD monitoring (0.15 FTE, GS-6)	$7,000	$7,000	$7,000	$7,000	$7,000
Law Enforcement and Visitor Protection (0.15 FTE for 20 LE and support staff; supplies, and permitting)[3]	Unknown				

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
Subtotal					
Wyoming Game and Fish Department:[2]					
Subtotal					
Grand Total					

[1]See detail in Appendix

[2] Dependent on size of elk reduction program; current annual expenditures are approx. $295,000 for 0.15 FTE for 20 LE and support staff; supplies, and permitting.

[3]Through Interagency Agreement

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APPENDIX 1. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007).

Populations

- Jackson elk herd objective of 11,000 would be maintained.
- New Jackson bison herd objective of 500 established.

Winter Feeding

- Supplemental feeding could be delayed or could occur earlier compared to current practices.
- Changes [to feeding program could] include alterations in the timing of feeding and providing supplemental feed in fewer years.
- Ration or pellet composition might need to be changed.
- Supplemental feeding would be initiated according to established criteria, including pre-winter forage production, assessments of forage utilization (done jointly by WGFD and NER personnel), elk condition and movements, and potentially on the January 1 index of winter severity calculations for elk (Farnes, Heydon, and Hansen 1999).
- Mechanical means could be used to increase forage access for elk after snow crusting events.
- Changes in the refuge supplemental feeding program could begin to affect elk nutrition (negligible adverse effect on NER elk from lower nutrition).
- Displacement of elk by bison during competition for standing forage would decrease as the bison herd is reduced.
- Aggressive social interactions involving competition for food among elk and bison would increase overall as feeding periods are reduced.

Winter Distribution

- Elk densities on the NER would decline due to more reliance on standing forage and wider distribution.
- Elk use of lands surrounding the NER would increase, including:
    - USFS lands east of the NER
    - Gros Ventre feedgrounds possibly
    - Southern GRTE
    - State feedgrounds south of the NER
- Most of winter distribution shift would involve elk in the Yellowstone, Teton Wilderness, and Gros Ventre segments.
- As ungulate numbers decreased and supplemental feeding was reduced, competition and aggressive social interactions on the refuge would also be reduced.
- Elk and bison distribution would increase as the animals relied more on native winter range.
- Fewer animals would be present on the refuge.

Mortality

- As supplemental feeding is reduced, natural factors such as climate and native forage availability would have a greater influence on numbers, movements, distribution, and mortality.
- More elk would be subject to natural factors affecting mortality, including loss of body condition, predation, and starvation.
- Increased mortality on and off the refuge would mainly affect older elk and calves, and some prime bulls entering the winter energetically stressed due to rut activities.
- Late winter calf ratios could decrease as a result of higher winter calf mortality

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- Average winter mortality on the refuge would increase from 1%–2% annually to an estimated 1%–5%.
- Overall, a higher total winter mortality rate of approximately 5% could be expected.

Disease

- Reductions in supplemental feeding or elk numbers would reduce the potential for impacts due to tuberculosis, septicemic pasturelosis, and CWD.
- The health and sustainability of the Jackson elk herd would be increased gradually as supplemental feeding was reduced and there was greater reliance on standing forage and wider ungulate distribution.
- Health and sustainability of the Jackson elk herd would be enhanced in the long term.
- Wider distribution of elk would result in moderate reductions in both the prevalence and potential transmission of brucellosis, as well as potential for spread of diseases not yet in the population.

Private Lands

- The agencies would work closely with the WGFD and landowners, including livestock producers, to coordinate actions that would prevent conflicts due to elk dispersal and to defray costs of managing potential conflicts. Preventing access to food/hay rewards on private lands would be vital for effective management.
- Private land conservation easements within NER boundaries would promote wider distribution.

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APPENDIX 2. Monitoring Supplemental Materials: Feeding Initiation Methods

At each sample site, 10 subplots will be measured at every 5 steps along the random bearing determined for each site. At each subplot a 13.27" diameter metal sampling ring will be placed on the ground. The amount of forage available to elk within the sampling ring (dry weight in grams) will be visually estimated. The 13.27" diameter subplot allows easy conversion from grams to lbs. per acre (each gram is equivalent to 100 lbs. per acre). During annual forage production sampling, refuge biologist Eric Cole has made approximately 1,000 of these visual estimates per year for 17 years, and 33% of Cole's estimates have been verified by clipping and weighing. Therefore, Cole will be the principal estimator, but additional personnel will be trained in these techniques to provide redundancy in the event of personnel changes, and to increase the number of observers to facilitate estimation of error.

Estimating available forage within the sample ring at each subplot is relatively straightforward when snow cover is limited, but estimating how much of the forage is accessible to elk when snow is dense, deep and crusted can be subjective. To decrease the subjectivity of the estimation process, if the area under the sample ring is covered with snow, only forage that can be exposed with a gloved hand will be included in the estimate of available forage. Forage that is fouled with manure and/or flush with the ground due to trampling and/or encrusted in ice will not be included in the estimate of available forage. At each subplot the estimate of available forage (dry weight g) will be converted to an equivalent lbs./acre value (1 gram=100 lbs./acre). The arithmetic mean of available forage (lbs./acre) for the 10 subplots provides an estimate of available forage for each index site. There are 3 sample site categories: 1) Historic Key Index Sites that have been used since 2007, 2) New randomly selected sites within areas preferred by elk, and 3) New randomly selected sites in areas not preferred by elk. Historic key index sites were not randomly selected, but were instead selected to represent areas most preferred by elk on the south end of NER. These were the sites used to determine when supplemental feeding would be initiated from 2007 until the implementation of the MSP. To facilitate comparison with pre-MSP data, we will continue to use mean lbs. per acre across historic key index sites to determine the 300 lbs. per acre threshold. However, post MSP implementation we will delay feeding initiation by 2 weeks once the 300 lbs./acre level has been reached. We will concurrently sample at randomly selected sites stratified on an annual basis between areas highly preferred and not highly preferred by elk. This will enable us to quantify the relationship between mean forage availability at historic key index sites and random sites over time.

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APPENDIX 3. Communication Plan

Communication Goals

Prior to the MSP's Implementation

- Utilize a variety of outreach methods to inform the public on the goals and timing of the MSP implementation and possible effects on wintering herds.
- Utilize a variety of outreach methods to inform the public on public comment opportunities.
- Identify and coordinate key messages and outreach with USFWS regional and national offices, State and federal agency partners, non-profits, elected officials, and other identified audiences.

During the MSP's Implementation

- Continue to utilize a variety of outreach methods to describe current management actions as well as measurable and noticeable changes on the landscape, in animal behavior, or in animal health.
- Provide a comprehensive overview of the MSP by providing links and references to previous outreach and background information.

Communication Objectives

- Work with current media contacts to promote news of the MSP via print, radio, Web, and social media platforms.
- Utilize new media and social media tools to provide information on why the MSP was developed, what public comment opportunities exist, and how the plan is being implemented.
- Plan, coordinate, and execute public meetings to allow for public comment and questions on the plan.
- Develop and provide methods for the public to submit written comments on the MSP.
- Monitor print media on Refuge elk and bison management to see how the Step own Plan objectives and reactions are being portrayed to the public.

Current Outreach Resources

- National Elk Refuge web site
- National Elk Refuge news release list
- (approximately 300 contacts)
- National Elk Refuge Twitter site (1,039 followers)
- Bison and Elk Management Plan web site (http://www.fws.gov/bisonandelkplan/)
- Space for an 11" x 17" poster in the Visitor Center on Refuge management topics
- Display panels in the Visitor Center theater for temporary displays

Available Supporting Outreach Resources

- USFWS Mountain–Prairie External Affairs staff
- USFWS Mountain–Prairie web site, including the
- "Top Stories" feature
- USFWS Mountain–Prairie Twitter site USFWS Mountain-Prairie Region Facebook page
- USFWS National Wildlife Refuge System

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- Facebook page
- USFWS Facebook page

Previous Outreach Efforts

- NER routinely writes and disseminates news releases on Refuge management activities, including the Comprehensive Conservation Plan, supplemental feeding, herd health monitoring, and forage production.
- Post the above news stories as Content.
- Management System (CMS) articles.
- Post CMS news story promos so they prominently appear on the home page, linking readers to the articles.
- Send out Twitter messages linking viewers back to the news stories.
- Prepare, upload and provide links to Adobe PDF versions of news stories with additional photos where additional images are available and/or help understand or visualize the content.
- Utilized the Conservation link on the web Content
- Management System to post information about the Bison and Elk Management Plan and the draft Comprehensive Conservation Plan.
- Retained and provided a link to the original Bison and Elk Management web page (http://www.fws.gov/bisonandelkplan/) that was developed during the planning process. The web site includes links to the Final Plan/EIS, Record of Decision, Federal Register Notice of Availability for both the Record of Decision and Final Plan/EIS, associated news releases, public meeting highlights, and other related documents. Note: the National Elk Refuge does not manage the site.

Additional Outreach Opportunities

- Public meetings in Jackson and other identified locations.
- Service produced video; video could be posted to the National Elk Refuge's multimedia web page, or USFWS Mountain–Prairie home page "Top Video" feature.
- Live radio interview on KHOL (Jackson, WY radio)
- Wyoming Public Radio interview with Refuge management staff
- Interviews with local print media sources
- Updates at community leader meetings such as Rotary Club, Jackson Hole Chamber of Commerce board meetings, and interagency breakfast meetings (with Federal agencies and local elected officials).

Target Audiences

Internal

- Regional and National USFWS Leadership
- Refuge permanent staff
- Refuge seasonal staff
- Refuge volunteers

External

- Congressional representatives
- State of Wyoming leadership
- Federal agency partners, particularly Grand Teton National Park and the Bridger–Teton National

Forest
- Wyoming Game & Fish Department
- Other NER partners, including county and town agencies and local nonprofit organizations
- Local elected officials
- Private landowners in proximity to the National
- Elk Refuge or neighboring Federal lands
- Tribes
- Local and state media
- Local public

Key Outreach Topics

- Overview of BEMP objectives
- Strategy to change elk/bison behavior
- Threat of disease
- Natural mortality rates
- Anticipated winter distribution changes for bison/elk
- Mitigate negative effects on private lands
- Change elk behavior and distribution while avoiding increased mortality.
- Explain the historic reasons a supplemental feeding program began and why it was continued.
- Explain the NER's limited large ungulate carrying capacity and the disproportionate impact of bison on available forage; 3 elk = 1 bison.

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APPENDIX 4. Models

Elk winter distribution model

The proportion of the JEH that winter on the NER will be linked to factors hypothesized to influence elk winter distribution using a generalized linear mixed effects model (GLMM). A GLMM can account for a proportional response variable (i.e., constrained to the interval 0–1) using a log link and binomially-distributed errors. A GLMM also includes fixed and random effects, with the latter capturing residual model variance otherwise not explained by fixed effects. Year will be including as a random effect, providing several benefits. First, we don't assume years are independent and comprise all of the factor levels of interest. Instead, the effect of year is treated as a random variable, with individual year effects realizations of that distribution. This allows inference to non-sampled factor levels, i.e. years, by estimating a latent population-level proportion of elk expected to winter on the NER regardless of fixed effect influences. Thus, the random year effect can be considered a latent variable describing elk behavior manifested as observed winter distribution. Second, because year effects are not treated as independent, estimated effects of year on the proportion of JEH elk wintering on the NER are dependent on all factor levels, leading to greater precision when estimating individual year effects (Kéry 2010).

The full GLMM incorporating fixed effects for each factor identified as influencing elk winter distribution is:

$$P_t = \beta_{0(t)} + \beta_1 * AFI_t + \beta_2 * SDM_t + \beta_3 * WP_t + \beta_4 * GSP_t + \beta_5 * SWE_t + \varepsilon_t$$

where the random intercept and residual model variance are

$B_{0(t)} \sim N(\mu_{\beta_0}, \sigma^2_{\beta_0})$, and

$\varepsilon_t \sim N(0, \sigma^2)$, respectively.

Fixed effects include 1) per capita available forage at initiation of winter feeding (*AFI*) , 2) proportion of the JEH that are short-distance migrants (*SDM*), 3) number of wolf packs present on JEH native winter range (*WP*), 4) growing season (May–August) precipitation for the Wyoming Snake Drainage climate division (*GSP*; a proxy for available forage on native winter range), and 5) snow water equivalent on 1 January at Thumb Divide (*SWE*; a proxy for early winter severity).

Elk calf winter survival and forage deficits

The Forage Accounting Model of Hobbs et al. (2003) has as an output weekly available forage biomass for the NER (sum of predictions for 30 × 30 m cells). These predictions account for snow conditions using a proxy of SWE and decrement total available biomass by 35% to account for unpalatable plants within the total estimate.

While calf survival is a function of multiple factors the primary management action influencing calf survival is supplemental winter feeding. Current winter feeding initiation criteria lead to calf survival generally higher than in unfed populations. Proposed feeding initiation criteria will result in later initiation of supplemental feed, which will be most influential to calf survival. There is currently little

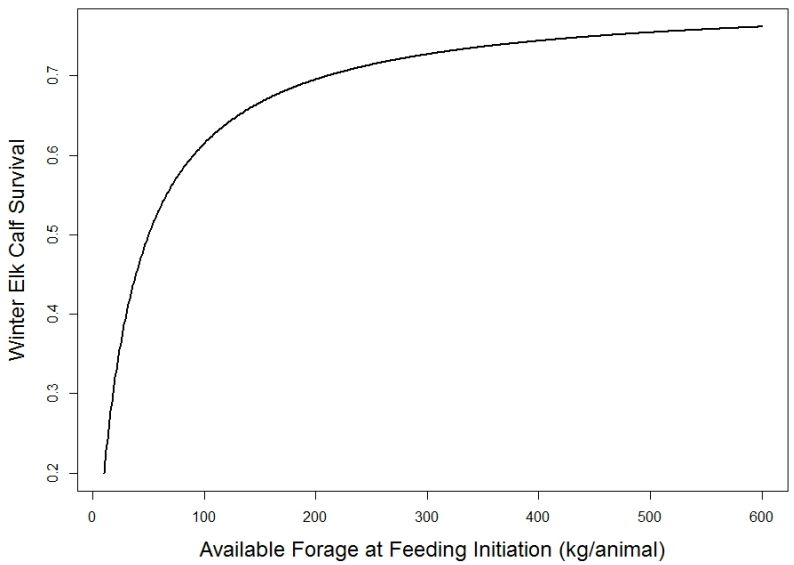
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understanding regarding the relationship between initiation of winter feeding and calf survival, except that current feeding initiation criteria result in high calf survival. We believe a threshold level of available forage at initiation of winter feeding exists such that winter calf survival reaches an asymptote. Below this threshold, calf survival is hypothesized to decline quickly with reductions in available forage at winter feeding initiation. Available forage at the initiation of winter feeding will be related to on elk calf winter survival using a saturating function (i.e., Holling type-II functional response; Fig. 6) by

$$S_t = \frac{aAFI_t}{b + AFI_t}.$$

The parameters *a* and *b* determine how calf survival is related to available forage. Maximum calf survival is *a*, and *b* represents the value of available forage to an individual when survival is 50% of *a* (Hilborn and Mangel 1997).

Although this approach doesn't capture forage deficits *per se*, it does provide a potentially sensitive proxy for this concept. It is assumed that a forage deficit for calves would occur at a point on the curve of the relationship between calf survival and available forage at initiation of supplemental feeding. Modeling the response of winter calf elk survival to changes in feeding initiation criteria facilitates our ability to maximize the influence of feeding initiation criteria on winter distribution while minimizing the likelihood of a large mortality event.



Hypothesized relationship between winter survival of elk calves and per capita available forage at initiation of winter feeding on the National Elk Refuge.

From: Will Meeks
To: Mike Blenden; Steve Kallin; ryan_moehring@fws.gov
Cc: Anna Munoz; Maureen Gallagher
Subject: NER - a future meeting
Date: Saturday, July 30, 2016 10:19:31 AM

All -

In meeting with Matt recently he conveyed that after our next CCP/BEMP/AMP/Engagement meeting it would be good to get on Noreen's calendar for an update. I think this is wise.

Mike - can you work with Stephanie to get that on the books as a marker with sufficient time to prepare?

Thanks.

Will Meeks
U.S. Fish and Wildlife Service
Mountain-Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

From:	Steve Kallin
To:	Mike Blenden
Subject:	Draft Step Down Plan Completion and Implementation Schedule (version 7/27/2016)
Date:	Wednesday, August 03, 2016 3:33:39 PM
Attachments:	DRAFT Step Down Plan Implementation Schedule 7-27-2016.docx

Mike:

Per our discussion yesterday, attached is the latest draft schedule. As you can see, deadlines are tight if we want to implement this upcoming feeding season.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

DRAFT Completion and Implementation Schedule for the BEMP Step Down Management Plan

July 27, 2016

	STEPDOWN PLAN COMPLETION AND APPROVAL PROCESS	INITIATE	COMPLETE	WORK DAYS
1	Final Step Down Plan Meeting	July 18, 2016	July 18, 2016	
2	Final 1st Draft Step Down Plan; Team reviews changes	July 19, 2016	July 27, 2016	7
3	Peer review panel	July 27, 2016	Aug. 11, 2016	11
4	Team meets to review Panel's suggested changes	Aug. 12, 2016	Aug. 12, 2016	1
5	Team changes finalized	Aug. 15, 2016	Aug. 17, 2016	3
6	Agency comments (Planning Team)	Aug. 17, 2016	Aug. 31, 2016	10
7	Incorporate agency comments; finalize draft	Sept. 1, 2016	Sept. 9, 2016	7
8	Release draft plan to public; Public outreach, meetings	Sept. 12, 2016		
9	Public review and comment period (60 days)	Sept. 12, 2016	Nov. 10, 2016	60 (calendar)
10	Review public comments and incorporate changes	Nov. 11, 2015	Nov. 18, 2016	6
11	Team review & comments	Nov. 21, 2016	Nov. 25, 2016	5
12	Agency Review of updated document	Nov. 28, 2015	Jan. 6, 2016	28
13	Update final document	Jan. 9, 2017	Jan. 13, 2017	5
14	Final FWS/NPS review and signatures.	Jan 16, 2017	Jan. 27, 2017	10
15	Release Final Step Down Plan. Continue Public outreach/meetings.	Jan. 30, 2017		
16	Initiate enhanced forage monitoring	Jan. 1, 2017	Feb. 1, 2017	30
17	Implement new feeding schedule (delay 1-5 days)	Feb. 1, 2017	Feb. 15, 2016	
18	Feedground tours for elected officials, key stakeholders	Feb. 15, 2017	March 22, 2017	22
19	GPS collar 30 elk	March 1, 2017	March 15, 2017	10
20	Initiate early termination of supplemental feeding	April 2, 2017		

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From:	Steve Kallin
To:	Mike Blenden
Subject:	RE: Draft Step Down Plan Completion and Implementation Schedule (version 7/27/2016)
Date:	Wednesday, August 03, 2016 4:20:52 PM
Attachments:	Draft NER Step Down Plan Peer Review Copy_7_25_2016.docx

Mike:

Attached is the latest version which was sent out for peer review.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
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Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Blenden, Mike [mailto:mike_blenden@fws.gov]
Sent: Wednesday, August 03, 2016 4:00 PM
To: Steve Kallin
Subject: Re: Draft Step Down Plan Completion and Implementation Schedule (version 7/27/2016)

Thanks Steve. I'll share this. Can I get a copy of the draft step down plan? For internal use only of course,

On Wed, Aug 3, 2016 at 3:33 PM, Steve Kallin <steve_kallin@fws.gov> wrote:
Mike:

Per our discussion yesterday, attached is the latest draft schedule. As you can see, deadlines are tight if we want to implement this upcoming feeding season.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
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Too often we...enjoy the comfort of opinion without the discomfort of thought.
John F. Kennedy

BISON AND ELK MANAGEMENT STEP DOWN PLAN

A Structured Framework for Reducing Reliance on Supplemental Winter Feeding

National Elk Refuge
Grand Teton National Park

DRAFT

July 28, 2016

BISON AND ELK
MANAGEMENT STEP DOWN PLAN

For the

National Elk Refuge,
Grand Teton National Park,
John D. Rockefeller, Jr. Memorial Parkway

Teton County, Wyoming

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EXECUTIVE SUMMARY

Overview

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands, focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The final plan directed the NER and GRTE (in conjunction with the Wyoming Game and Fish Department: WGFD) to maintain the state's elk herd objective of 11,000; establish a bison population objective of 500; restore habitat on the NER and in GRTE; continue hunting bison and elk on the NER; continue the elk reduction program, when necessary, in GRTE; allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available; and develop a dynamic, structured framework and Step Down Management Plan for decreasing the need for supplemental feeding on the NER. ***This Bison and Elk Management Step Down Plan (MSP) was developed to specifically addresses the criteria for a structured framework referenced in the Record of Decision.***

Background

Winter feeding of elk in Jackson was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. The loss of available winter range in Jackson Hole due to new ranching operations and a growing town resulted in significant numbers of elk dying during several severe winters in the late 1800s and early 1900s. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, established the National Elk Refuge. Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding.

Bison were extirpated outside Yellowstone National Park (YNP) by the mid-1880s but in 1948 were reintroduced to Jackson Hole when 20 bison from YNP were released near Moran, Wyoming. The herd remained small until discovering elk feedlines in 1980, when the population began sustained population growth. Bison and elk that winter on the NER are migratory and occupy summer ranges predominantly to the north.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands, thereby reducing other wildlife associated with woody vegetation, unusually low winter mortality, which affects predators and other species and requires intensive hunting programs.

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. The potential risk of catastrophic disease outbreaks and the need to mitigate this threat is a vital component in achieving the BEMP Sustainable Populations Goal.

Objectives

This MSP addresses several objectives under a broader BEMP goal of sustainable populations,

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which directed the agencies to: 1) develop a dynamic, structured framework for reducing NER supplemental feeding; 2) implement a phased reduction of animals on feed: a) Phase 1, to 5,000 elk and 500 bison, and b) Phase 2, elk and bison rely predominantly on native habitat; 3) maintain natural elk bull-to-cow ratios in park summer herd; and 4) enhance public outreach/education. The BEMP further stated that consideration criteria for implementing the 2nd phase of reduced feeding would include some or all of: 1) the level of forage production and availability on the National Elk Refuge, 2) desired herd sizes and age/sex ratios, 3) effective mitigation of bison and elk co-mingling with livestock on private lands , 4) winter distribution patterns of elk and bison, 5) prevalence of brucellosis, chronic wasting disease, and other wildlife diseases, and 6) public support. **In short, the overall objective of this plan is to provide a path for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives and public support.**

Strategies

Elk have been fed for some period during nearly every winter on the National Elk Refuge since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during a time of year when natural forage is typically most limited is powerful to both species, and their knowledge of its existence has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Attempting to modify this behavior on a large scale is unprecedented and will necessarily require investigation, constant evaluation, adaptive modifications to the approach when indicated, and repeated trials.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into the 3 broad categories of 1) timing and intensity of winter feeding, 2) timing and intensity of hunting, and 3) herd segment specific and overall harvest levels.

Measuring the success of MSP strategies will require knowledge of several bison and elk herd attributes. Because we are interested in reducing the intensity of elk and bison feeding throughout the entire winter season, which includes both the number of animals on feed and the duration of feeding, we will use measurements of elk-fed-days (EFD; the total number of elk fed per day per season derived from daily feedground estimates) and bison-fed-days (BFD; the total number of bison fed per day derived from daily feedground estimates) to evaluate feeding intensity. For example, if 5,000 elk were fed for 100 days during a given winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD. Average baseline feeding intensity during the post-BEMP to pre-MSP period from 2008-2016 was 487,838 EFD (range = 223,614-746,800), and 45,224 BFD (range = 26,035-82,124). Reductions in EFD and BFD compared to these baselines will represent progress in meeting feeding reduction objectives under the MSP. Reductions in EFD and BFD could be achieved through reducing the length of the feed season, reducing the number of elk and bison on feed, or some combination of both factors.

Initial success of MSP implementation will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP did not provide specific measurement criteria for the definition of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage" we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. These levels of reduction are consistent with elk and bison predominantly relying on free

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standing forage rather than supplemental feed.

Similarly there are population-specific objectives derived from the BEMP and Phase 1 of the MSP for 5,000 elk wintering on NER and 500 bison wintering in the Jackson Hole area. Progress towards these objectives will be measured using annual classification counts and the average number of elk and bison counted during daily feedground estimates.

Chronic Wasting Disease. As of 2016, CWD has been detected within 40 miles of the Jackson Elk Herd (JEH) in moose, within 35 miles in deer, and within 175 miles in elk. Continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence will take place. Some aspects of CWD response planning could change based on implementation of WGFD's CWD management plan (WGFD 2016).

Winter Feeding. Currently, the initiation of supplemental winter feeding occurs when available forage drops to 300 lbs/acre along transects in areas with highly preferred grasses. This protocol will change to delay the initiation of feeding.

The strategy of delaying the start of supplemental feeding is to encourage elk and bison to use native winter range, especially those individuals that have not previously received a food reward on the Refuge. Over time, it's anticipated a cohort of animals will develop that are not conditioned to the Refuge supplemental feeding program, which will reduce herd concentrations and the risk of disease transmission.

To reduce supplemental feeding overall, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk and bison fed days, the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years of MSP implementation, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require focused mitigation measures.

As bison and elk behavioral responses are better understood, feeding delays will be extended to encourage a redistribution of elk and bison to native winter range. However other factors outside of the scope of this plan such as wolf numbers and distribution could reduce the effectiveness of this strategy.

Variables that influence feeding initiation date will be considered (Table 4, Fig. 10). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. And finally, the distribution of animals, particularly on private, livestock producing lands, would be considered prior to delaying feeding initiation date.

Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years.

In the early years of MSP implementation, the

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seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date as the MSP is implemented.

Harvest. Few options for manipulating elk hunting are currently available because the JEH is at or near the 11,000 WGFD objective. Proposed changes include allowing limited any elk permits, allowing a bow season near developments on the NER, delaying the elk season so it will better coincide with migration timing, and alternating areas that are closed and open to hunting over time to encourage animal movements or facilitate harvest.

Based on summer bull ratios in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded hunting opportunities are considered.

The proportion of the Jackson Elk Herd that winters on NER has increased in the past 2 decades. This trend is correlated with a decline in elk use of native winter range and an increase in the proportion of NER elk that occupy winter ranges immediately adjacent to the Refuge. If efforts to encourage increased use of native winter range are unsuccessful, agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. This will provide a level of harvest flexibility more commensurate with addressing changes in herd distribution.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution or discouraging bison from attempting to leave the NER via the south boundary into the town of Jackson. Serious consideration will be given to reducing the bison herd population objective in the future through collaboration with WGFD. Lowering the Jackson Bison Herd objective and population would reduce winter NER forage consumption and further reduce the need for supplemental feed. Genetic diversity could be addressed by periodically introducing bison from other herds.

The effectiveness of NER late-season harvest regimes is influenced by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could help reduce winter elk numbers on the Refuge. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st .

Private Lands Mitigation. Several strategies would be employed to mitigate likely changes in bison and elk distribution, including providing incentives for non-breeding cattle operations, increased fencing in limited areas to separate elk and bison from livestock feed lines, hazing elk and bison away from livestock feed lines, and purchasing private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal wildlife conflict technician positions supervised by WGFD.

Vegetation Restoration. Various approaches to restore the Kelly Hayfields in GRTE (4,500 acres) were initiated in 2008. Work will likely be complete in 2035. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and providing visitor opportunities to enjoy wildlife viewing within a

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natural setting. The restoration process involves removal of non-native vegetation, collecting and propagating native seeds and plants, as well as the seeding of native plants.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres are currently under restoration treatment and 3,265 acres remain non-native pasture. Maintenance of restored ecological conditions will require management efforts in perpetuity to keep non-native species from colonizing restored areas. The park will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Strategies Considered But Rejected

Strategies considered but rejected include fertility control in elk and bison, agency reduction of either elk or bison, and altering rations of supplemental feed. These strategies were rejected because they were not included in the BEMP preferred alternative and/or because there was not support for them by cooperating agencies.

Models and Monitoring

Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

A robust monitoring program will be necessary to track the effects of actions implemented under this plan. Critical monitoring components will include: 1) enhanced forage production and availability sampling; 2) measuring animal abundance and distribution including differences in some sex and age classes; 3) determining elk and bison fed days each feeding season; 4) estimating winter mortality; 5) brucellosis seroprevalence rates; and 6) CWD surveillance. In many cases, attribute baselines for the period preceding implementation of this plan have been developed for comparison after the plan is implemented.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Actions completed each year, the results of monitoring programs, and any proposed changes in management direction will be presented in an annual MSP update/report, completed by NER staff by the end of June.

Public Outreach/Education

De-emphasizing the supplemental feeding program will be a major paradigm shift especially for the residents of Jackson Hole and Teton County, but will also be of interest to others in Wyoming and across the nation familiar with the long history of feeding elk on the National Elk Refuge. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk and bison herd management methods. A detailed communication plan has been developed that identifies key messages and utilizes a variety of outreach methods, including print, video, and voice material, utilizing social media, and meetings with elected officials, state and local governments, agency and tribal partners, community organizations, stakeholders, and the general public.

Schedule

GPS collars were deployed on 30 adult cow elk in February 2016. Assuming adequate funding, , additional GPS collars will be deployed in winter 2017. Public outreach, private lands conflict mitigation and contacts, and enhanced forage monitoring will occur in fall 2016 through January 2017. Reductions in feed season length will begin in winter 2017.

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INTRODUCTION

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands. It included directives for forthcoming development of adaptive management practices to address several objectives in the plan, including a desired future condition of elk and bison relying predominantly on native forage. This MSP has been developed expressly for that purpose.

Bison and Elk Populations

While Jackson Hole is probably best known for the splendor and ruggedness of the Teton Range, the Jackson bison and elk herds rank among the top characterizing features of the valley. Both figure prominently in Jackson Hole's history and culture, although bison were absent from the valley for about 100 years between the mid-1800s and mid-1900s.

The JEH occupies approximately 8,000 km^2 in the upper Snake River watershed north of the town of Jackson (Fig. 1). Much of the herd is migratory, moving between distinct wintering and summer ranges. Primary wintering areas include the Buffalo Valley, lower elevations of the Gros Ventre River drainage, the NER, and areas adjacent to the NER on Bridger-Teton National Forest (BTNF) lands. Summering areas occur throughout the herd's range and for convenience are divided into five geographic regions that include GRTE, Yellowstone National Park (YNP), the Gros Ventre drainage, Teton Wilderness, and Southwest Boundary area, which includes private and public lands in the vicinity of GRTE's southwest boundary.

In the late 1800s, when elk populations all over North America were being extirpated, the residents of Jackson Hole protected elk from "tusk hunters" and large-scale commercial hunting operations. Elk are just as important to today's residents of the valley. Thousands of people each year have the opportunity to see elk at close range on the refuge while riding on horse-drawn sleighs. Thousands of pounds of shed elk antlers are sold at an annual antler auction each spring in the town square. Elk are important to backcountry users as well as to people that never leave the road. Jackson Hole is a popular destination for instate and out-of-state elk hunters. The draw of elk to visitors contributes significantly to the local economy.

Winter feeding of elk in Jackson Hole began in 1910 and was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. According to historical reports, before Euro-American settlement some Jackson elk wintered in the southern portion of Jackson Hole (present location of the NER town of Jackson) and may have used areas outside Jackson Hole, including the Green River and Wind River basins to the south and east, respectively, and the Snake River basin to the southwest in what is now eastern Idaho (Allred 1950; Anderson 1958; Blair 1987; Barnes 1912; Sheldon 1927). Radio-collar studies have documented small numbers of Jackson elk wintering in each of these areas in recent times as well (NER and GRTE, unpublished data). Over time, changes in land use and development in these areas, over hunting, and establishment of feedgrounds probably reduced the use of these areas by Jackson elk.

By the end of the 19th century the JEH was believed to be largely confined to Jackson Hole and the immediately surrounding area, where wintering conditions are often harsh. Significant numbers of elk died during several severe winters in the late 1800s and early 1900s> Primary reasons for these mortality events included the loss of available winter range in Jackson Hole from new ranching operations and a and

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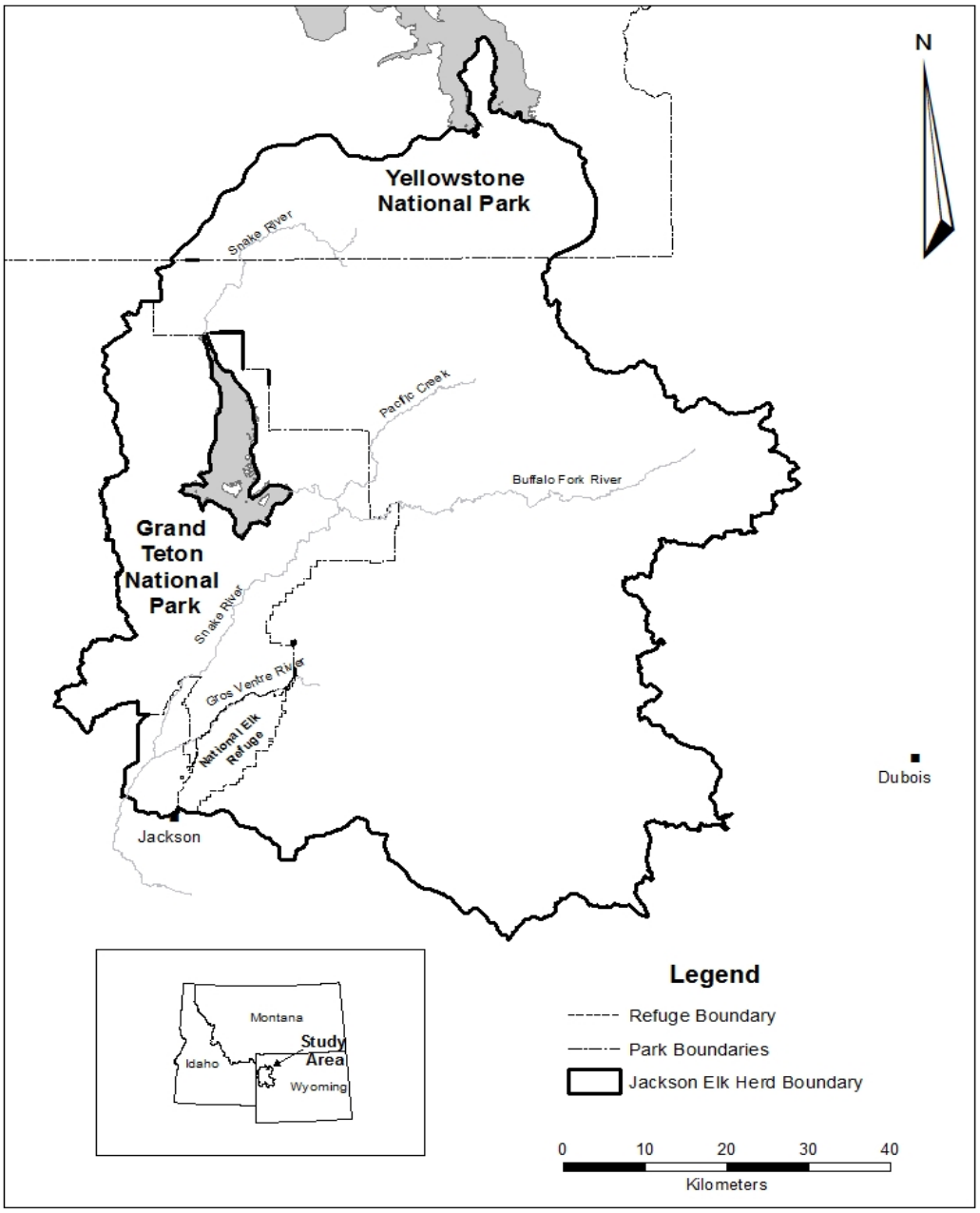


Figure 1. Jackson elk and bison herd ranges, including the National Elk Refuge, Grand Teton and Yellowstone National Parks, and Bridger-Teton National Forest. [include bison range, labels for continental divide and Bridger-Teton National Forest, and in Legend Jackson elk herd unit].

expansion of Jackson. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, appropriated $45,000 for the purchase of lands and maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first winter census in the area was conducted in 1912 and showed about 20,000 elk residing in Jackson Hole and the

Hoback River drainage (the latter is not within the JEH's range).

Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding. In recent times the population has fluctuated near the herd objective of 11,000 that was adopted by the WGFD (Fig. 2).

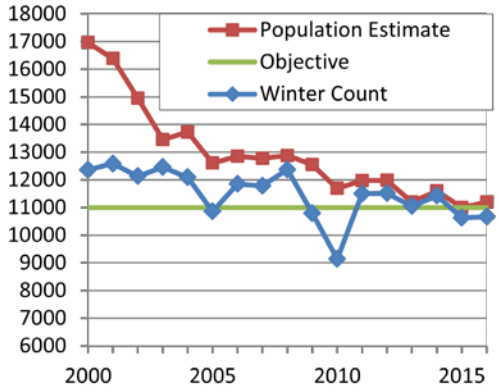


Figure 2. Winter Counts, population estimates, and herd objective for the Jackson elk herd, 2000-2016.

An iconic symbol of the American West, bison are also popular with visitors and residents. Because so few opportunities remain to see bison in the wild, viewing and photographing them in GRTE with the Teton Range in the background is a treasured opportunity for many of the valley's visitors. Similar to elk, there is also a high level of interest in bison hunting. Bison are of particular interest to nearby American Indian tribes and tribes in other parts of the United States because the animals are central to their culture and tradition.

Bison are native to Jackson Hole, as evidenced by the presence of prehistoric bison remains throughout the valley, but were extirpated outside Yellowstone National Park by the mid-1880s. In 1948, 20 bison from YNP were reintroduced to the 1,500-acre Jackson Hole Wildlife Park near Moran. The Jackson Hole Wildlife Park was a private, non-profit organization sponsored by the New York Zoological Society, the Jackson Hole Preserve, Inc., and the WGFD. A population of 15–30 bison was maintained in a large enclosure there until 1963, when brucellosis was discovered in the herd (likely transferred with the original 20 animals from YNP). At that time, all the adult animals were destroyed, but four vaccinated yearlings and five vaccinated calves were retained. In 1964 twelve certified brucellosis free bison from Theodore Roosevelt National Park were added to the herd. In 1968 the herd (down to 11 animals) escaped the confines of the wildlife park, and a year later the decision was made to allow them to range freely. The expansion of GRTE in 1950 had enveloped the Wildlife Park, and this allowed the bison to range freely and was consistent with National Park Service wildlife management policy. The herd remained small and wintered mostly in the Snake River bottoms in GRTE until 1975, when it followed the winter environmental gradient to the NER and began wintering there. The use of standing forage by bison on the NER was viewed as natural behavior thus acceptable to managers. In 1980, however, bison discovered and utilized supplemental feed provided to elk in winter, and they have continued to do so ever since.

The discovery of supplemental feed by bison has had several consequences, including a significant increase in the population's growth rate (Fig 3). Bison on the elk feedlines have at times disrupted feeding operations and displaced and injured elk. To minimize conflicts between bison and elk, managers have provided separate feedlines for bison since 1984. As the population has grown, separating elk and bison on feedlines has become increasingly difficult, and a variety of feeding strategies are employed to help reduce displacement of elk.

As the herd has grown it has maintained fairly stable movement patterns, wintering almost entirely on the NER and summering within GRTE and adjacent lands on the BTNF (Fig. 1).

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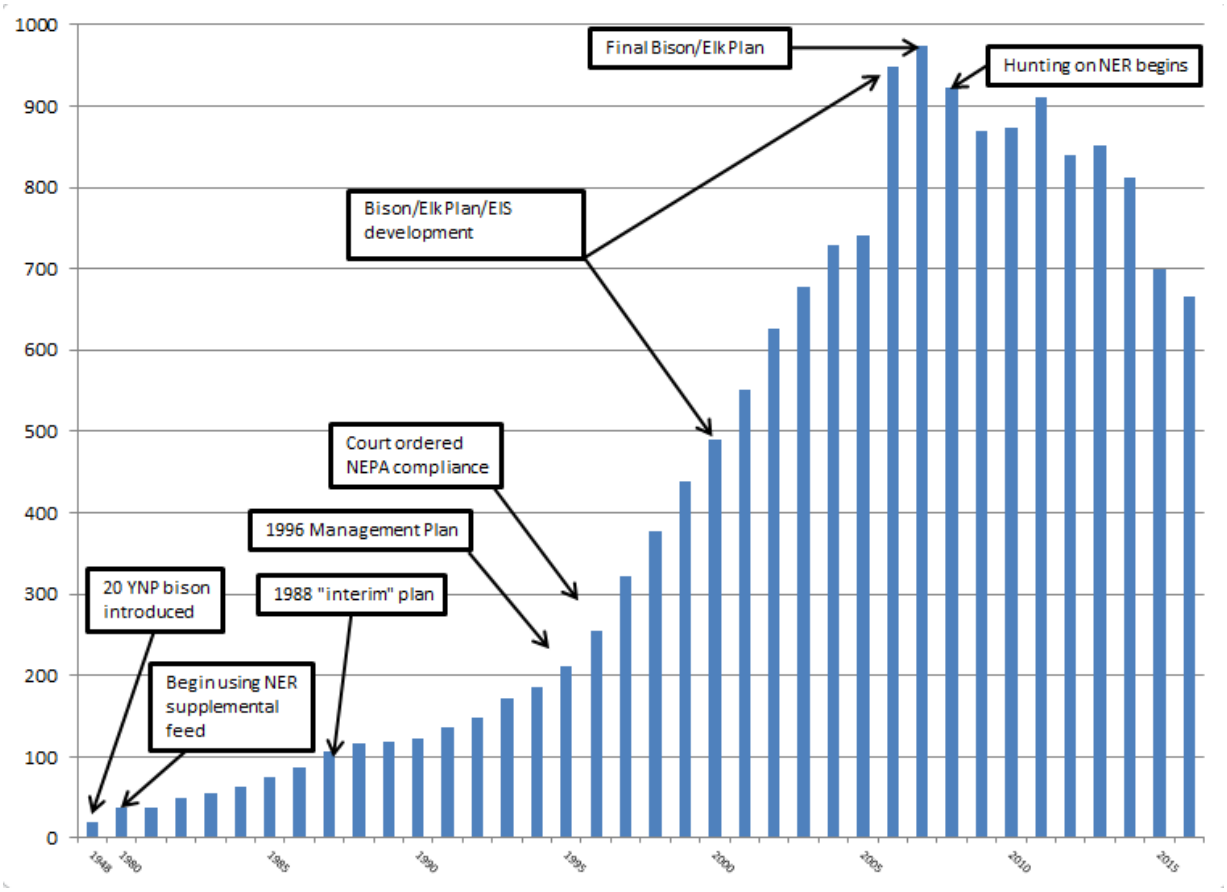


Figure 3. Population growth and planning history for the Jackson bison herd, 1948-2016.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands and thereby reducing availability of these habitats to other wildlife as well as unusually low winter mortality, which has affected predators and other species and has required intensive hunting programs.

Planning History

Jackson's bison and elk populations have been the subject of previous planning efforts. Elk management and research has been guided by the Jackson Hole Cooperative Elk Studies Group since it was established in 1958. The group consists of biologists and agency administrators from the NER, GRTE, YNP, BTNF, and WGFD, who meet at least annually to coordinate management of the population and its habitat. Coordination of bison management began soon after they started frequenting the NER in 1976 and using supplemental feed provided to elk in 1980 (Fig. 3). Release of an "Interim" plan that called for maintaining a herd of 90-110 bison while data were gathered for a long term plan occurred in 1988. It was followed by implementation of a sport hunt outside GRTE, administered by WGFD. This plan was halted after litigation in which the plan's violation of NEPA was successfully argued by plaintiffs.

In 1996, after considerable herd growth, a new long term management plan and environmental

assessment for the Jackson bison herd was released (Fig 3). This plan had strong support and called for maintaining a herd size of 350-400 bison, but it was shelved a year later when plaintiffs from the earlier litigation successfully argued that, because the plan failed to consider the effects of feeding elk on bison management, it also violated NEPA and was not sufficient. This led to development of the draft bison and elk management plan and environmental impact statement from 2000-2006 and release of the final plan in 2007 (Fig 3).

The 2007 Bison and Elk Management Plan (BEMP; USFWS 2007) considered six alternatives for bison and elk management focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The primary management scenarios presented in the alternatives included the status quo, terminating elk and bison hunting on the NER and the elk reduction program in GRTE, brucellosis vaccination options, restoring habitat, improving forage, and decreasing or phasing out supplemental winter feeding.

The final BEMP (USFWS 2007; www.fws.gov/bisonandelkplan) which set management direction for 15 years or until a subsequent plan is developed, proposed to maintain the state's elk herd objective of 11,000, establish a bison population objective of 500, restore habitat in the NER and GRTE, continue hunting bison and elk on the NER, continue the elk reduction program in GRTE in concert with the parks enabling legislation, allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available, and develop a dynamic framework of management actions which adaptively decrease the need for supplemental feeding on the NER. ***This Bison and Elk Management MSP was developed to address the latter and specifically addresses the criteria for a structured framework listed on page 5 of the Record of Decision*** **(Fig. 4).** It does not address other on-going bison and elk management actions already prescribed by the BEMP.

The BEMP scheduled the completion of the MSP for 2008. However, litigation challenging the BEMP in 2008 led to the decision to postpone its development until litigation was resolved. As of March 2015, two court rulings have upheld the 2007 BEMP and ROD. In a lawsuit against the BEMP and its author agencies (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2010), plaintiffs argued that the BEMP violated the National Wildlife Refuge System Improvement Act (National Wildlife Refuge System Improvement Act 1997) by disrupting the biological integrity of the Refuge, and that the plan and the accompanying EIS violated NEPA because they were insufficiently detailed to allow a reasonably complete discussion of mitigation. The crux of the plaintiff's argument was that the plan did not set a specific date for the cessation of supplemental feeding. In response, the agencies argued that the plan constituted a valid exercise of discretion and that it and the EIS were sufficiently detailed to satisfy the requirements of NEPA. In March 2010, the United States District Court for the District of Columbia sided in favor of the agencies in this case. In 2011, the plaintiffs appealed this ruling to the United States Court of Appeals for the District of Columbia Circuit. This Court affirmed the District Court ruling (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2011).

National Environmental Protection Act Compliance

The 2007 BEMP/EIS and ROD satisfied NEPA requirements for current bison and elk management through a detailed analysis of alternative management actions and their likely effect on the environment, and substantial involvement of the public in the process. This MSP does not duplicate or add to this process. It is designed to tier off of the BEMP as a dynamic implementation guide to one part of the preferred alternative outlined in the BEMP ROD. As such, references to NEPA covered in the BEMP

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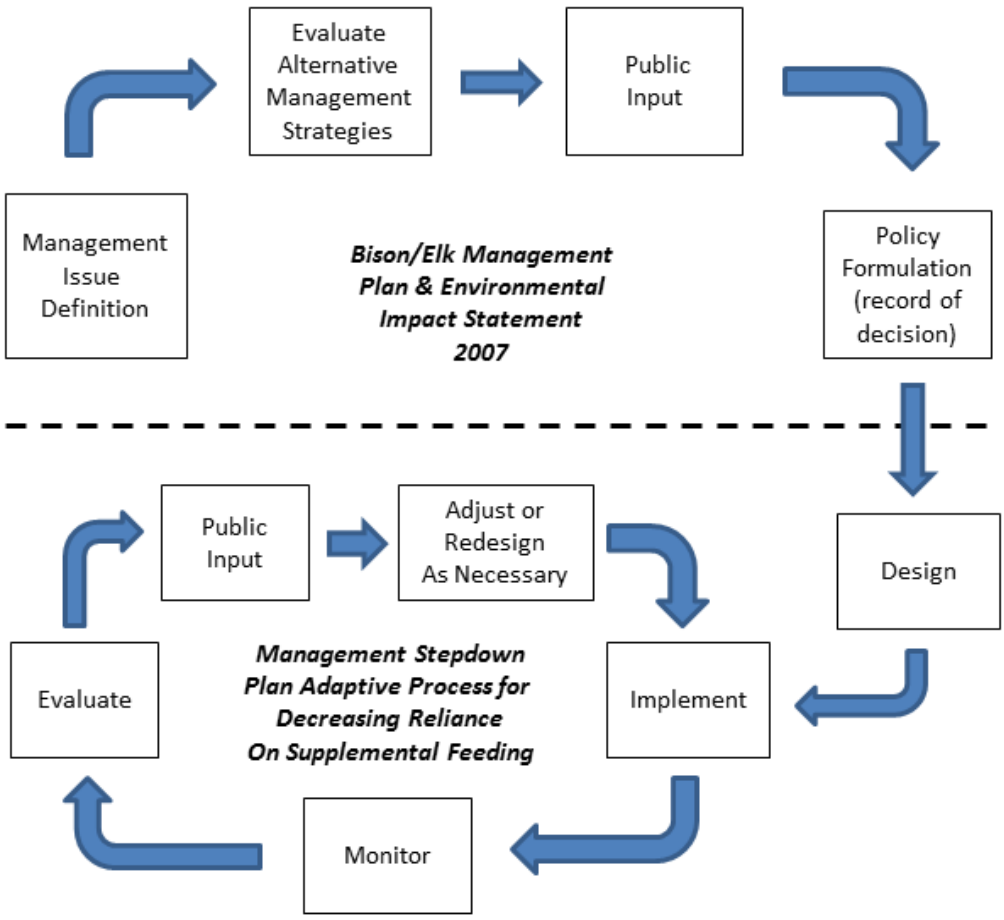


Figure 4. Management step down planning for supplemental feeding on the National Elk Refuge and its relationship to the 2007 Bison/Elk Management Plan and Environmental Assessment.

will be included where necessary in this document, and the discussion of any action that would require additional NEPA compliance will be explicitly stated as such in that context.

Management Step Down Planning

The use of adaptive management plans has gained popularity in natural resource management planning because, by definition, they allow modifications of strategy based on monitoring results and outcomes toward reaching specific goals or objectives. Four elements generally included in an adaptive management approach include: 1) well defined and mutually agreed upon objectives; 2) knowledge (including descriptive models) of the dynamics of the system being managed; 3) clearly articulated management actions and strategies; and 4) a monitoring program to evaluate responses of the system to management actions (Walters 1986).

This MSP utilizes adaptive management planning principles but is not intended to include all of the adaptive management planning elements outlined in the Department of Interior Adaptive Management Technical Guide (2007). This MSP is more accurately described as a "structured framework" of adaptive management actions that progressively transitions from supplemental winter feeding to greater reliance on free-standing forage (BEMP ROD p.5).

Table 1. 2007 Bison/Elk Management Plan Goals and Objectives (Step Down Plan objectives shaded)

Goal: Habitat Conservation

Objectives:

- Conserve important private lands.
- Increase forage production.
- Minimize non-native plants.
- Protect sagebrush grasslands.
- Restore willow, aspen, and cottonwood.
- Perpetuate natural mosaic of plant communities.

Goal: Sustainable Populations

Objectives (BEMP pages 135-136):

- Develop structured framework for reducing NER supplemental feeding.
- Phase reduction of animals on feed: 1) to 5,000 elk and 500 bison, and 2) elk and bison rely predominantly on native habitat.
- Maintain natural bull-to-cow ratios in park summer herd.
- Ensure a genetically viable bison herd with close to an even sex ratio.
- Enhance public outreach/education.

Goal: Elk and Bison Numbers

Objectives:

- Maintain state elk herd objective of 11,000.
- Maintain a genetically viable bison population of about 500 animals.

Goal: Disease Management

Objectives:

- Manage brucellosis transmission risk from elk and bison to livestock.
- Manage feeding to reduce brucellosis transmission among bison and elk.
- Educate hunters about wildlife disease human health hazards.

OBJECTIVES

The management direction and desired conditions stated in the BEMP called for the NER and GRTE staffs to work with others (agencies, partners, etc.) to "adaptively manage elk and bison in a manner that contributes to the State's herd objectives yet allows for the biotic integrity and environmental health of the resources to be sustained," so that the public can enjoy a variety of compatible wildlife-dependent recreational opportunities. Under the BEMP's 4 primary goals, 20 associated objectives were identified (Table 1). This MSP addresses four objectives under the goal of sustainable populations (Fig. 5).

The reduction of animals on feed at the NER was proposed to be spread over two phases. In Phase 1, the aim is to reduce the average number of elk on feed to 5,000 (while maintaining WGFD's 11,000 elk herd objective), and reduce the winter

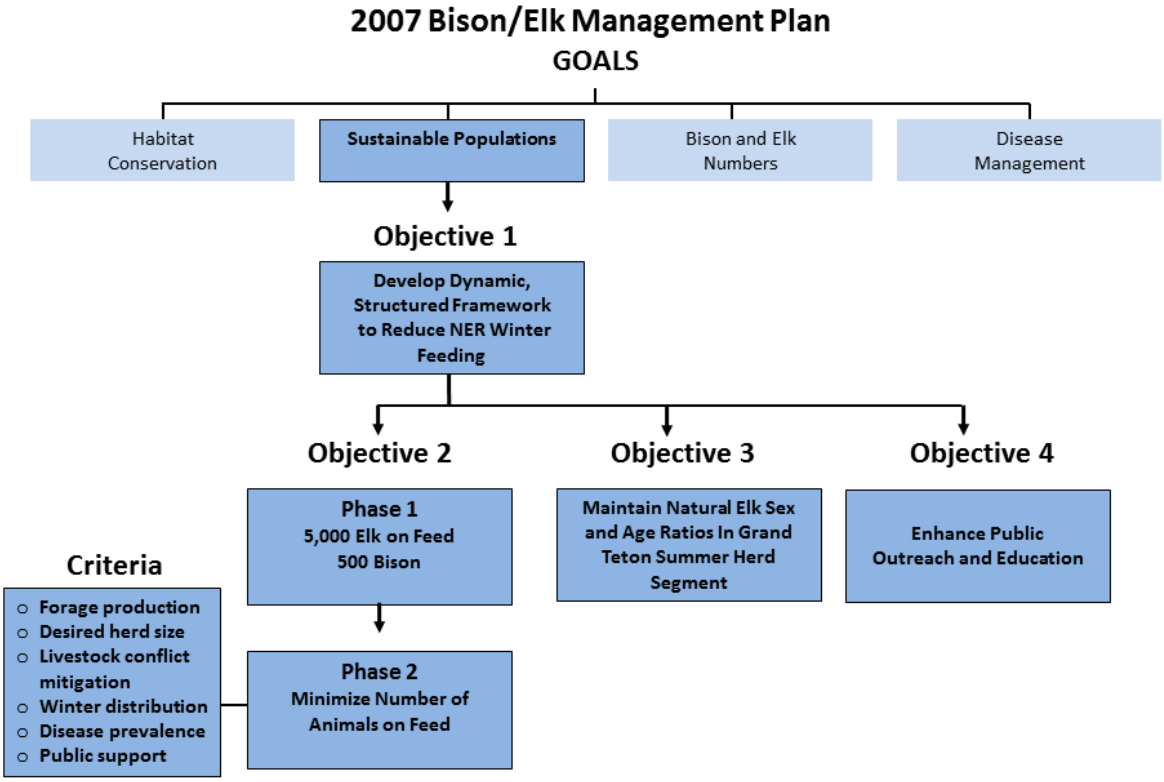


Figure 5. Relationship of MSP to the 2007 Bison/Elk Management plan goals, phasing of objectives, and consideration criteria for reducing the reliance of elk and bison on supplemental feed during Phase 2.

population of bison to the BEMP recommended, and WGFD adopted, objective of 500. In Phase 2, the overall objective is to reduce the reliance of bison and elk on supplemental feed (USFWS and USNPS 2007a). Desired conditions include animals relying predominantly on native habitat and cultivated forage. Important consideration criteria for implementing Phase 2 will include: 1) the level of forage production and availability on the NER and adjacent winter ranges; 2) maintenance of desired herd sizes and age/sex ratios; 3) the ability to effectively mitigate bison and elk livestock conflicts; such as co-mingling on private lands during high risk disease transmission periods; 4) maintaining desirable winter distribution patterns of elk and bison; 5) the prevalence of brucellosis, chronic wasting disease, and other wildlife diseases; and 6) public support. In short, the overall objective of this plan is to outline a framework for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives.

This Plan focuses on management actions to initially achieve Phase 1 objectives. However, if successful, these actions will continue to be used to achieve the Phase 2 objective of reducing reliance on supplemental feeding while considering the six criteria listed above.

MANAGEMENT ACTIONS AND STRATEGIES

Background

The principle goal of reducing reliance on

supplemental feeding is to limit transmission of density dependent diseases in elk and bison while simultaneously minimizing winter mortality in elk. We will attempt to achieve this goal by experimentally reducing feed season length and closely monitoring elk and bison distribution and winter mortality.

Elk have been fed on the NER each year in all but 9 winters since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during winter months is powerful to both species, and their knowledge of NER feed grounds has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Because use of feed grounds is a learned behavior, decreasing feed season length will potentially reduce the likelihood of elk that winter on native range finding NER feed grounds. Over time this could result in a greater percentage of elk using native winter range relative to NER feed grounds. Because it is largely unprecedented, the concept of modifying this behavior on such a large scale is daunting and poses questions for which there are no immediate answers. In some cases, the likelihood a specific management strategy's success will only be able to be roughly estimated, and unanticipated results are likely. Closely monitoring forage availability, elk and bison distribution, and elk mortality will allow us to evaluate the effectiveness of management actions and adjust management actions as needed should unintended negative consequences arise.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into 3 broad categories: 1) timing and duration of winter feeding; 2) timing and intensity of hunting; and 3) herd segment specific and overall harvest levels.

Important Changes Since 2007

The BEMP was developed based on data collected and knowledge that existed up until its ROD. Since then, important changes have taken place, some of which are advantageous to this effort and some of which are not.

A primary change that will facilitate meeting objectives under this plan is the reduction of the bison population from nearly 1,200 animals in 2007 to about 666 during winter 2015-2016 (Fig. 3) through hunting programs administered by WGFD. Licensing changes enacted in 2014 included a reduction in the bison cow/calf license fee (from $416 to $263 for residents and $2522 to $1022 for non-residents) and eliminating the once-in-a-lifetime restriction on a successful bison hunter to only those that successfully harvested a bull. Continued progress toward the 500 animal herd objective will require sustained harvest success.

During the same period, the Jackson Elk Herd has declined from nearly 13,000 to its objective of 11,000, but because the proportion of the JEH that winters on NER has increased dramatically (Fig. 6), this will make achieving the Phase I objective of 5,000 elk on feed and any future elk population reductions more difficult. Preliminary modeling suggests that the increasing proportion of the JEH wintering on NER has been associated with 1) changes in elk winter distribution associated with wolves (NER, unpublished data) and 2) high numbers of elk that summer immediately adjacent to NER (Cole and Foley et al. 2015).

Refuge-wide herbaceous forage production averaged 14,387 (SD = 4,125) tons during 1998–2013. In recent years irrigation of approximately 3,600 acres has increased refuge-wide forage production by approximately 10% compared to what would have been produced with precipitation alone, and by 15% in the southern

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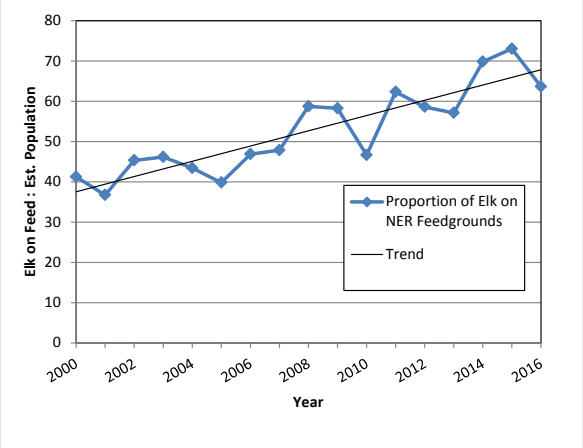


Figure 6. Increasing trend of National Elk Refuge elk on feed as a proportion of the Jackson Elk Herd estimated population size.

portion of NER which receives the greatest use by elk and bison.

Since 2007, the general awareness of climate change among the public has greatly increased. A strong, credible body of scientific evidence shows that climate change is occurring, is caused largely by human activities, and poses significant risks for a broad range of human and natural systems (National Academy of Science 2010). Ecological systems in the GYE are likely to be affected and associated changes may have implications for elk and bison management. Moderate term to long term effects of climate change in Jackson Hole will likely include increases in average temperature, a reduction in the duration and distribution of snow cover, an increase in the number of frost free days, increased wildfire frequency, and changes in plant community composition and structure including loss of forest and shrub cover and an increase in invasive plants (Riginos and Newcomb 2015). The net effect of these changes relative to the implementation of the MSP remains uncertain.

Current Management

Ongoing primary management actions on the NER include winter feeding, harvest, irrigation, and hazing. In GRTE, harvest of elk during the Elk Reduction Program takes place, when necessary, in collaboration with WGFD, and restoration of previously cultivated and irrigated sagebrush-grasslands is ongoing. Fundamental components of each of these will be briefly described below to provide a basis for comparison to MSP strategies that will follow.

Chronic Wasting Disease

Supplemental feeding has occurred in all but 9 winters on NER since 1912, and although this strategy minimizes winter elk mortality from starvation, contributes to Wyoming state elk herd objectives, eliminates commingling with livestock, and keep elk off adjacent roadways, elk occur at numbers and densities well in excess of carrying capacity (Smith et al. 2004, Lubow and Smith 2004). Considerable evidence suggests that Chronic Wasting Disease (CWD) transmission and prevalence are density dependent (Peters et al. 2000, Williams et al. 2002). Monello et al. (2014) found that elk densities of 15-110/km^2 (0.06 to 0.45/ac) in Rocky Mountain National Park were associated with 13% CWD prevalence, and they predicted elk population declines when CWD prevalence exceeded 13%. NER elk densities range from 77-16,850/km^2 (0.31-68/ac; NER unpublished data), which suggests that the introduction of CWD to NER elk would have significant negative population effects over time.

Winter Feeding

Initiation of feeding has the primary objectives of 1) minimizing elk winter mortality, focusing on calves since they are the most susceptible age class, and 2) minimizing comingling of elk with cattle on nearby adjacent private lands. Winter feeding begins when available forage reaches approximately 300 lbs/ac. Historic radio telemetry data and observations of elk movements indicate that when available forage declines below 300 lbs/ac., some elk leave NER for surrounding private lands. Therefore, the purpose of this feeding "trigger" is to keep elk on the NER and prevent them from searching for forage off the NER, which would increase the potential of comingling with cattle causing damage to private lands, and moving across Highway 89 where the risk of vehicles hitting elk

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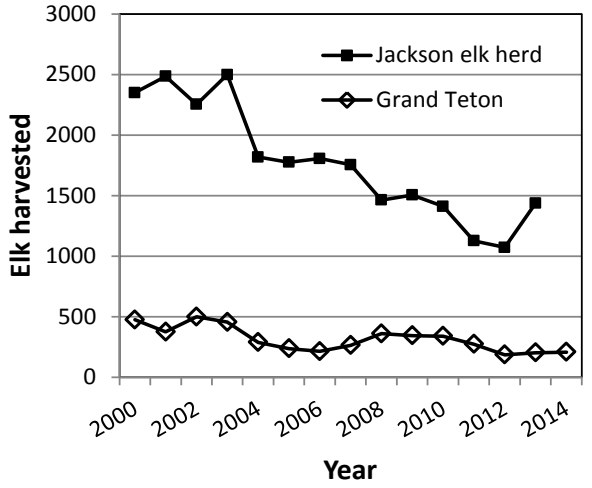


Figure 7. Estimated elk harvests for the Jackson Elk Herd and the amount of that harvest that occurs in Grand Teton National Park, 2000–2014.

is high. This trigger is not a warning that a significant nutritional deficit threshold has been reached. Available winter forage for elk and bison on the NER is largely determined by biomass of forage produced during the previous growing season, rate of forage consumption during fall and winter, and how snow conditions affect forage availability.

Index sites are used to sample forage biomass and determine when feeding should be initiated. These sites are selected annually to represent plant communities that are highly preferred by elk due to plant species composition and the persistence of green vegetation. Weekly sampling begins in late December to estimate available forage biomass at each index site. When average available forage across index sites is below 300 lbs/ac, biologists typically recommend that supplemental feeding be initiated.

During 1995–2013, the average initiation of winter feeding in NER occurred 28 January (range = 30 December–28 February), and feeding was terminated on 3 April (range = 20 March–20 April). Variation in feeding initiation and termination dates has been based on winter conditions and a desire to avoid elk-cattle comingling on nearby private lands. Coordination of winter feeding dates on the NER and WGFD-operated Gros Ventre drainage feedgrounds (Alkali, Patrol Cabin, and Fish Creek) occurs annually to help minimize movement of elk between these areas. This coordination will continue regardless of the management strategy employed. The relationship of recent elk numbers and objectives for NER and WGFD-operated feedgrounds and native range is shown in Table 2.

Bison discovered refuge feeding operations in 1980, and since that time they have been fed each year to help minimize disruption to elk feeding operations. Because bison displace elk from feedlines, NER staff attempt to feed most bison in the northernmost refuge feedground and provide a heavy feed ration, which helps keep them in this area. This strategy prevents bison from mingling with elk and also prevents bison from moving to areas where conflicts with humans are more likely.

Harvest

Total hunter harvest of the JEH was gradually

Table 2. Annual distribution of wintering elk from the Jackson Elk Herd during February classification counts, 2011–2016, relative to the current objective.

	OBJECTIVE	2011	2012	2013	2014	2015	2016	mean
NER	5,000	7,746	7,360	6,285	8,296	8,390	7,290	7,561
Gros Ventre	3,500	2,775	3,265	2,982	2,326	1,162	1,667	2,362
Native Range[1]	2,500	982	894	1,784	801	913	1,711	1,180
Total	11,000	11,503	11,519	11,051	11,423	10,465	10,668	11,105

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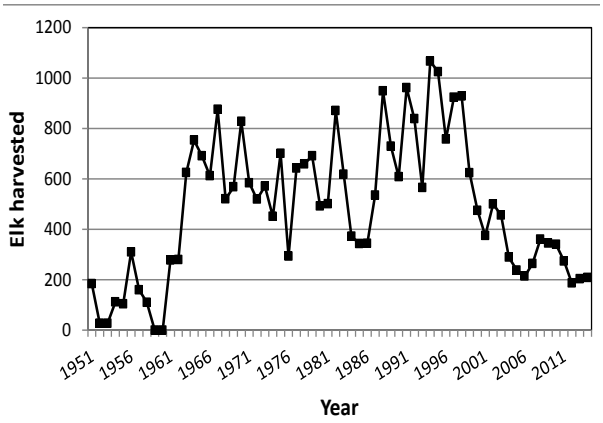


Figure 8. Elk harvest in Grand Teton National Park, 1950-2015.

reduced over the last decade as the population neared objective (Fig. 7). Elk hunting on the NER (Hunt Area 77) typically begins in mid-October and ends in mid-December, with peak harvest in recent years occurring in late November to early December. From 2005 to 2015, 422 ± 102 (mean ± SD, range = 329-612) hunters harvested 196 ± 95 (range = 126-457) elk per year during the NER hunt.

The 1950 legislation that created GRTE provided for a controlled reduction of elk, when necessary, in specific portions of the park, primarily east of the Snake River. Elk reduction programs have taken place in the park each year since 1950 except two (1959 and 1960), when GRTE and WGFD officials agreed a reduction was not necessary (Figure 8). Season dates have varied over the years but recently have run from mid-October to early-December. The GRTE harvest accounts for about 25% of the JEH overall harvest, thus has been an important factor in regulating the population. Increased predation, likely a result of increases in grizzly bears and wolves over the last 20 years, has decreased the need for large harvests in GRTE.

Bison hunting begins 15 August and ends in early to mid-January. Most harvest occurs on the NER, with some additional harvest on private and BTNF lands. Since resuming the bison hunt in 2007, harvest has been 210 ± 45.5 (range 139-301) bison per year. This level of harvest has been sufficient to arrest the exponential growth of the population, reducing bison numbers from the peak in 2007 to about 700 animals in winter 2015 (Fig 3). Tribal bison harvest of up to 5 animals for ceremonial purposes was authorized in the BEMP. Translocation of wild bison to lands outside of Teton County is not currently permitted due to brucellosis concerns.

Bison hunting is not allowed in GRTE because of long standing NPS policy that prohibits most hunting in national parks. Bison quickly learned to take advantage of the safety of GRTE, which has made hunter harvest goals difficult to achieve. Many bison stay in GRTE during the hunting season, with only occasional short term movements to the NER, until severe winter conditions occur. In response, NER and WGFD managers have attempted to extend the hunt to late January while minimizing the conflict with the initiation of winter feeding. The unpredictable nature of winter conditions that time of year makes this challenging, and has (or could) result in the use of emergency season extensions or reductions.

Hazing

NER staff haze elk and bison to conserve winter forage, prevent year-round use of winter range, and in some cases to prevent elk and bison from moving to private lands or other areas where conflicts with humans are likely. Hazing using ATVs has proven most effective. The strategy is typically employed during 3 time periods: 1) in May to move elk and bison off NER that are lingering on NER winter range; 2) in July when some bison typically return to NER; and 3) in the period just prior to feeding initiation when elk and bison are most likely to leave NER for private lands. Hazing of elk and bison by WGFD staff also occurs on private lands adjacent to NER periodically throughout the year.

Vegetation Restoration and Protection

The BEMP identified approximately 4,500 acres of previously irrigated and cultivated grasslands in GRTE in need of restoration to native sagebrush grasslands community. Objectives of ecological

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restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. After 2 years of research and field studies, restoration efforts began in 2008. The restoration process involves several steps including: removal of non-native vegetation through repeated herbicide applications, collection and propagation of native grass, forb and shrub seeds and finally native seeding. Repeated herbicide treatments have been warranted prior to native seed planting as well as spot treatments of invasive weed species subsequent to native seeding. Substantial progress in this endeavor has been made since 2008, including 1,235 acres of previously cultivated lands under restoration treatment. Of the 1,235 acres undergoing treatment, 745 acres has been seeded with native grass, shrub, and select forb mixes, and 89 acres is considered fully restored. Two-hundred and seventy-five of these acres are currently fenced to reduce grazing pressure of early native vegetation establishment from bison and other ungulates. An additional 490 acres are targeted for native seeding in 2016 once removal of the invasive vegetation is successful. All treatments are monitored for native plant establishment and invasive plant infestations and treatments will be adjusted as necessary. Invasive plant treatments may have to continue indefinitely. GRTE will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Private Lands Mitigation

Fencing of hay stacks and livestock feedlines has been historically used to mitigate particularly difficult conflicts on private lands. Targeted fencing of golf course greens and sand traps fall through spring has also been successful in some situations for mitigating elk and bison presence and associated damage in these areas. It is important to note that the county has a "wildlife-friendly" fence policy and does not support extensive fencing that is impermeable to wildlife in residential areas.

Methods, Assumptions, and Constraints Common to All Strategies

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes, particularly population sizes. Measurements of the Jackson bison herd will be based on the annual mid-winter census and sex and age classification survey performed by NER, GRTE, and WGFD biologists. This survey occurs one day in February and includes ground counts of animals on feed at the NER and aerial counts of outlying bison across their winter ranges on the refuge, park, and Bridger-Teton National Forest.

Elk population estimates will also be based on mid-winter aerial and ground counts. However, the mid-winter counts are undertaken during a single survey period and do not necessarily represent either peak or cumulative abundance of elk on feed. Rather than basing progress toward the number of elk on feed for the entire season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 elk were fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000.

We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both

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Table 3. Summary of potential Step Down Plan constraints.

Policy

- ESA[1] Lynx – limits on habitat impacts
- Greater Sage Grouse – core area protection
- 2007 BEMP/EIS (federal actions/lands)
  - No fertility control
  - No test and slaughter
  - Limited tribal harvest
- Bison/elk hunt end date (Feb. 1st)
  - WGFD, brucellosis safety
- Carcass disposal (Feb. 15th)
  - WGFD, brucellosis safety
- Forest Service winter closure (Dec. 1st – April 30th)
- Easement limitation (NER boundary)

Winter Feeding

- Only during non-hunting periods

Harvest

- State regulations

Vegetation Restoration/Protection

- Bison/elk distribution
- Exotic plant species management

Private Lands

- Owner agreements

Social

- Hunter density (safety; hunt quality)
- Elk/bison winter mortality levels
- Public safety (ungulate/vehicle collisions)
- Disease
- Land-use conflicts (agricultural and residential)

Biological

- Disease (bison/elk/cattle commingling)
- Sage grouse habitat conflicts
- Fencing/wildlife conflicts
- Elk herd distribution
  - summer segment distribution goals

Funding

- Easement purchase
- Plan implementation

[1]Endangered Species Act

species on supplemental winter feeding.

Initial success of the MSP will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP does not provide specific measurement criteria to determine when the NER has successfully attained the objective of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage", we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. This level was chosen to define success because it suggests that elk and bison will be predominately foraging on free standing natural and cultivated forage rather than on supplemental feed.

Several management constraints are common to the strategies discussed below (Table 3). Many law and policy constraints are applicable but we include here only those most pertinent. Endangered Species Act (16 USC 1531 et seq.) requirements for wolves, grizzly bears, lynx, and others apply. Lynx requirements for maintaining certain habitat types could limit methods used and areas considered for habitat improvements in GRTE and the BTNF. Such improvements could increase elk and bison use of native winter range off the Refuge while simultaneously reducing use of feedlines. Similarly, compliance with the 2015 sage grouse amendment to the 1990 Bridger-Teton National Forest Land and Resource Management Plan and the Wyoming greater sage-grouse core area protection executive order (2011-5 and supplement 2013-3) could affect habitat manipulations. NEPA compliance conducted as part of the BEMP/EIS constrains what federal actions can be taken as a part of this plan. State regulations constrain late (winter) hunt and carcass disposal timing to protect against brucellosis contamination, since February-April represent the period bison and elk are most likely to transmit the disease. Restrictions on hunting timing also result from BTNF winter range closures, immediately east of the NER and elsewhere, December 1 to April 30. Additional details about these and other

constraints will be included in discussions about specific strategies that follow.

Strategies

This section describes the management action this MSP proposes to implement. As such, it unveils the heart of management changes proposed to begin the process of transitioning to greater reliance of bison and elk on native forage during winter. Fundamentally, the strategies discussed in this plan represent an experiment designed to achieve Phase I objectives of 5,000 elk and 500 bison on NER and are a first step towards reducing reliance on supplemental feeding while meeting the sustainable population goals identified in the BEMP.

Initial strategies for achieving sustainable population goals identified in the BEMP (Table 1) are presented by the objectives below. The primary management actions available to the agencies to achieve Phase I objectives are modifications to winter feeding and hunting seasons. To a lesser extent, vegetation protection and restoration can be important, particularly for improving long-term ecological function and enhancing natural production of native forage. Private lands are also an integral component as changes in elk and bison distribution occur and new challenges develop. The likely consequences of implementing these strategies were evaluated in the BEMP. The most relevant of these are summarized in Appendix 1.

Objective: 1) *Implement a phased reduction of animals on NER feed to 5,000 elk and 500 bison, and, 2) influence elk and bison to rely predominantly on native habitat* (Table 1).

The first phase will be to reduce the number of elk on NER feed to approximately 5,000 and achieve a target population of about 500 bison. The second phase will be to adaptively manage bison and elk populations to achieve desired conditions, with animals relying predominately on available native habitat (NER, GRTE, and USFS lands) and cultivated forage (NER).

As previously mentioned, the concept of reducing winter feeding after more than 100 years of the practice, and the associated behavioral conditioning of elk and bison to its presence, represents a formidable challenge that must be approached cautiously and systematically. Efforts to scale back elk supplemental feeding operations in other parts of North America have been rare and fraught with controversy (Smith 2001). The strategies discussed below have been developed in this context, with appropriate feedback mechanisms through rigorous monitoring and frequent evaluation. Inability to meet this objective under the strategies presented here would trigger a thorough evaluation and consideration of more aggressive strategies when the BEMP is updated in 2022.

Chronic Wasting Disease

Since 1997, NER has cooperated with WGFD to conduct intensive surveillance for CWD in the JEH unit. GRTE has also collaborated with WGFD to collect samples from the ERP and from road-killed cervids. Although this effort indicates that CWD is not currently found in the JEH, continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence annually will be critical to ensure a timely management response and limit the long-term population effects of the [USFWS and USNPS, 2007b]. Given that CWD has been detected within 40 miles of the JEH in moose, within 35 miles in deer, and within 175 miles in elk, this level of surveillance is warranted.

In 2016, the WGFD cooperated with federal agencies and other stakeholders to revise the 2006 Wyoming CWD Management Plan. The NER and USFWS Region 6 Wildlife Health Office staff participated in several meetings associated with this effort. The Wyoming CWD Plan lists several management responses for consideration if CWD be is detected on or adjacent to State or NER elk feedgrounds. Early detection of CWD in the JEH is essential to allow implementation of management responses.

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The BEMP (2007) identifies the management response to the arrival of CWD as following the State of Wyoming CWD Plan in effect in 2007. The Wyoming CWD Plan was updated and significantly changed in 2016. In light of changes in the Wyoming State CWD Plan, and the results of CWD Studies completed since 2007, the NER management response to CWD will be reviewed and updated in a NER Disease Contingency Plan, as identified in the NER Comprehensive Conservation Plan (2016). The CWD section of the NER Disease Contingency Plan will remain consistent with the goals of the BEMP. The NER Disease Contingency Plan is scheduled to be completed in 2017.

Winter Feeding

Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the long run, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning animals to "expect" feed to be available later in the winter; this could build cohorts of animals that rely primarily on native winter range. To reduce supplemental feeding, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, which is the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require assistance with focused mitigation measures.

As bison and elk behavioral responses are better understood, and targeted mitigation on private lands is achieved as needed, feeding delays will be extended depending on several variables (Table 4, Fig. 9). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence on feeding initiation date, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Forage availability would also be affected by the numbers of elk and bison on the NER. And finally, the distribution of animals, particularly on private, livestock producing lands would be considered in determining feeding initiation date.

A primary concern of manipulating feeding is elk winter mortality, particularly among calves. As food becomes limited in winter, calves are usually the first to experience nutritional deficit and winter mortality because they are displaced by more dominant animals, they have limited fat reserves, and are more susceptible to cold temperatures than larger animals. Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years (Appendix 1).

In the early years of MSP implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date during the period of MSP implementation.

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The MSP winter feeding strategy would include the establishment of additional key forage index sites and on-going measurements at those sites throughout the winter.

Harvest

Currently the JEH is at the Wyoming Game and Fish Commission established objective of 11,000 animals, which means there is less flexibility in manipulation of harvest regimes than there would be if the herd was above objective. Initially there would be little change in elk harvest programs on the NER, with the exception of allowing a limited number of any elk permits throughout the season, considering allowing bow hunting near developed areas (roads and buildings) and shifting the season about a week later (Table 4). Allowing a limited number of any elk permits would be consistent with providing sport hunting recreation on National Wildlife Refuges (NWRS Improvement Act; 1997) and the NER CCP [USFWS, 2015] and possibly encourage more hunters to participate in antlerless elk hunts. Monitoring programs and consideration of bull ratios in the GRTE summer segment (since most park bulls migrate to the NER) would help inform levels of proposed take. Bow hunting in areas currently closed to firearms will likely increase harvest by eliminating "no-hunt" areas which can become sanctuaries for large numbers of elk. Shifting the hunt one week later is consistent with later migrations and will improve harvest effectiveness (Fig. 9).

General elk harvest patterns in GRTE would continue to be based on need for harvest, summer segment population estimates, herd status relative to population objective, herd demographic parameters, herd-wide distribution of harvest, and mitigation for impacts on other resources and visitor activities.

Elk herd population objectives are reviewed every five years by the Wyoming Game and Fish Commission and adjusted as necessary. Agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. Lowering the population would help compensate for reduced use of traditional native winter range and increased growth of short-distance migrants which has led to significant increases of winter elk concentrations on the NER.

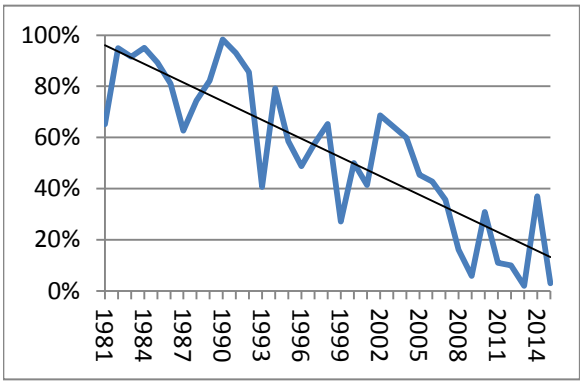


Figure 9. The percentage of elk that wintered on NER counted there on December 1, showing progressively later annual fall/winter arrival of elk to the NER during the past several decades.

The annual fall/winter arrival of elk to the NER during the past several decades has been occurring progressively later. This trend may necessitate extending the elk hunting season later into the year to achieve harvest objectives.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later end dates that are commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution. Special limited hunts designed to discourage bison from attempting to leave the NER via the south boundary into the town of Jackson will also be considered. If progress toward reaching the herd objective of 500 animals continues and the objective is reached, WGFD will adjust harvest quotas in the context of the objective, as necessary, to address population changes through time.

A cattle guard was installed on the Refuge Road

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near the east end of Broadway Avenue to help prevent bison and elk herds from entering the Town of Jackson. This will reduce the potential for dangerous human/wildlife interactions.

Currently, the effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives, but also that elk are sensitive to hunting pressure which can cause elk movements to areas that cause management issues for WGFD. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st in the future.

Annual herd-wide population estimates, elk summer herd segment estimates in GRTE and NER, temporal and spatial harvest patterns, and animal-fed-days would be monitored, and the resulting information would be used to inform ongoing evaluation of elk and bison management harvest programs (Figs. 9 and 10).

Hazing

No change in hazing practices is anticipated initially under this MSP framework.

Private Lands Mitigation

Delaying the onset of NER feeding is likely to result in changes in bison and elk distribution (Appendix 1). Some elk or bison may move to private lands in search of forage. Of greatest concern is the potential for elk or bison to commingle with cattle of cow/calf operations, where brucellosis transmission could have considerable consequences, such as requiring depopulation of the cattle herd.

Several strategies would be employed to mitigate potential problems (Table 4), including providing incentives for non-breeding cattle operations (because brucellosis transmission to slaughter-bound cattle is not economically important), increased fencing in some limited areas to separate elk/bison from livestock feed lines, haze elk/bison away from livestock feed lines and purchase private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal Wildlife Conflict Technician positions which are supervised by the WGFD. These Technicians are also critical to the success of an expanded monitoring program vital to the MSP (see Monitoring section below).

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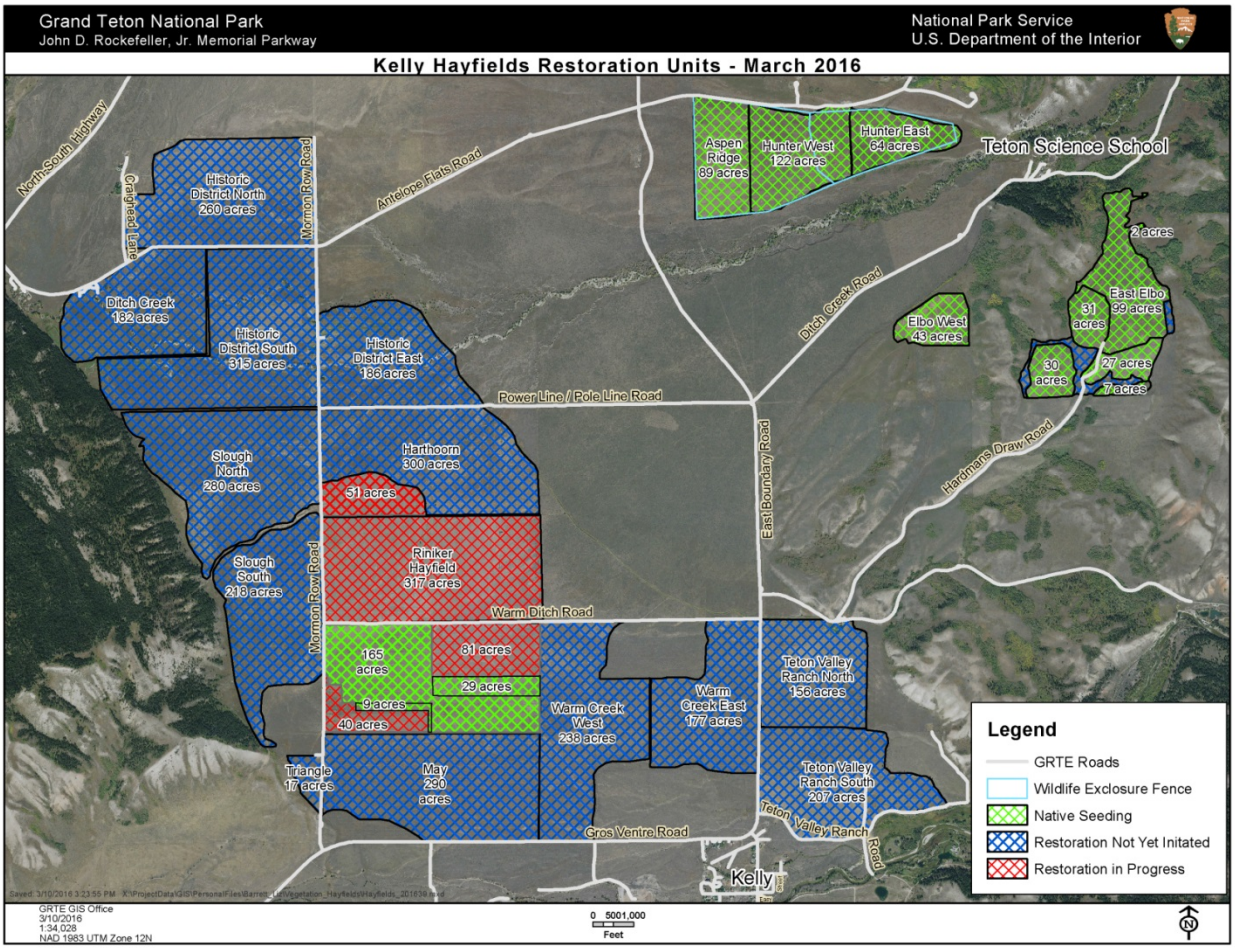


Figure 9. Units and status for the Kelly Hayfields ecological restoration effort in Grand Teton National Park, March 2016.

A database will be established to track non-agricultural conflicts on private lands to determine trends which will help evaluate the effectiveness of MSP mitigation efforts.

Preventing elk and especially bison from entering the Town of Jackson is essential in maximizing publicsafety and minimizing private property conflicts. Currently, bison are hazed northward when they drift south of Miller Butte. A cattle guard was installed on the Refuge Road just north of Broadway Avenue. This barrier is designed to prevent elk/bison from entering the Town of Jackson.

Vegetation Restoration/Protection

The varied approaches to restore the Kelly Hayfields in GRTE (4,500 acres) was initiated in 2008 following 2 years of research and field studies (Moeny 2008). The approach to ecological restoration includes serial treatments to 1) remove non-native species (e.g., herbicide application and prescribed burning); 2) seed native shrub, grass, and forb species; and 3) treat subsequent invasive plants by applying herbicides and, where appropriate, construct temporary fences to protect recently seeded pastures from colonization of non-native species and damage from large herbivores during early phases of restoration.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres within 7 pasture units are currently under restoration treatment and 3,265 acres remain non-native grass pasture (as of 2016; Figure 9).

The non-native grass pastures are divided into 13 pasture treatment areas and are projected to be likely restored by 2035. As of 2016, approximately 745 acres are seeded with native vegetation, and 89 acres are considered fully restored. Maintenance of restored ecological conditions, however, will likely require management efforts in perpetuity to keep non-native species from colonizing restored areas. All 1,235 acres that are underway toward ecological restoration are being monitored for native plant establishment, invasive plant infestations, including cheatgrass spread. Park staff will continue to monitor and adaptively adjust treatments and restoration strategies according to our results.

Objective: *Maintain natural bull-to-cow ratios in park summer herd* (Table 1).

National Park Service management policy (NPS 2006) provides guidance for maintaining naturally regulated wildlife populations, free from the impacts of humans, to the greatest extent possible. The final BEMP identified a goal of maintaining park elk bull:cow ratios (a common way of expressing sex and age ratios in wild ungulate populations) near 35 adult bulls per 100 adult cows, based on estimates of what this ratio would be in a herd free from the effects of human harvest. The sex and age ratios of most North American elk populations are affected by sport hunting and herd managers generally maintain lower bull ratios.

Harvest

Based on summer bull ratios for elk in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded refuge hunting opportunities are considered.

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Table 4. Comparison of current and primary MSP components and parameters.

Action	Current Management	Management	Comment
Winter Feeding:			
Feed	Pelleted alfalfa	Pelleted alfalfa	No change
Ration	Full ration average: 8-12 lbs/day/elk	No Change	No change, to minimize calf mortality. Note average daily ration over the entire feed season is lower than a full ration because feed rate is gradually increased at the beginning of the feed season and gradually reduced at the end to facilitate rumen acclimation
	20-22 lbs/day/bison	20 lbs/day/bison	
Start criteria:			
Available standing forage	300 lbs/acre, as measured at traditional key index sites	Generally later; index sites to be increased in number and distribution	Influencing factors: -time of season -forage availability -number of elk/bison on NER -elk/bison distribution
End criteria:			
Available forage	Based on a snow cover index and subjective estimate of when residual or new forage is adequate	Generally 1 week earlier than current management	Ongoing development of more objective criteria for future implementation ongoing
Monitoring:			
Animals on feed	Mid-winter census	Elk/bison fed days[1]	
Proportion of JEH on NER	Mid-winter census	Mid-winter census	
feed			
Calf mortality	2008-2015 Average: 3.3% (range 1.1-9.0%)	Potentially higher than current levels but less than native winter range	
Elk/bison distribution – collars	Almost no documented use of private lands during feeding operations	Unknown, but likely higher use of private lands than current management	
Elk Winter mortality (all age classes)	2008-2015 Average:	<=3%	
	1.2% (range 0.6-1.9%)		

Table 4. Comparison of current and primary MSP components and parameters.

Action	Current Management	Management	Comment
Elk summer range segment Proportions for NER wintering elk	Approximately -40% GTNP North of Moose -35% South Snake River -10% Gros Ventre/Flat Creek -10% Teton Wilderness -5% Southern Yellowstone	Unknown, but will be monitored based on summer distribution of radio collared elk	Based on summer distribution of elk that were randomly radio collared on NER.
Harvest, National Elk Refuge elk:			
Frequency	Annual	Annual	
Begin Date	2nd week October	No Change	Modified as necessary
End Date	3nd week December	No Change	Modified as necessary
Structure	- 1 week initial drawing	- 1 week initial drawing	
	- 1 week left over 1st served	- 1 week left over 1st served	
	- partial week alternate	- partial week alternate	
	-daily 1st served alternates	- daily 1st served alternates	
Refuge permit types	- 1st week any elk	- Primarily antlerless only	
	- Antlerless only remainder of season	- limited any elk permits throughout season	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries		Consider expanding to allow bow hunting near developed areas	
Harvest, National Elk Refuge bison:			
Frequency	Annual	Annual	
Begin date	August 15th	August 15th	Modified as necessary
End date	2nd or 3rd week January	Consider later dates as appropriate	Modified as necessary
Hunting Season Structure	As per WGFD	As per WGFD	
Refuge permit types	Any bison or cow/calf per state license	Any bison or cow/calf per state license	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries	Limited to north of Nowlin Creek area	Consider escorted hunting in South Unit as needed	Guided hunts in South Unit when authorized
Harvest, Grand Teton NP elk:			
Frequency	As needed	As needed	
Begin Date	3rd week October	3rd week October	Modified as necessary
End Date	2nd week December	2nd week December	Modified as necessary
License types	Antlerless only	Antlerless only[2]	
Special regulations:	Cartridge limits	Cartridge limits	

Table 4. Comparison of current and primary MSP components and parameters.

Action	Current Management	Management	Comment
	Bear spray required	Bear spray required	
	Hunter safety card required	Hunter safety card required	
Harvest, Bridger-Teton NF, Elk Hunt Area 80:			
Begin Date			
End Date		15-Dec	Would require change in winter closure dates
Harvest, Elk Hunt Area 78			
Structure			Changes at discretion of WGFD
License Types			
Private Lands Mitigation:			
Cattle commingling		Incentives for non-breeding operation	
Hay depredation		Increased fencing	
Landscape damage			
Easement acquisition			
Vegetation Restoration/ Protection: Elk Refuge			
Vegetation Restoration/ Protection: Grand Teton	Herbicide treatments, prescribed burning, native seed propagation and planting, and protection and maintenance of restored pastures	Same as Current Management for remaining non-native grasslands in Kelly Hayfields	

[1]Number elk and bison on feed per day, totaled by feeding season.

[2]Any elk licenses could be offered if bull ratios in the park consistently exceed BEMP criteria.

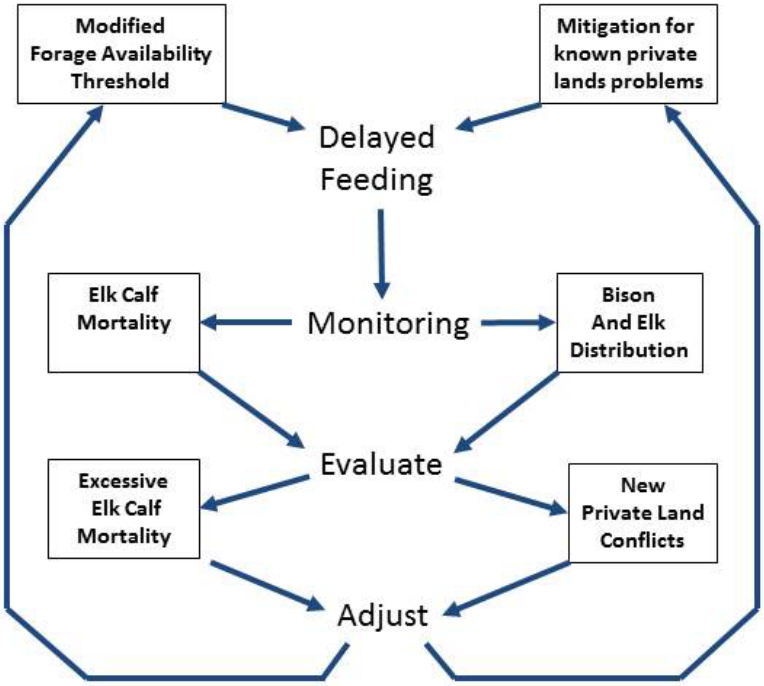


Figure 10. Framework for delayed feeding strategy under MSP.

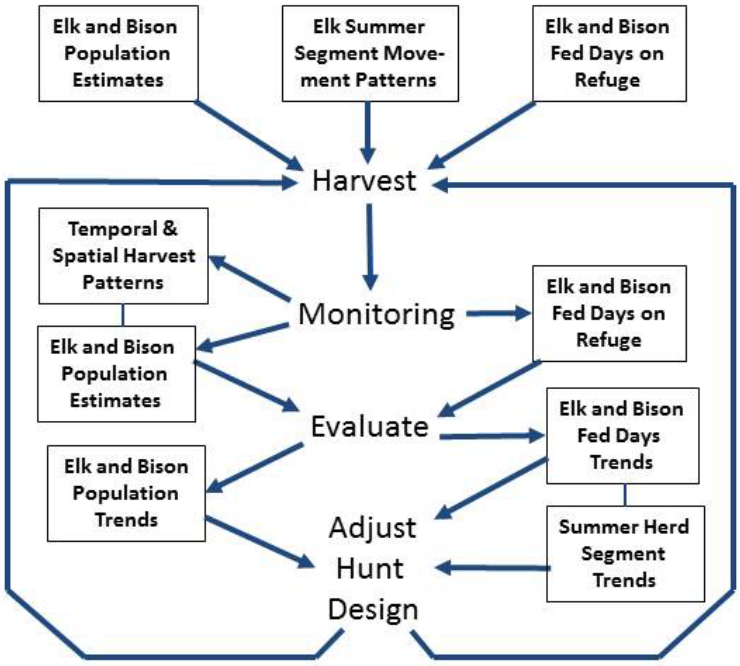


Figure 11. Framework for harvest strategy under MSP.

Strategies Considered But Rejected

The BEMP considered several additional strategies for elk and bison management that, for a variety of reasons, were not selected for implementation in the preferred alternative and Record of Decision. The agencies reconsidered a subset of these during the development of this MSP (Table 5). Since they were not part of the ROD, additional NEPA compliance would be necessary to incorporate any of them into this MSP, and thus they are not being considered at this time.

Table 5. Strategies considered but rejected.

Strategy Considered	Reason Rejected
Fertility control in elk	Judged not reasonable or feasible in BEMP, primarily due to major technical, social, and financial hurdles[1]. For MSP discussed primarily with regard to the difficult to harvest herd segment in Hunt Area 78 on private lands, where federal agencies have no jurisdiction.
Fertility control in bison	Impacts discussed at length in BEMP[2]. Not considered for MSP because current hunting programs appear effective at slowly moving the herd toward the 500 animal herd objective.
Agency reduction of bison or elk	Not considered necessary or desirable on federal lands because current hunting programs that utilize sport hunters are effective at meeting herd objectives.
Altering rations of supplemental feed	Rejected as a strategy because reducing daily feed ration below 8 lbs/elk would be enough feed to encourage elk to remain on NER but would result in unacceptably high elk calf mortality rates.
Private Lands Hunting Coordinator	The WGFD contacted private landowners and ranchers in the Spring Gulch area and discussed this concept to enhance elk harvest of short distance migrants. Generally, landowner interest was low.

MODELS OF SYSTEM DYNAMICS

Models provide a simplified representation of the biological system being managed. We will use modeling to quantify the effects of our management actions on 2 key responses of interest, elk distribution and winter elk calf mortality. (ADD: range of elk calf mortality in non-fed populations.)

There are a suite of possible factors that affect the proportion of elk on NER feedgrounds versus native winter range. Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

An increase in calf elk winter mortality is a potential result of reduced feed season length. Several factors influence winter calf elk survival on NER (Fig. 13). Models will be used to assess the effects of available forage on winter calf elk survival (Appendix 4). Over time this will allow us to assess the effects of our principal management strategy (reducing feed season length) relative to winter elk calf survival.

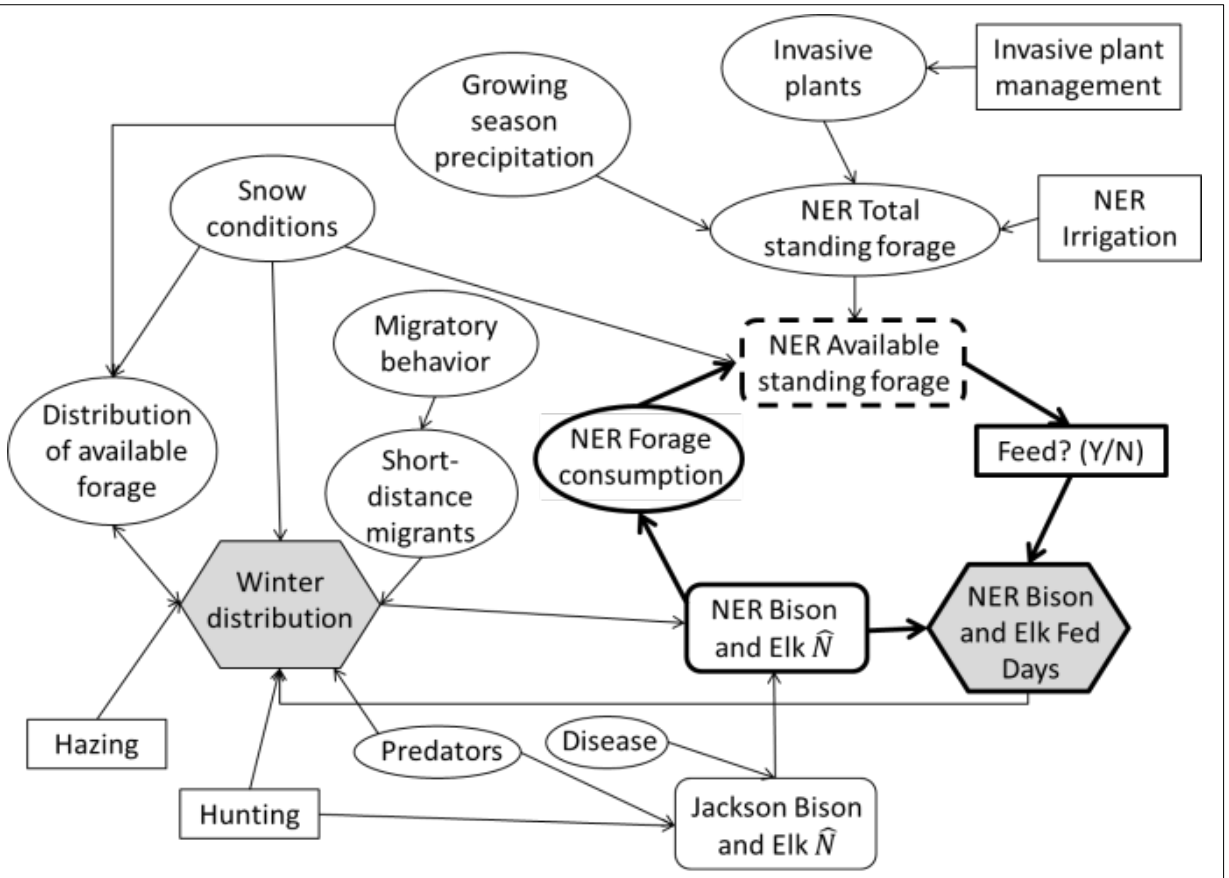


Figure 12. Diagram depicting the factors that potentially influence outcomes identified in the Bison and Elk Management Plan (BEMP; USFWS 2007a). Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

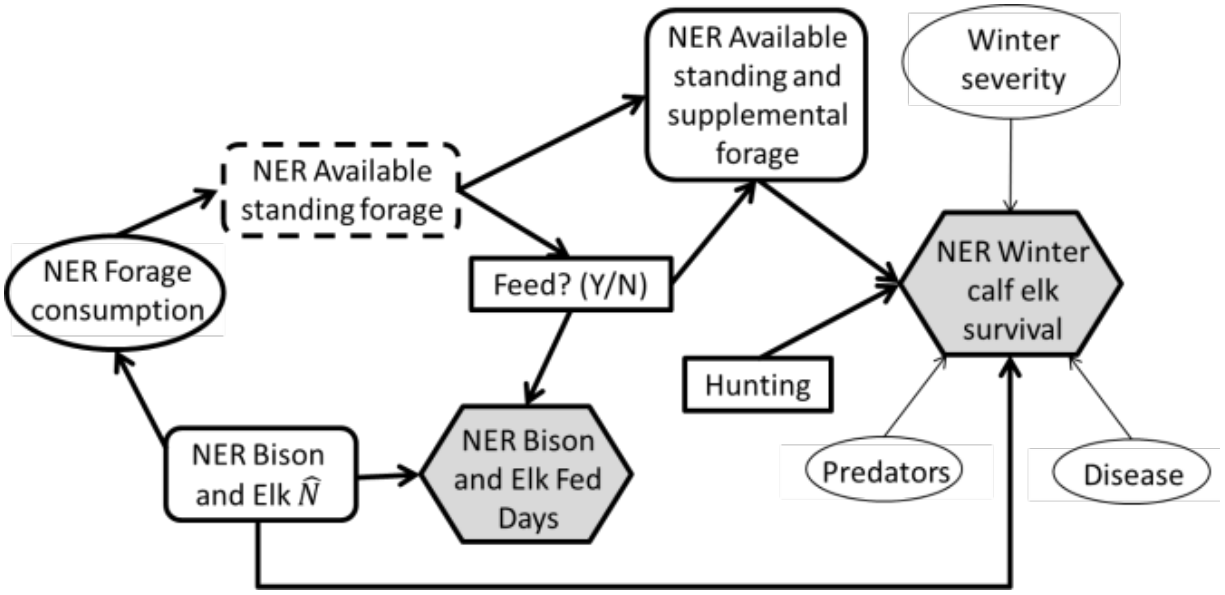


Figure 13. Diagram depicting the factors that potentially influence bison and elk fed days on the National Elk Refuge and winter calf elk survival. Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

MONITORING

Feeding Initiation Monitoring

NER uses weekly field estimates of the amount of forage available to elk to determine feeding initiation date. Currently measurements are taken at key index sites representing areas preferred by elk on NER (see supplemental materials at end of this section). These methods will be enhanced by 1) increasing the number of sampled sites to better represent the total amount of forage available to elk on the southern half of NER; 2) increasing the precision of estimates at each site by increasing the number of observers; and 3) extending the monitoring period later in the winter to assess the relationship between available forage and elk and bison distribution.

To better represent the total amount of forage available on the southern half of NER, a subsample of current key index sites will be retained to facilitate comparison with historic data, but additional random sample sites stratified by elk habitat preference will be added. Historic elk distribution mapping and elk GPS collar data (NER unpublished data) suggest that the areas most preferred by elk on southern NER are associated with moderate to high forage production and green vegetation. Because the distribution of forage production and greenness characteristics vary annually based on irrigation and precipitation patterns, we will annually map areas preferred and not preferred by elk and sample sites will be randomly selected within each of these mapped categories. At least 3 historic key index sites, 3 random sites in areas preferred by elk, and 3 sites in areas not preferred by elk will be sampled each week from late December through the initiation of supplemental feeding.

Currently the NER biologist is the only person trained in the techniques used to estimate available forage (see supplemental materials). At least 2 additional personnel will be trained in these techniques. This will provide a backup in the event of future personnel changes and will facilitate error estimates of the available forage measurements at each site.

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Currently NER and WYGFD biologists monitor available forage conditions at least weekly from late December until average available forage at key index sites nears the threshold level of 300 lbs. per acre and feeding is initiated. The principal MSP strategy is to delay the initiation of supplemental feeding after average forage production reaches the 300 lbs/ac level at key index sites. Therefore the monitoring period will be extended to include this period of delayed feeding.

Proportion of Elk Wintering on NER

A principal MSP goal is to reduce the number of elk wintering on NER. Our strategy will be to effect redistribution of elk to native winter range from NER over time via shortening the duration of the feed season, and thus slowly conditioning elk to seek food elsewhere. As feeding periods are shortened, the probability of younger elk age classes discovering NER feedgrounds will be reduced, and, hypothetically, that proportion of the JEH that utilizes NER feedgrounds will decline over time. We will measure this effect by examining changes in the winter distribution of the JEH. WGFD annual trend/classification count data provide a multi-year baseline data set to measure changes in the winter distribution of the JEH and categorizes observations by location. In each year, we will calculate the proportion of total classified elk in the JEH that are classified on NER feedgrounds. We will compare the 3-year running average post MSP implementation to the pre-implementation baseline. The pretreatment baseline will be comprised of data from 2008 2016, a time period that represents BEMP implementation prior to MSP actions (Figure 13).

Elk Fed Days and Bison Fed Days

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. We further assume the variables elk-fed-days (EFD) and bison-fed-days (BFD) are a proxy for these conditions. EFD and BFD will be calculated annually for each species based on the following formulas:

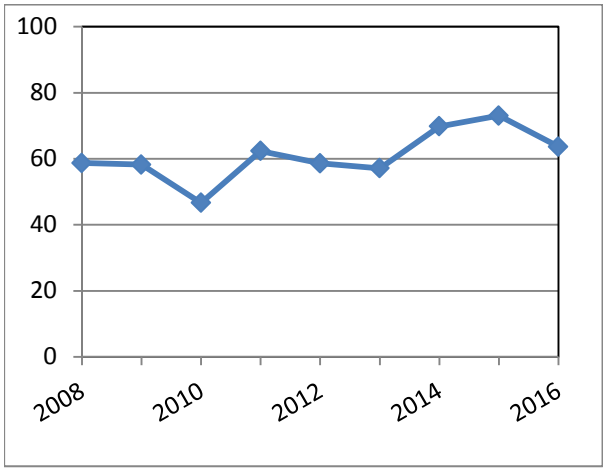


Figure 14. Proportion of the Jackson Elk Herd that was classified on NER feedgrounds in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

EFD= ∑ Total elk counted on feed during daily feedground counts for duration of feed season

BFD= ∑ Total bison counted on feed during daily feedground counts for duration of feed season

Because EFD and BFD are influenced by feed season length and the number of animals on feed, the MSP strategy of delaying the initiation of supplemental feeding will inherently reduce the number of EFD and BFD through a reduction in average feed season length. We believe that EFD will be further reduced by encouraging a greater proportion of the JEH to winter on native winter range, thereby reducing the number of elk occupying NER feedgrounds. We will evaluate changes in EFD and BFD by comparing the 3-year running average post MSP implementation compared to mean EFD and BFD from 2008–2015. The running average is an appropriate comparison because it will help

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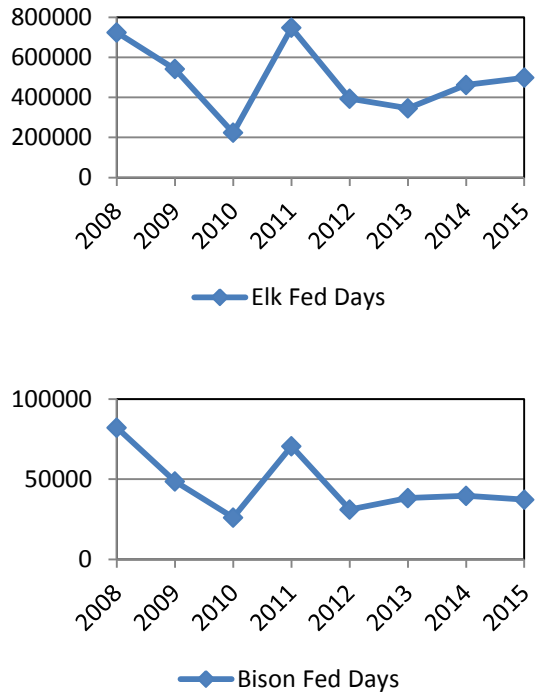


Figure 15. Elk Fed Days (EFD) and Bison Fed Days (BFD) in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the Management Step Down Plan (2008-2015). These values represent the pretreatment baseline which will be compared to the 3-year running average EFD and BFD post MSP implementation.

account for wide annual variation in EFD and BFD associated with winter severity (Figure 15)

Elk Winter Mortality Monitoring

NER has used consistent methods to monitor winter elk mortality since 1982. Each winter NER biologists and other refuge staff conduct a survey of all non-hunting related winter elk mortalities that occur on NER from November through April. Mortalities are tallied by age/sex class and percent mortality is calculated using the corresponding number of elk classified on NER feedgrounds as the denominator. We will continue to monitor elk winter mortality using the same methods post-MSP implementation, which will allow trend comparisons to the pre MSP baseline (Figure 15). Under the MSP framework, we believe the 3-year running averages for total and calf winter elk mortality will be within the range of variation exhibited by the pre MSP baseline. Historic monitoring suggests that calf and total mortality are sensitive to winter severity and disease outbreaks, and that winter mortality occasionally exceeds >3% total mortality and >10% calf mortality. Post-MSP mortality in excess of these levels may warrant shortening the feeding initiation delay in subsequent years.

Elk Collaring

One of the MSP's principal strategies is to shorten the length of the feed season to encourage elk use of native winter range, but we anticipate that this strategy will also result in an increase in elk conflicts on surrounding private land in the town of Jackson and the Spring Gulch areas, potentially including large groups of elk. To quantify this effect and provide real-time information to WGFD and NER managers to facilitate a response, we propose maintaining a sample of 50 GPS-collared elk that winter on NER throughout the MSP implementation period. Forty-five elk represents approximately 0.5% (1 in 200) of the NER winter elk population. This sample size will not be sufficient to detect all elk movements from NER to surrounding private lands, particularly movements by small groups of mature bull elk, but it will be sufficient to detect and quantify significant movements of cow/calf/yearling elk groups compared to pre-MSP baseline data.

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NER has elk GPS-collar data available from the 2008-2013, which represents the post-BEMP, pre-MSP baseline period. We hypothesize that elk movements from NER to surrounding private lands will increase during the MSP implementation period compared to the pre-treatment baseline. This will be tested by comparing the number of incidents that elk left NER for surrounding private lands (per elk/per year), and the proportion of elk GPS fixes on NER versus private lands during time periods of interest. The principal time period of interest is late December–March because this represents the period after the NER elk hunting season, and prior to, and during, NER feeding operations. This is the season when changes to the NER feeding program would be most likely to result in elk distribution changes.

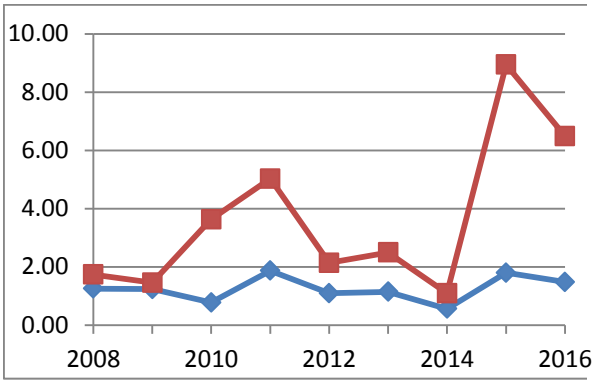


Figure 16. Total (blue) and calf (red) elk winter mortality (%) on NER in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

Thirty adult cow elk were captured on NER feedgrounds in February 2016 and Telonics Iridium GPS collars were deployed with a 90 minute fix interval. Collars will be deployed on up to 50 additional adult cow elk in February-March 2017. Given 83% annual survival for adult cow elk in the JEH (Cole and Foley et al. 2015) and 3-year collar life, approximately 10 additional elk will need to be collared each year in winter 2018 and 2019 to maintain the 50 elk desired sample size over the life of the MSP implementation period.

Ancillary data that will be collected and analyzed during the elk capture and collar data analysis process includes brucellosis seroprevalence, pregnancy rate, and elk summer range determination for comparison to the findings of Cole and Foley et al. (2015).

Disease

The primary purpose of limiting reliance on supplemental feeding is to reduce the prevalence of endemic elk and bison diseases and mitigate transmission risk associated with the introduction of novel diseases. We hypothesize that brucellosis seroprevalence will decline post MSP implementation. There are no recent brucellosis seroprevalence data for elk on the NER, but >50 elk will be captured during elk collaring operations in winter 2016, and each elk will be tested for brucellosis exposure. The 2016 Brucellosis seroprevalence rate will be the pre-treatment baseline to evaluate post MSP change. Chronic wasting disease (CWD) has been monitored in the JEH since 1997, and since 2008 it has been monitored with sufficient sample size to detect 1% prevalence with 95% confidence. No CWD positive cases have been detected in the JEH, which given the long term persistence of the disease, provides overwhelming evidence that CWD is not currently endemic to the JEH. However, most evidence suggests that the distribution of CWD is increasing and that its introduction to the JEH is inevitable. Early detection is critical to ensure an adequate management response, and therefore ongoing monitoring at sample sizes sufficient to detect 1% CWD prevalence with 95% confidence is necessary. CWD is sampled by testing tissues collected primarily from hunter harvested elk, and past experience suggests that 2 full time technicians working from September-December are necessary to ensure minimum sample size. Typical costs associated with 2 technicians are $32,000 per year.

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Data Collected for Modeling

Table 6. Variables to be used in models to explain elk winter distribution in the Jackson Elk Herd and elk calf mortality on NER.

VARIABLE	SOURCE	Elk Winter Distribution Model	Elk Calf Mortality Model
Proportion Jackson Elk Herd on NER Feedgrounds	WGFD/NER Jackson Elk Herd February Classification Count	Yes	No
Proportion Jackson Elk Herd from South Snake River summer segment	Determined from elk GPS collar data for elk captured on NER	Yes	No
Number of wolf packs in the Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated total wolf numbers in Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated number of wolves using NER in winter	NER observations	Yes	Yes
Total NER herbaceous forage biomass	NER forage production survey data	Yes	Yes
Snow Water Equivalent	NOAA snowtell site data	Yes	Yes
NER Winter elk Mortality (calf)	NER winter elk mortality survey	No	Yes
Snow Depth	NOAA Snowtell sites and NER measurements	Yes	Yes
Available Forage	NER and GTNP monitoring in winter months	Yes	Yes
NER Elk and Bison Fed Days	NER feeding records and daily feedground estimates of elk and bison	Yes	Yes
NER Feeding Start Date	NER feeding records	Yes	Yes
Gros Ventre Feeding Start date	WGFD feeding records	Yes	No
Elk Hunting Pressure by Hunt Area	Estimated number of hunter days from WGFD completion reports	Yes	Yes

To facilitate modeling, we will collect data on the following associated variables (Table 6). The table lists variables and how they relate to our efforts to use modeling to explain changes in elk distribution and elk calf mortality relative to our principal action of reducing feed season length.

EVALUATION/FUTURE MANAGEMENT

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Consequently, we anticipate that the strategies outlined in this plan will be in place for a minimum of 5 years, after which an initial evaluation of the program will be made. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented at an annual management MSP update/report, completed by NER staff by the end of March for the previous year.

Consistent with objectives outlined in the BEMP, the long-term goal of this plan is reduce the reliance of bison and elk on intensive supplemental feeding, using adaptive management principles through a structured framework of management actions, to achieve a desired condition of animals relying predominately on native habitat on NER, GRTE, and USFS lands, and on NER cultivated forage. But because there is no precedent for what this plan proposes, there are few responses to proposed management actions that can be predicted to a degree of certainty commensurate with establishing definable thresholds or other objective criteria for success in the short term.

Factors that will be considered in evaluating the success of the program will include the trend of EFD and BFD, type and frequency of private lands conflicts, the proportion of the JEH wintering on the NER, presence or absence of CWD and other infectious diseases, elk and bison population size and distribution, elk calf winter mortality, and public support. These are complex, dynamic, and interwoven components that, together with the MSP, make up the framework for decreasing reliance on supplemental feeding. As such, the effects of changing biological, social, and political conditions on these components will be part of the evaluation process.

In the context of this larger framework, however, we believe evaluation of the trend in EFD and BFD will be most important after the first 5 years of MSP implementation. The direction and magnitude of the trend observed will provide a preliminary basis for evaluation and decisions about continued management actions. Initial success with reduced feeding will be associated with a declining trend in EFD and BFD, with greater magnitudes indicating higher degrees of success. However, determinations of overall program success will necessarily include evaluation of all system components. For example, gains in reduced feeding come could be accompanied by an increase in private land conflicts, which would affect overall success determinations. While the overriding strategy will be to decrease feeding as aggressively as possible while gauging effects on other system components, overall measures of program success through time will necessarily involve evaluating a matrix of effects. These evaluations will be included in annual MSP reports.

As proposed and new management strategies are implemented and evaluated under this plan, at some point in the future it may become apparent that meeting reduced feeding goals will not possible without reducing elk and/or bison population objectives. Population objectives for both herds are set by Wyoming Game and Fish Commission and are evaluated regularly by WGFD personnel, including public review through annual season setting meetings. The BEMP supported the State herd objectives of 500 bison and 11,000 elk, and thus due to NEPA requirements any further consideration of reduced herd sizes by the NER or GRTE are beyond the scope of this plan. However, Wyoming Game and Fish Commission changes to Jackson bison or elk herd objectives are not constrained by the BEMP.

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Investigating the potential effects of climate change on elk and bison management will also be important in the long-term. During implementation of this plan, we will collect a variety of data that could be drawn upon for this purpose.

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PUBLIC OUTREACH AND EDUCATION

The practice of winter feeding is inexorably woven into the historic fabric of Jackson Hole. Elk are identified with the rich and unique legacy for which Jackson Hole is known around the world. De-emphasizing the supplemental feeding program will be a major paradigm shift for the residents of Jackson Hole, Teton County, and the State of Wyoming.

An effective Public Outreach and Education program is essential for effective MSP implementation. The practice of feeding elk evokes passionate responses from those that oppose and those that support this practice. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk/bison herd management methods.

A detailed communication plan to guide outreach and education efforts can be found in Appendix 3.

SCHEDULE

Table 7. Proposed implementation schedule for the MSP.

Action	Date
Public outreach and education	November 2016
Initiate private lands conflicts mitigation contacts/actions	January, 2017
Implement enhanced forage monitoring	January, 2017
Initiate changes in supplemental feeding protocol	January/February 2017
GPS Collar 30-40 elk (Iridium platform)	March 2017
Monitoring/Evaluation/Annual Report	June 2017

BUDGET

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
National Elk Refuge:					
Monitoring:					
Seasonal Biological Technician (0.5 FTE, GS-7)	$24,000	$25,000	$26,000	$27,000	$28,000
Bison/elk fed days					
Mid-winter census					
Elk summer herd segment distribution[1]					
Expanded standing forage estimates[1]					
Chronic Wasting Disease, 2 seasonal bio.-techs	$32,000	$32,000	$32,000	$32,000	$32,000
Winter bison/elk distribution					
Irrigation					
50 Elk radio telemetry collars; Iridium Platform	$115,000	$25,000	$25,000	$25,000	$25,000
Bison barrier maintenance at NER south entrance	$500	$500	$500	$500	$500
Step Down Management Plan annual reporting	$2,000	$2,000	$2,000	$2,000	$2,000
Private lands:					
Easements / Leases (Private Foundations)	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000
Conflict mitigation technicians (WGFD)	$91,000	$91,000	$91,000	$91,000	$91,000
Hazing (helicopter)	$6,000	$6,000	$6,000	$6,000	$6,000
Vegetation restoration/protection[1]					
Public Outreach and Education	$11,000	$1,000	$1,000	$1,000	$1,000
Subtotal					
Grand Teton National Park:					
Monitoring:					
Summer elk classification/distribution	$10,000	$11,000	$12,000	$13,000	$14,000
Collaborative elk monitoring (GRTE portion)	$5,000	$5,000	$5,000	$5,000	$5,000
Vegetation Restoration/Protection					
Monitoring	$16,000	$16,000	$18,000	$18,000	$12,000
Temporary bison fencing	$24,000				
Temporary fence maintenance	$6,000	$8,000	$8,000	$4,000	
Hayfields restoration	$84,000	$70,000	$70,000	$31,000	
Exotic plant mitigation	$50,000	$52,000	$46,000	$32,000	$16,000
Elk Reduction Program (subject to annual review)					
Hunter harvest evaluation	$1,500	$1,500	$1,500	$1,500	$1,500
Harvest age distribution	$2,000	$2,000	$2,000	$2,000	$2,000
CWD monitoring (0.15 FTE, GS-6)	$7,000	$7,000	$7,000	$7,000	$7,000
Law Enforcement and Visitor Protection (0.15 FTE for 20 LE and support staff; supplies, and permitting)[3]	Unknown				

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
Subtotal					
Wyoming Game and Fish Department:[2]					
Subtotal					
Grand Total					

[1]See detail in Appendix

[2] Dependent on size of elk reduction program; current annual expenditures are approx. $295,000 for 0.15 FTE for 20 LE and support staff; supplies, and permitting.

[3]Through Interagency Agreement

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APPENDIX 1. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007).

Populations

- Jackson elk herd objective of 11,000 would be maintained.
- New Jackson bison herd objective of 500 established.

Winter Feeding

- Supplemental feeding could be delayed or could occur earlier compared to current practices.
- Changes [to feeding program could] include alterations in the timing of feeding and providing supplemental feed in fewer years.
- Ration or pellet composition might need to be changed.
- Supplemental feeding would be initiated according to established criteria, including pre-winter forage production, assessments of forage utilization (done jointly by WGFD and NER personnel), elk condition and movements, and potentially on the January 1 index of winter severity calculations for elk (Farnes, Heydon, and Hansen 1999).
- Mechanical means could be used to increase forage access for elk after snow crusting events.
- Changes in the refuge supplemental feeding program could begin to affect elk nutrition (negligible adverse effect on NER elk from lower nutrition).
- Displacement of elk by bison during competition for standing forage would decrease as the bison herd is reduced.
- Aggressive social interactions involving competition for food among elk and bison would increase overall as feeding periods are reduced.

Winter Distribution

- Elk densities on the NER would decline due to more reliance on standing forage and wider distribution.
- Elk use of lands surrounding the NER would increase, including:
    - USFS lands east of the NER
    - Gros Ventre feedgrounds possibly
    - Southern GRTE
    - State feedgrounds south of the NER
- Most of winter distribution shift would involve elk in the Yellowstone, Teton Wilderness, and Gros Ventre segments.
- As ungulate numbers decreased and supplemental feeding was reduced, competition and aggressive social interactions on the refuge would also be reduced.
- Elk and bison distribution would increase as the animals relied more on native winter range.
- Fewer animals would be present on the refuge.

Mortality

- As supplemental feeding is reduced, natural factors such as climate and native forage availability would have a greater influence on numbers, movements, distribution, and mortality.
- More elk would be subject to natural factors affecting mortality, including loss of body condition, predation, and starvation.
- Increased mortality on and off the refuge would mainly affect older elk and calves, and some prime bulls entering the winter energetically stressed due to rut activities.
- Late winter calf ratios could decrease as a result of higher winter calf mortality

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- Average winter mortality on the refuge would increase from 1%–2% annually to an estimated 1%–5%.
- Overall, a higher total winter mortality rate of approximately 5% could be expected.

Disease

- Reductions in supplemental feeding or elk numbers would reduce the potential for impacts due to tuberculosis, septicemic pasturelosis, and CWD.
- The health and sustainability of the Jackson elk herd would be increased gradually as supplemental feeding was reduced and there was greater reliance on standing forage and wider ungulate distribution.
- Health and sustainability of the Jackson elk herd would be enhanced in the long term.
- Wider distribution of elk would result in moderate reductions in both the prevalence and potential transmission of brucellosis, as well as potential for spread of diseases not yet in the population.

Private Lands

- The agencies would work closely with the WGFD and landowners, including livestock producers, to coordinate actions that would prevent conflicts due to elk dispersal and to defray costs of managing potential conflicts. Preventing access to food/hay rewards on private lands would be vital for effective management.
- Private land conservation easements within NER boundaries would promote wider distribution.

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APPENDIX 2. Monitoring Supplemental Materials: Feeding Initiation Methods

At each sample site, 10 subplots will be measured at every 5 steps along the random bearing determined for each site. At each subplot a 13.27" diameter metal sampling ring will be placed on the ground. The amount of forage available to elk within the sampling ring (dry weight in grams) will be visually estimated. The 13.27" diameter subplot allows easy conversion from grams to lbs. per acre (each gram is equivalent to 100 lbs. per acre). During annual forage production sampling, refuge biologist Eric Cole has made approximately 1,000 of these visual estimates per year for 17 years, and 33% of Cole's estimates have been verified by clipping and weighing. Therefore, Cole will be the principal estimator, but additional personnel will be trained in these techniques to provide redundancy in the event of personnel changes, and to increase the number of observers to facilitate estimation of error.

Estimating available forage within the sample ring at each subplot is relatively straightforward when snow cover is limited, but estimating how much of the forage is accessible to elk when snow is dense, deep and crusted can be subjective. To decrease the subjectivity of the estimation process, if the area under the sample ring is covered with snow, only forage that can be exposed with a gloved hand will be included in the estimate of available forage. Forage that is fouled with manure and/or flush with the ground due to trampling and/or encrusted in ice will not be included in the estimate of available forage. At each subplot the estimate of available forage (dry weight g) will be converted to an equivalent lbs./acre value (1 gram=100 lbs./acre). The arithmetic mean of available forage (lbs./acre) for the 10 subplots provides an estimate of available forage for each index site. There are 3 sample site categories: 1) Historic Key Index Sites that have been used since 2007, 2) New randomly selected sites within areas preferred by elk, and 3) New randomly selected sites in areas not preferred by elk. Historic key index sites were not randomly selected, but were instead selected to represent areas most preferred by elk on the south end of NER. These were the sites used to determine when supplemental feeding would be initiated from 2007 until the implementation of the MSP. To facilitate comparison with pre-MSP data, we will continue to use mean lbs. per acre across historic key index sites to determine the 300 lbs. per acre threshold. However, post MSP implementation we will delay feeding initiation by 2 weeks once the 300 lbs./acre level has been reached. We will concurrently sample at randomly selected sites stratified on an annual basis between areas highly preferred and not highly preferred by elk. This will enable us to quantify the relationship between mean forage availability at historic key index sites and random sites over time.

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APPENDIX 3. Communication Plan

Communication Goals

Prior to the MSP's Implementation

- Utilize a variety of outreach methods to inform the public on the goals and timing of the MSP implementation and possible effects on wintering herds.
- Utilize a variety of outreach methods to inform the public on public comment opportunities.
- Identify and coordinate key messages and outreach with USFWS regional and national offices, State and federal agency partners, non-profits, elected officials, and other identified audiences.

During the MSP's Implementation

- Continue to utilize a variety of outreach methods to describe current management actions as well as measurable and noticeable changes on the landscape, in animal behavior, or in animal health.
- Provide a comprehensive overview of the MSP by providing links and references to previous outreach and background information.

Communication Objectives

- Work with current media contacts to promote news of the MSP via print, radio, Web, and social media platforms.
- Utilize new media and social media tools to provide information on why the MSP was developed, what public comment opportunities exist, and how the plan is being implemented.
- Plan, coordinate, and execute public meetings to allow for public comment and questions on the plan.
- Develop and provide methods for the public to submit written comments on the MSP.
- Monitor print media on Refuge elk and bison management to see how the Step own Plan objectives and reactions are being portrayed to the public.

Current Outreach Resources

- National Elk Refuge web site
- National Elk Refuge news release list
- (approximately 300 contacts)
- National Elk Refuge Twitter site (1,039 followers)
- Bison and Elk Management Plan web site (http://www.fws.gov/bisonandelkplan/)
- Space for an 11" x 17" poster in the Visitor Center on Refuge management topics
- Display panels in the Visitor Center theater for temporary displays

Available Supporting Outreach Resources

- USFWS Mountain–Prairie External Affairs staff
- USFWS Mountain–Prairie web site, including the
- "Top Stories" feature
- USFWS Mountain–Prairie Twitter site USFWS Mountain-Prairie Region Facebook page
- USFWS National Wildlife Refuge System

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- Facebook page
- USFWS Facebook page

Previous Outreach Efforts

- NER routinely writes and disseminates news releases on Refuge management activities, including the Comprehensive Conservation Plan, supplemental feeding, herd health monitoring, and forage production.
- Post the above news stories as Content.
- Management System (CMS) articles.
- Post CMS news story promos so they prominently appear on the home page, linking readers to the articles.
- Send out Twitter messages linking viewers back to the news stories.
- Prepare, upload and provide links to Adobe PDF versions of news stories with additional photos where additional images are available and/or help understand or visualize the content.
- Utilized the Conservation link on the web Content
- Management System to post information about the Bison and Elk Management Plan and the draft Comprehensive Conservation Plan.
- Retained and provided a link to the original Bison and Elk Management web page (http://www.fws.gov/bisonandelkplan/) that was developed during the planning process. The web site includes links to the Final Plan/EIS, Record of Decision, Federal Register Notice of Availability for both the Record of Decision and Final Plan/EIS, associated news releases, public meeting highlights, and other related documents. Note: the National Elk Refuge does not manage the site.

Additional Outreach Opportunities

- Public meetings in Jackson and other identified locations.
- Service produced video; video could be posted to the National Elk Refuge's multimedia web page, or USFWS Mountain–Prairie home page "Top Video" feature.
- Live radio interview on KHOL (Jackson, WY radio)
- Wyoming Public Radio interview with Refuge management staff
- Interviews with local print media sources
- Updates at community leader meetings such as Rotary Club, Jackson Hole Chamber of Commerce board meetings, and interagency breakfast meetings (with Federal agencies and local elected officials).

Target Audiences

Internal

- Regional and National USFWS Leadership
- Refuge permanent staff
- Refuge seasonal staff
- Refuge volunteers

External

- Congressional representatives
- State of Wyoming leadership
- Federal agency partners, particularly Grand Teton National Park and the Bridger–Teton National

Forest
- Wyoming Game & Fish Department
- Other NER partners, including county and town agencies and local nonprofit organizations
- Local elected officials
- Private landowners in proximity to the National
- Elk Refuge or neighboring Federal lands
- Tribes
- Local and state media
- Local public

Key Outreach Topics

- Overview of BEMP objectives
- Strategy to change elk/bison behavior
- Threat of disease
- Natural mortality rates
- Anticipated winter distribution changes for bison/elk
- Mitigate negative effects on private lands
- Change elk behavior and distribution while avoiding increased mortality.
- Explain the historic reasons a supplemental feeding program began and why it was continued.
- Explain the NER's limited large ungulate carrying capacity and the disproportionate impact of bison on available forage; 3 elk = 1 bison.

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APPENDIX 4. Models

Elk winter distribution model

The proportion of the JEH that winter on the NER will be linked to factors hypothesized to influence elk winter distribution using a generalized linear mixed effects model (GLMM). A GLMM can account for a proportional response variable (i.e., constrained to the interval 0–1) using a log link and binomially-distributed errors. A GLMM also includes fixed and random effects, with the latter capturing residual model variance otherwise not explained by fixed effects. Year will be including as a random effect, providing several benefits. First, we don't assume years are independent and comprise all of the factor levels of interest. Instead, the effect of year is treated as a random variable, with individual year effects realizations of that distribution. This allows inference to non-sampled factor levels, i.e. years, by estimating a latent population-level proportion of elk expected to winter on the NER regardless of fixed effect influences. Thus, the random year effect can be considered a latent variable describing elk behavior manifested as observed winter distribution. Second, because year effects are not treated as independent, estimated effects of year on the proportion of JEH elk wintering on the NER are dependent on all factor levels, leading to greater precision when estimating individual year effects (Kéry 2010).

The full GLMM incorporating fixed effects for each factor identified as influencing elk winter distribution is:

$$P_t = \beta_{0(t)} + \beta_1 * AFI_t + \beta_2 * SDM_t + \beta_3 * WP_t + \beta_4 * GSP_t + \beta_5 * SWE_t + \varepsilon_t$$

where the random intercept and residual model variance are

$B_{0(t)} \sim N(\mu_{\beta_0}, \sigma^2_{\beta_0})$, and

$\varepsilon_t \sim N(0, \sigma^2)$, respectively.

Fixed effects include 1) per capita available forage at initiation of winter feeding (*AFI*) , 2) proportion of the JEH that are short-distance migrants (*SDM*), 3) number of wolf packs present on JEH native winter range (*WP*), 4) growing season (May–August) precipitation for the Wyoming Snake Drainage climate division (*GSP*; a proxy for available forage on native winter range), and 5) snow water equivalent on 1 January at Thumb Divide (*SWE*; a proxy for early winter severity).

Elk calf winter survival and forage deficits

The Forage Accounting Model of Hobbs et al. (2003) has as an output weekly available forage biomass for the NER (sum of predictions for 30 × 30 m cells). These predictions account for snow conditions using a proxy of SWE and decrement total available biomass by 35% to account for unpalatable plants within the total estimate.

While calf survival is a function of multiple factors the primary management action influencing calf survival is supplemental winter feeding. Current winter feeding initiation criteria lead to calf survival generally higher than in unfed populations. Proposed feeding initiation criteria will result in later initiation of supplemental feed, which will be most influential to calf survival. There is currently little

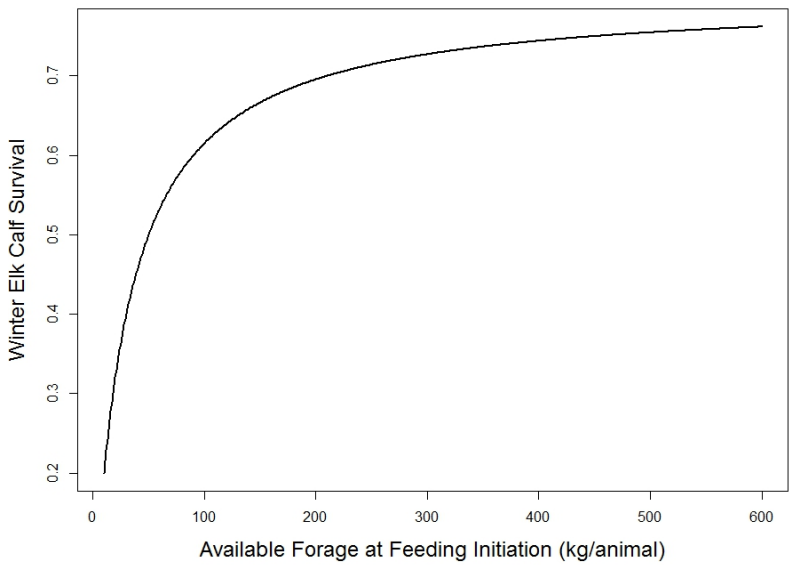
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understanding regarding the relationship between initiation of winter feeding and calf survival, except that current feeding initiation criteria result in high calf survival. We believe a threshold level of available forage at initiation of winter feeding exists such that winter calf survival reaches an asymptote. Below this threshold, calf survival is hypothesized to decline quickly with reductions in available forage at winter feeding initiation. Available forage at the initiation of winter feeding will be related to on elk calf winter survival using a saturating function (i.e., Holling type-II functional response; Fig. 6) by

$$S_t = \frac{aAFI_t}{b + AFI_t}.$$

The parameters *a* and *b* determine how calf survival is related to available forage. Maximum calf survival is *a*, and *b* represents the value of available forage to an individual when survival is 50% of *a* (Hilborn and Mangel 1997).

Although this approach doesn't capture forage deficits *per se*, it does provide a potentially sensitive proxy for this concept. It is assumed that a forage deficit for calves would occur at a point on the curve of the relationship between calf survival and available forage at initiation of supplemental feeding. Modeling the response of winter calf elk survival to changes in feeding initiation criteria facilitates our ability to maximize the influence of feeding initiation criteria on winter distribution while minimizing the likelihood of a large mortality event.



Hypothesized relationship between winter survival of elk calves and per capita available forage at initiation of winter feeding on the National Elk Refuge.

From: Ryan Moehring
To: Mike Blenden
Subject: RE: Draft Step Down Plan Completion and Implementation Schedule (version 7/27/2016)
Date: Thursday, August 04, 2016 10:57:00 AM

Thanks, Mike. Do you think we should share this with Will, Mo, Anna, etc. in advance of Monday's call?

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Blenden, Mike [mailto:mike_blenden@fws.gov]
Sent: Thursday, August 04, 2016 8:01 AM
To: Ryan Moehring
Subject: Fwd: Draft Step Down Plan Completion and Implementation Schedule (version 7/27/2016)

Hi Ryan,

See attached.

Mike
---------- Forwarded message ----------
From: **Steve Kallin** <steve_kallin@fws.gov>
Date: Wed, Aug 3, 2016 at 4:20 PM
Subject: RE: Draft Step Down Plan Completion and Implementation Schedule (version 7/27/2016)
To: Mike Blenden <mike_blenden@fws.gov>

Mike:

Attached is the latest version which was sent out for peer review.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Blenden, Mike [mailto:mike_blenden@fws.gov]
Sent: Wednesday, August 03, 2016 4:00 PM
To: Steve Kallin
Subject: Re: Draft Step Down Plan Completion and Implementation Schedule (version 7/27/2016)

Thanks Steve. I'll share this. Can I get a copy of the draft step down plan? For internal use only of course,

On Wed, Aug 3, 2016 at 3:33 PM, Steve Kallin <steve_kallin@fws.gov> wrote:
Mike:

Per our discussion yesterday, attached is the latest draft schedule. As you can see, deadlines are tight if we want to implement this upcoming feeding season.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
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--
Michael Blenden
Refuge Supervisor - Montana, Wyoming and Utah
134 Union Boulevard
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303-236-4306
303-710-7934 cell

Too often we...enjoy the comfort of opinion without the discomfort of thought.
John F. Kennedy

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Michael Blenden
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303-710-7934 cell

Too often we...enjoy the comfort of opinion without the discomfort of thought.

John F. Kennedy

From:	Blenden, Mike
To:	Will Meeks; Anna Munoz; Maureen Gallagher
Cc:	Ryan Moehring
Subject:	Fwd: Draft Step Down Plan Completion and Implementation Schedule (version 7/27/2016)
Date:	Thursday, August 04, 2016 3:52:00 PM
Attachments:	Draft NER Step Down Plan Peer Review Copy_7_25_2016.docx

---

All,

Ryan reminded me that you ought to see this too. Attached is the draft step down plan for elk feeding at NER. As Steve's note indicates it currently out for peer review.

We can discuss Monday.

Mike
---------- Forwarded message ----------
From: **Steve Kallin** <steve_kallin@fws.gov>
Date: Wed, Aug 3, 2016 at 4:20 PM
Subject: RE: Draft Step Down Plan Completion and Implementation Schedule (version 7/27/2016)
To: Mike Blenden <mike_blenden@fws.gov>

Mike:

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Steve Kallin

Project Leader

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Phone: (307) 201-5409

Fax: (307) 733-9729

steve_kallin@fws.gov

From: Blenden, Mike [mailto:mike_blenden@fws.gov]
Sent: Wednesday, August 03, 2016 4:00 PM
To: Steve Kallin
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John F. Kennedy

BISON AND ELK MANAGEMENT STEP DOWN PLAN

A Structured Framework for Reducing Reliance on Supplemental Winter Feeding

National Elk Refuge
Grand Teton National Park

DRAFT

July 28, 2016

BISON AND ELK
MANAGEMENT STEP DOWN PLAN

For the

National Elk Refuge,
Grand Teton National Park,
John D. Rockefeller, Jr. Memorial Parkway

Teton County, Wyoming

DRAFT

***Suggested Citation**:* U.S. Fish and Wildlife Service: 2015. Bison and Elk Management Step Down Plan, National Elk Refuge and Grand Teton National Park. U.S. Department of the Interior, Washington D.C. Available online at:

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EXECUTIVE SUMMARY

Overview

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands, focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The final plan directed the NER and GRTE (in conjunction with the Wyoming Game and Fish Department: WGFD) to maintain the state's elk herd objective of 11,000; establish a bison population objective of 500; restore habitat on the NER and in GRTE; continue hunting bison and elk on the NER; continue the elk reduction program, when necessary, in GRTE; allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available; and develop a dynamic, structured framework and Step Down Management Plan for decreasing the need for supplemental feeding on the NER. ***This Bison and Elk Management Step Down Plan (MSP) was developed to specifically addresses the criteria for a structured framework referenced in the Record of Decision.***

Background

Winter feeding of elk in Jackson was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. The loss of available winter range in Jackson Hole due to new ranching operations and a growing town resulted in significant numbers of elk dying during several severe winters in the late 1800s and early 1900s. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, established the National Elk Refuge. Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding.

Bison were extirpated outside Yellowstone National Park (YNP) by the mid-1880s but in 1948 were reintroduced to Jackson Hole when 20 bison from YNP were released near Moran, Wyoming. The herd remained small until discovering elk feedlines in 1980, when the population began sustained population growth. Bison and elk that winter on the NER are migratory and occupy summer ranges predominantly to the north.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands, thereby reducing other wildlife associated with woody vegetation, unusually low winter mortality, which affects predators and other species and requires intensive hunting programs.

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. The potential risk of catastrophic disease outbreaks and the need to mitigate this threat is a vital component in achieving the BEMP Sustainable Populations Goal.

Objectives

This MSP addresses several objectives under a broader BEMP goal of sustainable populations,

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which directed the agencies to: 1) develop a dynamic, structured framework for reducing NER supplemental feeding; 2) implement a phased reduction of animals on feed: a) Phase 1, to 5,000 elk and 500 bison, and b) Phase 2, elk and bison rely predominantly on native habitat; 3) maintain natural elk bull-to-cow ratios in park summer herd; and 4) enhance public outreach/education. The BEMP further stated that consideration criteria for implementing the 2nd phase of reduced feeding would include some or all of: 1) the level of forage production and availability on the National Elk Refuge, 2) desired herd sizes and age/sex ratios, 3) effective mitigation of bison and elk co-mingling with livestock on private lands , 4) winter distribution patterns of elk and bison, 5) prevalence of brucellosis, chronic wasting disease, and other wildlife diseases, and 6) public support. **In short, the overall objective of this plan is to provide a path for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives and public support.**

Strategies

Elk have been fed for some period during nearly every winter on the National Elk Refuge since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during a time of year when natural forage is typically most limited is powerful to both species, and their knowledge of its existence has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Attempting to modify this behavior on a large scale is unprecedented and will necessarily require investigation, constant evaluation, adaptive modifications to the approach when indicated, and repeated trials.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into the 3 broad categories of 1) timing and intensity of winter feeding, 2) timing and intensity of hunting, and 3) herd segment specific and overall harvest levels.

Measuring the success of MSP strategies will require knowledge of several bison and elk herd attributes. Because we are interested in reducing the intensity of elk and bison feeding throughout the entire winter season, which includes both the number of animals on feed and the duration of feeding, we will use measurements of elk-fed-days (EFD; the total number of elk fed per day per season derived from daily feedground estimates) and bison-fed-days (BFD; the total number of bison fed per day derived from daily feedground estimates) to evaluate feeding intensity. For example, if 5,000 elk were fed for 100 days during a given winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD. Average baseline feeding intensity during the post-BEMP to pre-MSP period from 2008-2016 was 487,838 EFD (range = 223,614-746,800), and 45,224 BFD (range = 26,035-82,124). Reductions in EFD and BFD compared to these baselines will represent progress in meeting feeding reduction objectives under the MSP. Reductions in EFD and BFD could be achieved through reducing the length of the feed season, reducing the number of elk and bison on feed, or some combination of both factors.

Initial success of MSP implementation will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP did not provide specific measurement criteria for the definition of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage" we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. These levels of reduction are consistent with elk and bison predominantly relying on free

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standing forage rather than supplemental feed.

Similarly there are population-specific objectives derived from the BEMP and Phase 1 of the MSP for 5,000 elk wintering on NER and 500 bison wintering in the Jackson Hole area. Progress towards these objectives will be measured using annual classification counts and the average number of elk and bison counted during daily feedground estimates.

Chronic Wasting Disease. As of 2016, CWD has been detected within 40 miles of the Jackson Elk Herd (JEH) in moose, within 35 miles in deer, and within 175 miles in elk. Continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence will take place. Some aspects of CWD response planning could change based on implementation of WGFD's CWD management plan (WGFD 2016).

Winter Feeding. Currently, the initiation of supplemental winter feeding occurs when available forage drops to 300 lbs/acre along transects in areas with highly preferred grasses. This protocol will change to delay the initiation of feeding.

The strategy of delaying the start of supplemental feeding is to encourage elk and bison to use native winter range, especially those individuals that have not previously received a food reward on the Refuge. Over time, it's anticipated a cohort of animals will develop that are not conditioned to the Refuge supplemental feeding program, which will reduce herd concentrations and the risk of disease transmission.

To reduce supplemental feeding overall, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk and bison fed days, the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years of MSP implementation, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require focused mitigation measures.

As bison and elk behavioral responses are better understood, feeding delays will be extended to encourage a redistribution of elk and bison to native winter range. However other factors outside of the scope of this plan such as wolf numbers and distribution could reduce the effectiveness of this strategy.

Variables that influence feeding initiation date will be considered (Table 4, Fig. 10). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. And finally, the distribution of animals, particularly on private, livestock producing lands, would be considered prior to delaying feeding initiation date.

Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years.

In the early years of MSP implementation, the

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seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date as the MSP is implemented.

Harvest. Few options for manipulating elk hunting are currently available because the JEH is at or near the 11,000 WGFD objective. Proposed changes include allowing limited any elk permits, allowing a bow season near developments on the NER, delaying the elk season so it will better coincide with migration timing, and alternating areas that are closed and open to hunting over time to encourage animal movements or facilitate harvest.

Based on summer bull ratios in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded hunting opportunities are considered.

The proportion of the Jackson Elk Herd that winters on NER has increased in the past 2 decades. This trend is correlated with a decline in elk use of native winter range and an increase in the proportion of NER elk that occupy winter ranges immediately adjacent to the Refuge. If efforts to encourage increased use of native winter range are unsuccessful, agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. This will provide a level of harvest flexibility more commensurate with addressing changes in herd distribution.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution or discouraging bison from attempting to leave the NER via the south boundary into the town of Jackson. Serious consideration will be given to reducing the bison herd population objective in the future through collaboration with WGFD. Lowering the Jackson Bison Herd objective and population would reduce winter NER forage consumption and further reduce the need for supplemental feed. Genetic diversity could be addressed by periodically introducing bison from other herds.

The effectiveness of NER late-season harvest regimes is influenced by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could help reduce winter elk numbers on the Refuge. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st .

Private Lands Mitigation. Several strategies would be employed to mitigate likely changes in bison and elk distribution, including providing incentives for non-breeding cattle operations, increased fencing in limited areas to separate elk and bison from livestock feed lines, hazing elk and bison away from livestock feed lines, and purchasing private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal wildlife conflict technician positions supervised by WGFD.

Vegetation Restoration. Various approaches to restore the Kelly Hayfields in GRTE (4,500 acres) were initiated in 2008. Work will likely be complete in 2035. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and providing visitor opportunities to enjoy wildlife viewing within a

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natural setting. The restoration process involves removal of non-native vegetation, collecting and propagating native seeds and plants, as well as the seeding of native plants.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres are currently under restoration treatment and 3,265 acres remain non-native pasture. Maintenance of restored ecological conditions will require management efforts in perpetuity to keep non-native species from colonizing restored areas. The park will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Strategies Considered But Rejected

Strategies considered but rejected include fertility control in elk and bison, agency reduction of either elk or bison, and altering rations of supplemental feed. These strategies were rejected because they were not included in the BEMP preferred alternative and/or because there was not support for them by cooperating agencies.

Models and Monitoring

Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

A robust monitoring program will be necessary to track the effects of actions implemented under this plan. Critical monitoring components will include: 1) enhanced forage production and availability sampling; 2) measuring animal abundance and distribution including differences in some sex and age classes; 3) determining elk and bison fed days each feeding season; 4) estimating winter mortality; 5) brucellosis seroprevalence rates; and 6) CWD surveillance. In many cases, attribute baselines for the period preceding implementation of this plan have been developed for comparison after the plan is implemented.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Actions completed each year, the results of monitoring programs, and any proposed changes in management direction will be presented in an annual MSP update/report, completed by NER staff by the end of June.

Public Outreach/Education

De-emphasizing the supplemental feeding program will be a major paradigm shift especially for the residents of Jackson Hole and Teton County, but will also be of interest to others in Wyoming and across the nation familiar with the long history of feeding elk on the National Elk Refuge. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk and bison herd management methods. A detailed communication plan has been developed that identifies key messages and utilizes a variety of outreach methods, including print, video, and voice material, utilizing social media, and meetings with elected officials, state and local governments, agency and tribal partners, community organizations, stakeholders, and the general public.

Schedule

GPS collars were deployed on 30 adult cow elk in February 2016. Assuming adequate funding, , additional GPS collars will be deployed in winter 2017. Public outreach, private lands conflict mitigation and contacts, and enhanced forage monitoring will occur in fall 2016 through January 2017. Reductions in feed season length will begin in winter 2017.

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INTRODUCTION

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands. It included directives for forthcoming development of adaptive management practices to address several objectives in the plan, including a desired future condition of elk and bison relying predominantly on native forage. This MSP has been developed expressly for that purpose.

Bison and Elk Populations

While Jackson Hole is probably best known for the splendor and ruggedness of the Teton Range, the Jackson bison and elk herds rank among the top characterizing features of the valley. Both figure prominently in Jackson Hole's history and culture, although bison were absent from the valley for about 100 years between the mid-1800s and mid-1900s.

The JEH occupies approximately 8,000 km^2 in the upper Snake River watershed north of the town of Jackson (Fig. 1). Much of the herd is migratory, moving between distinct wintering and summer ranges. Primary wintering areas include the Buffalo Valley, lower elevations of the Gros Ventre River drainage, the NER, and areas adjacent to the NER on Bridger-Teton National Forest (BTNF) lands. Summering areas occur throughout the herd's range and for convenience are divided into five geographic regions that include GRTE, Yellowstone National Park (YNP), the Gros Ventre drainage, Teton Wilderness, and Southwest Boundary area, which includes private and public lands in the vicinity of GRTE's southwest boundary.

In the late 1800s, when elk populations all over North America were being extirpated, the residents of Jackson Hole protected elk from "tusk hunters" and large-scale commercial hunting operations. Elk are just as important to today's residents of the valley. Thousands of people each year have the opportunity to see elk at close range on the refuge while riding on horse-drawn sleighs. Thousands of pounds of shed elk antlers are sold at an annual antler auction each spring in the town square. Elk are important to backcountry users as well as to people that never leave the road. Jackson Hole is a popular destination for instate and out-of-state elk hunters. The draw of elk to visitors contributes significantly to the local economy.

Winter feeding of elk in Jackson Hole began in 1910 and was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. According to historical reports, before Euro-American settlement some Jackson elk wintered in the southern portion of Jackson Hole (present location of the NER town of Jackson) and may have used areas outside Jackson Hole, including the Green River and Wind River basins to the south and east, respectively, and the Snake River basin to the southwest in what is now eastern Idaho (Allred 1950; Anderson 1958; Blair 1987; Barnes 1912; Sheldon 1927). Radio-collar studies have documented small numbers of Jackson elk wintering in each of these areas in recent times as well (NER and GRTE, unpublished data). Over time, changes in land use and development in these areas, over hunting, and establishment of feedgrounds probably reduced the use of these areas by Jackson elk.

By the end of the 19th century the JEH was believed to be largely confined to Jackson Hole and the immediately surrounding area, where wintering conditions are often harsh. Significant numbers of elk died during several severe winters in the late 1800s and early 1900s> Primary reasons for these mortality events included the loss of available winter range in Jackson Hole from new ranching operations and a and

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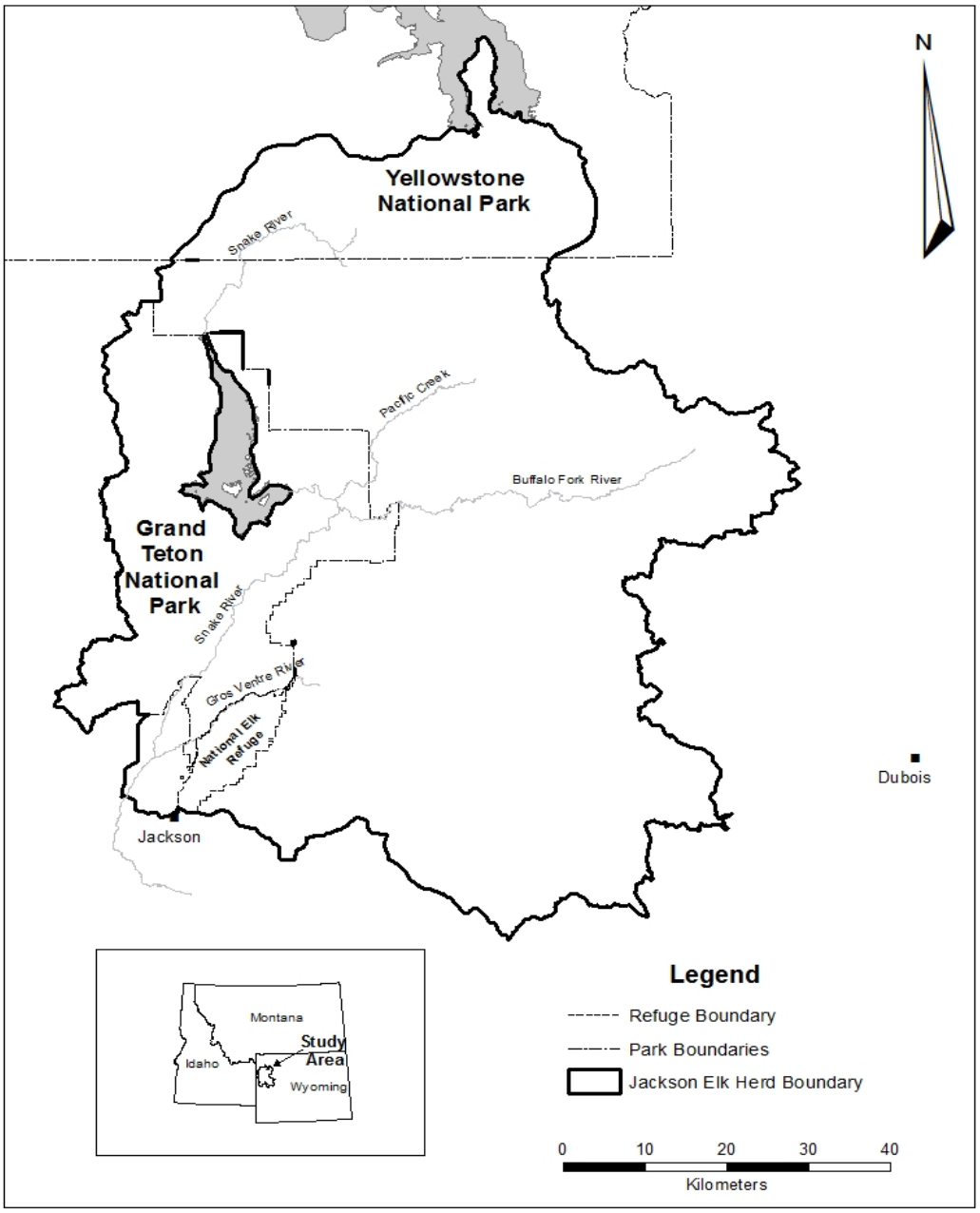


Figure 1. Jackson elk and bison herd ranges, including the National Elk Refuge, Grand Teton and Yellowstone National Parks, and Bridger-Teton National Forest. [include bison range, labels for continental divide and Bridger-Teton National Forest, and in Legend Jackson elk herd unit].

expansion of Jackson. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, appropriated $45,000 for the purchase of lands and maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first winter census in the area was conducted in 1912 and showed about 20,000 elk residing in Jackson Hole and the

Hoback River drainage (the latter is not within the JEH's range).

Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding. In recent times the population has fluctuated near the herd objective of 11,000 that was adopted by the WGFD (Fig. 2).

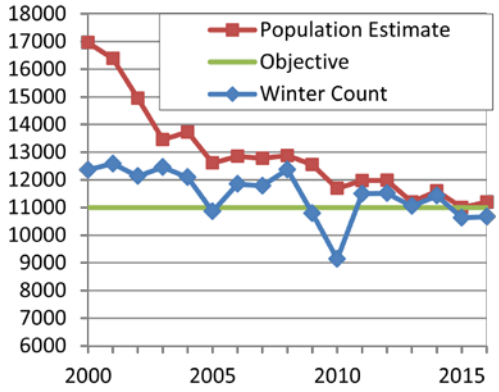


Figure 2. Winter Counts, population estimates, and herd objective for the Jackson elk herd, 2000-2016.

An iconic symbol of the American West, bison are also popular with visitors and residents. Because so few opportunities remain to see bison in the wild, viewing and photographing them in GRTE with the Teton Range in the background is a treasured opportunity for many of the valley's visitors. Similar to elk, there is also a high level of interest in bison hunting. Bison are of particular interest to nearby American Indian tribes and tribes in other parts of the United States because the animals are central to their culture and tradition.

Bison are native to Jackson Hole, as evidenced by the presence of prehistoric bison remains throughout the valley, but were extirpated outside Yellowstone National Park by the mid-1880s. In 1948, 20 bison from YNP were reintroduced to the 1,500-acre Jackson Hole Wildlife Park near Moran. The Jackson Hole Wildlife Park was a private, non-profit organization sponsored by the New York Zoological Society, the Jackson Hole Preserve, Inc., and the WGFD. A population of 15–30 bison was maintained in a large enclosure there until 1963, when brucellosis was discovered in the herd (likely transferred with the original 20 animals from YNP). At that time, all the adult animals were destroyed, but four vaccinated yearlings and five vaccinated calves were retained. In 1964 twelve certified brucellosis free bison from Theodore Roosevelt National Park were added to the herd. In 1968 the herd (down to 11 animals) escaped the confines of the wildlife park, and a year later the decision was made to allow them to range freely. The expansion of GRTE in 1950 had enveloped the Wildlife Park, and this allowed the bison to range freely and was consistent with National Park Service wildlife management policy. The herd remained small and wintered mostly in the Snake River bottoms in GRTE until 1975, when it followed the winter environmental gradient to the NER and began wintering there. The use of standing forage by bison on the NER was viewed as natural behavior thus acceptable to managers. In 1980, however, bison discovered and utilized supplemental feed provided to elk in winter, and they have continued to do so ever since.

The discovery of supplemental feed by bison has had several consequences, including a significant increase in the population's growth rate (Fig 3). Bison on the elk feedlines have at times disrupted feeding operations and displaced and injured elk. To minimize conflicts between bison and elk, managers have provided separate feedlines for bison since 1984. As the population has grown, separating elk and bison on feedlines has become increasingly difficult, and a variety of feeding strategies are employed to help reduce displacement of elk.

As the herd has grown it has maintained fairly stable movement patterns, wintering almost entirely on the NER and summering within GRTE and adjacent lands on the BTNF (Fig. 1).

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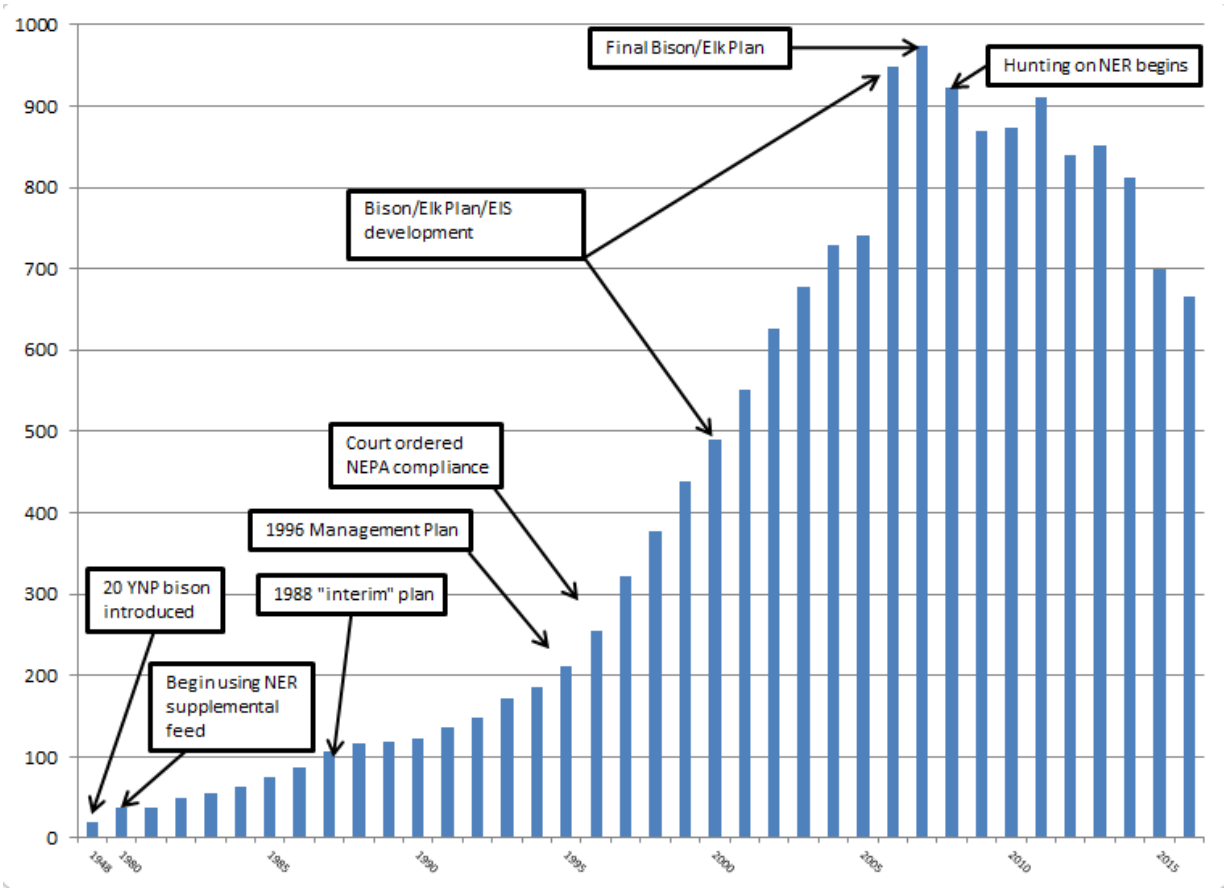


Figure 3. Population growth and planning history for the Jackson bison herd, 1948-2016.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands and thereby reducing availability of these habitats to other wildlife as well as unusually low winter mortality, which has affected predators and other species and has required intensive hunting programs.

Planning History

Jackson's bison and elk populations have been the subject of previous planning efforts. Elk management and research has been guided by the Jackson Hole Cooperative Elk Studies Group since it was established in 1958. The group consists of biologists and agency administrators from the NER, GRTE, YNP, BTNF, and WGFD, who meet at least annually to coordinate management of the population and its habitat. Coordination of bison management began soon after they started frequenting the NER in 1976 and using supplemental feed provided to elk in 1980 (Fig. 3). Release of an "Interim" plan that called for maintaining a herd of 90-110 bison while data were gathered for a long term plan occurred in 1988. It was followed by implementation of a sport hunt outside GRTE, administered by WGFD. This plan was halted after litigation in which the plan's violation of NEPA was successfully argued by plaintiffs.

In 1996, after considerable herd growth, a new long term management plan and environmental

assessment for the Jackson bison herd was released (Fig 3). This plan had strong support and called for maintaining a herd size of 350-400 bison, but it was shelved a year later when plaintiffs from the earlier litigation successfully argued that, because the plan failed to consider the effects of feeding elk on bison management, it also violated NEPA and was not sufficient. This led to development of the draft bison and elk management plan and environmental impact statement from 2000-2006 and release of the final plan in 2007 (Fig 3).

The 2007 Bison and Elk Management Plan (BEMP; USFWS 2007) considered six alternatives for bison and elk management focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The primary management scenarios presented in the alternatives included the status quo, terminating elk and bison hunting on the NER and the elk reduction program in GRTE, brucellosis vaccination options, restoring habitat, improving forage, and decreasing or phasing out supplemental winter feeding.

The final BEMP (USFWS 2007; www.fws.gov/bisonandelkplan) which set management direction for 15 years or until a subsequent plan is developed, proposed to maintain the state's elk herd objective of 11,000, establish a bison population objective of 500, restore habitat in the NER and GRTE, continue hunting bison and elk on the NER, continue the elk reduction program in GRTE in concert with the parks enabling legislation, allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available, and develop a dynamic framework of management actions which adaptively decrease the need for supplemental feeding on the NER. ***This Bison and Elk Management MSP was developed to address the latter and specifically addresses the criteria for a structured framework listed on page 5 of the Record of Decision*** **(Fig. 4).** It does not address other on-going bison and elk management actions already prescribed by the BEMP.

The BEMP scheduled the completion of the MSP for 2008. However, litigation challenging the BEMP in 2008 led to the decision to postpone its development until litigation was resolved. As of March 2015, two court rulings have upheld the 2007 BEMP and ROD. In a lawsuit against the BEMP and its author agencies (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2010), plaintiffs argued that the BEMP violated the National Wildlife Refuge System Improvement Act (National Wildlife Refuge System Improvement Act 1997) by disrupting the biological integrity of the Refuge, and that the plan and the accompanying EIS violated NEPA because they were insufficiently detailed to allow a reasonably complete discussion of mitigation. The crux of the plaintiff's argument was that the plan did not set a specific date for the cessation of supplemental feeding. In response, the agencies argued that the plan constituted a valid exercise of discretion and that it and the EIS were sufficiently detailed to satisfy the requirements of NEPA. In March 2010, the United States District Court for the District of Columbia sided in favor of the agencies in this case. In 2011, the plaintiffs appealed this ruling to the United States Court of Appeals for the District of Columbia Circuit. This Court affirmed the District Court ruling (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2011).

National Environmental Protection Act Compliance

The 2007 BEMP/EIS and ROD satisfied NEPA requirements for current bison and elk management through a detailed analysis of alternative management actions and their likely effect on the environment, and substantial involvement of the public in the process. This MSP does not duplicate or add to this process. It is designed to tier off of the BEMP as a dynamic implementation guide to one part of the preferred alternative outlined in the BEMP ROD. As such, references to NEPA covered in the BEMP

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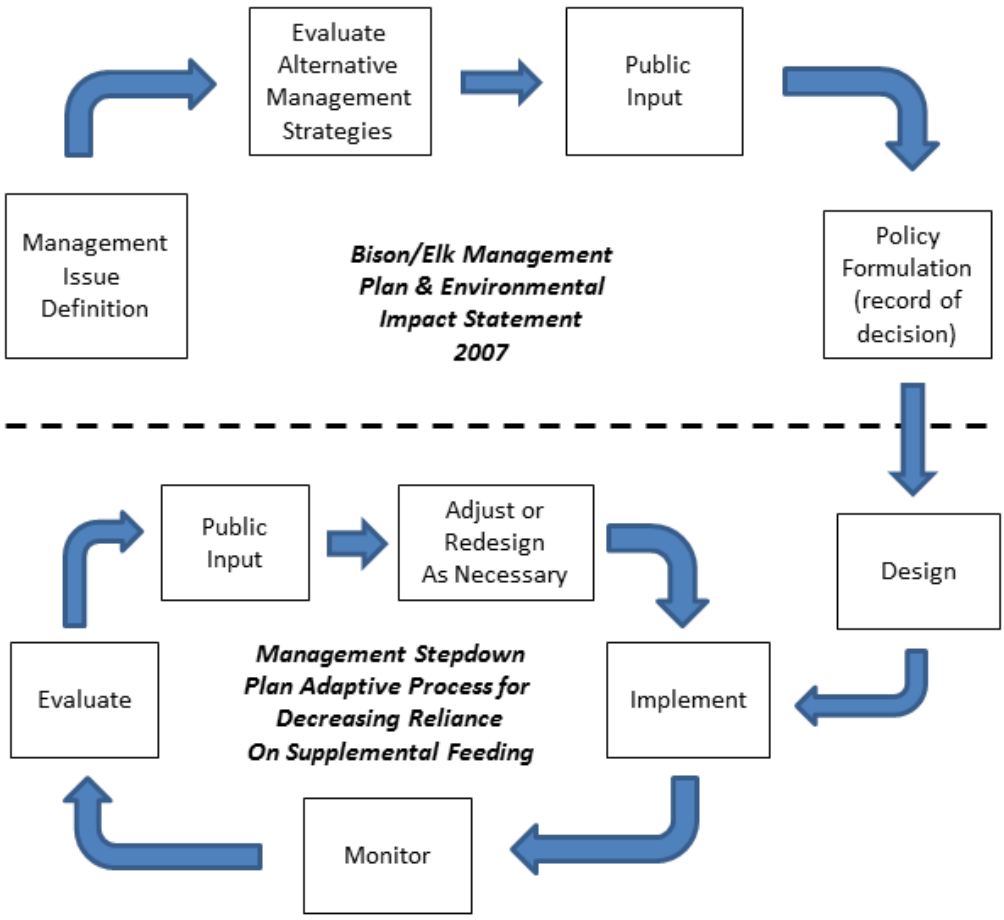


Figure 4. Management step down planning for supplemental feeding on the National Elk Refuge and its relationship to the 2007 Bison/Elk Management Plan and Environmental Assessment.

will be included where necessary in this document, and the discussion of any action that would require additional NEPA compliance will be explicitly stated as such in that context.

Management Step Down Planning

The use of adaptive management plans has gained popularity in natural resource management planning because, by definition, they allow modifications of strategy based on monitoring results and outcomes toward reaching specific goals or objectives. Four elements generally included in an adaptive management approach include: 1) well defined and mutually agreed upon objectives; 2) knowledge (including descriptive models) of the dynamics of the system being managed; 3) clearly articulated management actions and strategies; and 4) a monitoring program to evaluate responses of the system to management actions (Walters 1986).

This MSP utilizes adaptive management planning principles but is not intended to include all of the adaptive management planning elements outlined in the Department of Interior Adaptive Management Technical Guide (2007). This MSP is more accurately described as a "structured framework" of adaptive management actions that progressively transitions from supplemental winter feeding to greater reliance on free-standing forage (BEMP ROD p.5).

Table 1. 2007 Bison/Elk Management Plan Goals and Objectives (Step Down Plan objectives shaded)

Goal: Habitat Conservation

Objectives:

- Conserve important private lands.
- Increase forage production.
- Minimize non-native plants.
- Protect sagebrush grasslands.
- Restore willow, aspen, and cottonwood.
- Perpetuate natural mosaic of plant communities.

Goal: Sustainable Populations

Objectives (BEMP pages 135-136):

- Develop structured framework for reducing NER supplemental feeding.
- Phase reduction of animals on feed: 1) to 5,000 elk and 500 bison, and 2) elk and bison rely predominantly on native habitat.
- Maintain natural bull-to-cow ratios in park summer herd.
- Ensure a genetically viable bison herd with close to an even sex ratio.
- Enhance public outreach/education.

Goal: Elk and Bison Numbers

Objectives:

- Maintain state elk herd objective of 11,000.
- Maintain a genetically viable bison population of about 500 animals.

Goal: Disease Management

Objectives:

- Manage brucellosis transmission risk from elk and bison to livestock.
- Manage feeding to reduce brucellosis transmission among bison and elk.
- Educate hunters about wildlife disease human health hazards.

OBJECTIVES

The management direction and desired conditions stated in the BEMP called for the NER and GRTE staffs to work with others (agencies, partners, etc.) to "adaptively manage elk and bison in a manner that contributes to the State's herd objectives yet allows for the biotic integrity and environmental health of the resources to be sustained," so that the public can enjoy a variety of compatible wildlife-dependent recreational opportunities. Under the BEMP's 4 primary goals, 20 associated objectives were identified (Table 1). This MSP addresses four objectives under the goal of sustainable populations (Fig. 5).

The reduction of animals on feed at the NER was proposed to be spread over two phases. In Phase 1, the aim is to reduce the average number of elk on feed to 5,000 (while maintaining WGFD's 11,000 elk herd objective), and reduce the winter

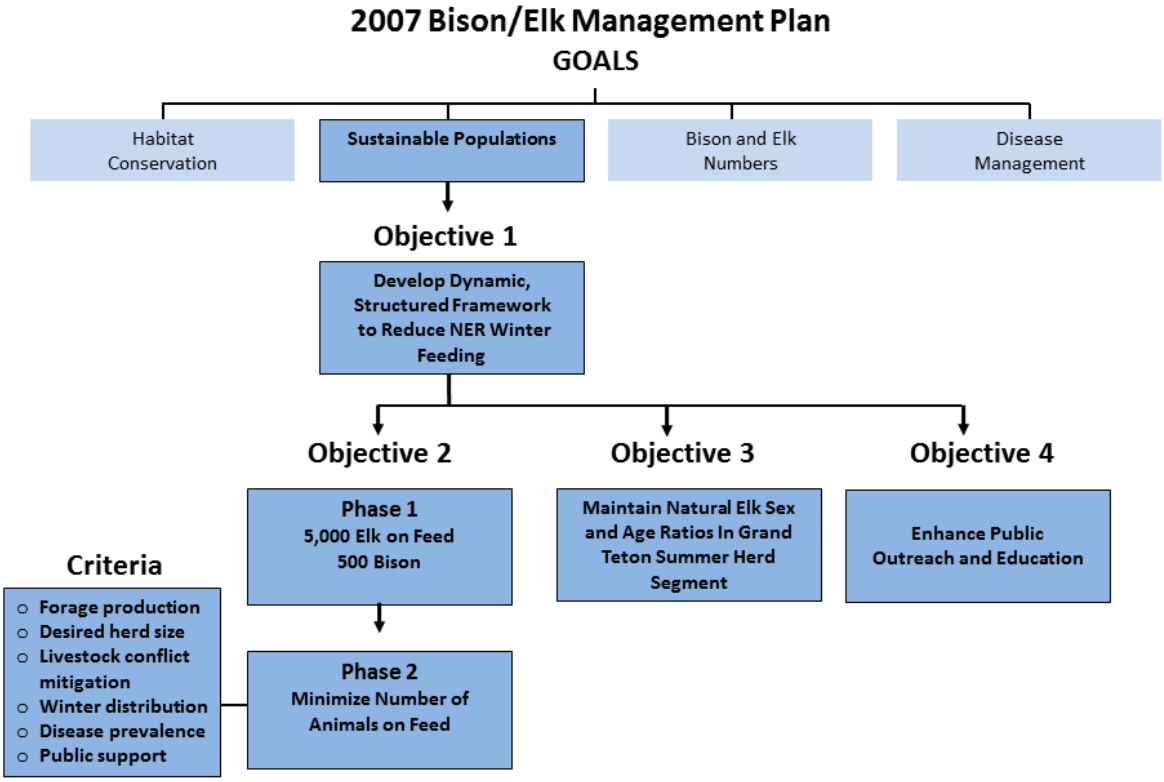


Figure 5. Relationship of MSP to the 2007 Bison/Elk Management plan goals, phasing of objectives, and consideration criteria for reducing the reliance of elk and bison on supplemental feed during Phase 2.

population of bison to the BEMP recommended, and WGFD adopted, objective of 500. In Phase 2, the overall objective is to reduce the reliance of bison and elk on supplemental feed (USFWS and USNPS 2007a). Desired conditions include animals relying predominantly on native habitat and cultivated forage. Important consideration criteria for implementing Phase 2 will include: 1) the level of forage production and availability on the NER and adjacent winter ranges; 2) maintenance of desired herd sizes and age/sex ratios; 3) the ability to effectively mitigate bison and elk livestock conflicts; such as co-mingling on private lands during high risk disease transmission periods; 4) maintaining desirable winter distribution patterns of elk and bison; 5) the prevalence of brucellosis, chronic wasting disease, and other wildlife diseases; and 6) public support. In short, the overall objective of this plan is to outline a framework for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives.

This Plan focuses on management actions to initially achieve Phase 1 objectives. However, if successful, these actions will continue to be used to achieve the Phase 2 objective of reducing reliance on supplemental feeding while considering the six criteria listed above.

MANAGEMENT ACTIONS AND STRATEGIES

Background

The principle goal of reducing reliance on

supplemental feeding is to limit transmission of density dependent diseases in elk and bison while simultaneously minimizing winter mortality in elk. We will attempt to achieve this goal by experimentally reducing feed season length and closely monitoring elk and bison distribution and winter mortality.

Elk have been fed on the NER each year in all but 9 winters since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during winter months is powerful to both species, and their knowledge of NER feed grounds has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Because use of feed grounds is a learned behavior, decreasing feed season length will potentially reduce the likelihood of elk that winter on native range finding NER feed grounds. Over time this could result in a greater percentage of elk using native winter range relative to NER feed grounds. Because it is largely unprecedented, the concept of modifying this behavior on such a large scale is daunting and poses questions for which there are no immediate answers. In some cases, the likelihood a specific management strategy's success will only be able to be roughly estimated, and unanticipated results are likely. Closely monitoring forage availability, elk and bison distribution, and elk mortality will allow us to evaluate the effectiveness of management actions and adjust management actions as needed should unintended negative consequences arise.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into 3 broad categories: 1) timing and duration of winter feeding; 2) timing and intensity of hunting; and 3) herd segment specific and overall harvest levels.

Important Changes Since 2007

The BEMP was developed based on data collected and knowledge that existed up until its ROD. Since then, important changes have taken place, some of which are advantageous to this effort and some of which are not.

A primary change that will facilitate meeting objectives under this plan is the reduction of the bison population from nearly 1,200 animals in 2007 to about 666 during winter 2015-2016 (Fig. 3) through hunting programs administered by WGFD. Licensing changes enacted in 2014 included a reduction in the bison cow/calf license fee (from $416 to $263 for residents and $2522 to $1022 for non-residents) and eliminating the once-in-a-lifetime restriction on a successful bison hunter to only those that successfully harvested a bull. Continued progress toward the 500 animal herd objective will require sustained harvest success.

During the same period, the Jackson Elk Herd has declined from nearly 13,000 to its objective of 11,000, but because the proportion of the JEH that winters on NER has increased dramatically (Fig. 6), this will make achieving the Phase I objective of 5,000 elk on feed and any future elk population reductions more difficult. Preliminary modeling suggests that the increasing proportion of the JEH wintering on NER has been associated with 1) changes in elk winter distribution associated with wolves (NER, unpublished data) and 2) high numbers of elk that summer immediately adjacent to NER (Cole and Foley et al. 2015).

Refuge-wide herbaceous forage production averaged 14,387 (SD = 4,125) tons during 1998–2013. In recent years irrigation of approximately 3,600 acres has increased refuge-wide forage production by approximately 10% compared to what would have been produced with precipitation alone, and by 15% in the southern

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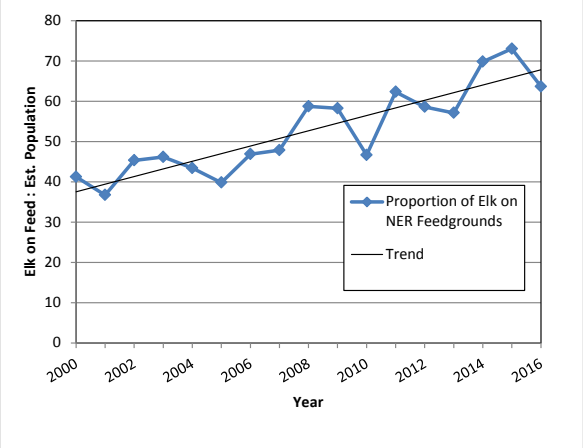


Figure 6. Increasing trend of National Elk Refuge elk on feed as a proportion of the Jackson Elk Herd estimated population size.

portion of NER which receives the greatest use by elk and bison.

Since 2007, the general awareness of climate change among the public has greatly increased. A strong, credible body of scientific evidence shows that climate change is occurring, is caused largely by human activities, and poses significant risks for a broad range of human and natural systems (National Academy of Science 2010). Ecological systems in the GYE are likely to be affected and associated changes may have implications for elk and bison management. Moderate term to long term effects of climate change in Jackson Hole will likely include increases in average temperature, a reduction in the duration and distribution of snow cover, an increase in the number of frost free days, increased wildfire frequency, and changes in plant community composition and structure including loss of forest and shrub cover and an increase in invasive plants (Riginos and Newcomb 2015). The net effect of these changes relative to the implementation of the MSP remains uncertain.

Current Management

Ongoing primary management actions on the NER include winter feeding, harvest, irrigation, and hazing. In GRTE, harvest of elk during the Elk Reduction Program takes place, when necessary, in collaboration with WGFD, and restoration of previously cultivated and irrigated sagebrush-grasslands is ongoing. Fundamental components of each of these will be briefly described below to provide a basis for comparison to MSP strategies that will follow.

Chronic Wasting Disease

Supplemental feeding has occurred in all but 9 winters on NER since 1912, and although this strategy minimizes winter elk mortality from starvation, contributes to Wyoming state elk herd objectives, eliminates commingling with livestock, and keep elk off adjacent roadways, elk occur at numbers and densities well in excess of carrying capacity (Smith et al. 2004, Lubow and Smith 2004). Considerable evidence suggests that Chronic Wasting Disease (CWD) transmission and prevalence are density dependent (Peters et al. 2000, Williams et al. 2002). Monello et al. (2014) found that elk densities of 15-110/km^2 (0.06 to 0.45/ac) in Rocky Mountain National Park were associated with 13% CWD prevalence, and they predicted elk population declines when CWD prevalence exceeded 13%. NER elk densities range from 77-16,850/km^2 (0.31-68/ac; NER unpublished data), which suggests that the introduction of CWD to NER elk would have significant negative population effects over time.

Winter Feeding

Initiation of feeding has the primary objectives of 1) minimizing elk winter mortality, focusing on calves since they are the most susceptible age class, and 2) minimizing comingling of elk with cattle on nearby adjacent private lands. Winter feeding begins when available forage reaches approximately 300 lbs/ac. Historic radio telemetry data and observations of elk movements indicate that when available forage declines below 300 lbs/ac., some elk leave NER for surrounding private lands. Therefore, the purpose of this feeding "trigger" is to keep elk on the NER and prevent them from searching for forage off the NER, which would increase the potential of comingling with cattle causing damage to private lands, and moving across Highway 89 where the risk of vehicles hitting elk

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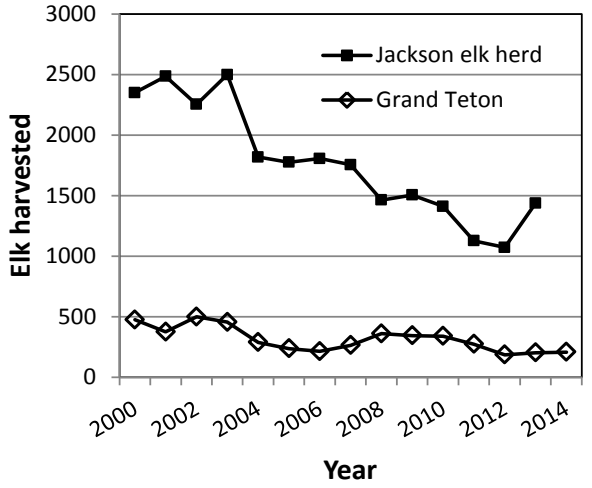


Figure 7. Estimated elk harvests for the Jackson Elk Herd and the amount of that harvest that occurs in Grand Teton National Park, 2000–2014.

is high. This trigger is not a warning that a significant nutritional deficit threshold has been reached. Available winter forage for elk and bison on the NER is largely determined by biomass of forage produced during the previous growing season, rate of forage consumption during fall and winter, and how snow conditions affect forage availability.

Index sites are used to sample forage biomass and determine when feeding should be initiated. These sites are selected annually to represent plant communities that are highly preferred by elk due to plant species composition and the persistence of green vegetation. Weekly sampling begins in late December to estimate available forage biomass at each index site. When average available forage across index sites is below 300 lbs/ac, biologists typically recommend that supplemental feeding be initiated.

During 1995–2013, the average initiation of winter feeding in NER occurred 28 January (range = 30 December–28 February), and feeding was terminated on 3 April (range = 20 March–20 April). Variation in feeding initiation and termination dates has been based on winter conditions and a desire to avoid elk-cattle comingling on nearby private lands. Coordination of winter feeding dates on the NER and WGFD-operated Gros Ventre drainage feedgrounds (Alkali, Patrol Cabin, and Fish Creek) occurs annually to help minimize movement of elk between these areas. This coordination will continue regardless of the management strategy employed. The relationship of recent elk numbers and objectives for NER and WGFD-operated feedgrounds and native range is shown in Table 2.

Bison discovered refuge feeding operations in 1980, and since that time they have been fed each year to help minimize disruption to elk feeding operations. Because bison displace elk from feedlines, NER staff attempt to feed most bison in the northernmost refuge feedground and provide a heavy feed ration, which helps keep them in this area. This strategy prevents bison from mingling with elk and also prevents bison from moving to areas where conflicts with humans are more likely.

Harvest

Total hunter harvest of the JEH was gradually

Table 2. Annual distribution of wintering elk from the Jackson Elk Herd during February classification counts, 2011–2016, relative to the current objective.

	OBJECTIVE	2011	2012	2013	2014	2015	2016	mean
NER	5,000	7,746	7,360	6,285	8,296	8,390	7,290	7,561
Gros Ventre	3,500	2,775	3,265	2,982	2,326	1,162	1,667	2,362
Native Range[1]	2,500	982	894	1,784	801	913	1,711	1,180
Total	11,000	11,503	11,519	11,051	11,423	10,465	10,668	11,105

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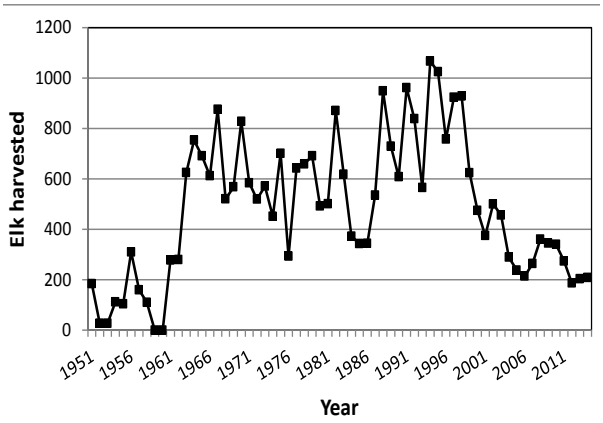


Figure 8. Elk harvest in Grand Teton National Park, 1950-2015.

reduced over the last decade as the population neared objective (Fig. 7). Elk hunting on the NER (Hunt Area 77) typically begins in mid-October and ends in mid-December, with peak harvest in recent years occurring in late November to early December. From 2005 to 2015, 422 ± 102 (mean ± SD, range = 329-612) hunters harvested 196 ± 95 (range = 126-457) elk per year during the NER hunt.

The 1950 legislation that created GRTE provided for a controlled reduction of elk, when necessary, in specific portions of the park, primarily east of the Snake River. Elk reduction programs have taken place in the park each year since 1950 except two (1959 and 1960), when GRTE and WGFD officials agreed a reduction was not necessary (Figure 8). Season dates have varied over the years but recently have run from mid-October to early-December. The GRTE harvest accounts for about 25% of the JEH overall harvest, thus has been an important factor in regulating the population. Increased predation, likely a result of increases in grizzly bears and wolves over the last 20 years, has decreased the need for large harvests in GRTE.

Bison hunting begins 15 August and ends in early to mid-January. Most harvest occurs on the NER, with some additional harvest on private and BTNF lands. Since resuming the bison hunt in 2007, harvest has been 210 ± 45.5 (range 139-301) bison per year. This level of harvest has been sufficient to arrest the exponential growth of the population, reducing bison numbers from the peak in 2007 to about 700 animals in winter 2015 (Fig 3). Tribal bison harvest of up to 5 animals for ceremonial purposes was authorized in the BEMP. Translocation of wild bison to lands outside of Teton County is not currently permitted due to brucellosis concerns.

Bison hunting is not allowed in GRTE because of long standing NPS policy that prohibits most hunting in national parks. Bison quickly learned to take advantage of the safety of GRTE, which has made hunter harvest goals difficult to achieve. Many bison stay in GRTE during the hunting season, with only occasional short term movements to the NER, until severe winter conditions occur. In response, NER and WGFD managers have attempted to extend the hunt to late January while minimizing the conflict with the initiation of winter feeding. The unpredictable nature of winter conditions that time of year makes this challenging, and has (or could) result in the use of emergency season extensions or reductions.

Hazing

NER staff haze elk and bison to conserve winter forage, prevent year-round use of winter range, and in some cases to prevent elk and bison from moving to private lands or other areas where conflicts with humans are likely. Hazing using ATVs has proven most effective. The strategy is typically employed during 3 time periods: 1) in May to move elk and bison off NER that are lingering on NER winter range; 2) in July when some bison typically return to NER; and 3) in the period just prior to feeding initiation when elk and bison are most likely to leave NER for private lands. Hazing of elk and bison by WGFD staff also occurs on private lands adjacent to NER periodically throughout the year.

Vegetation Restoration and Protection

The BEMP identified approximately 4,500 acres of previously irrigated and cultivated grasslands in GRTE in need of restoration to native sagebrush grasslands community. Objectives of ecological

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restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. After 2 years of research and field studies, restoration efforts began in 2008. The restoration process involves several steps including: removal of non-native vegetation through repeated herbicide applications, collection and propagation of native grass, forb and shrub seeds and finally native seeding. Repeated herbicide treatments have been warranted prior to native seed planting as well as spot treatments of invasive weed species subsequent to native seeding. Substantial progress in this endeavor has been made since 2008, including 1,235 acres of previously cultivated lands under restoration treatment. Of the 1,235 acres undergoing treatment, 745 acres has been seeded with native grass, shrub, and select forb mixes, and 89 acres is considered fully restored. Two-hundred and seventy-five of these acres are currently fenced to reduce grazing pressure of early native vegetation establishment from bison and other ungulates. An additional 490 acres are targeted for native seeding in 2016 once removal of the invasive vegetation is successful. All treatments are monitored for native plant establishment and invasive plant infestations and treatments will be adjusted as necessary. Invasive plant treatments may have to continue indefinitely. GRTE will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Private Lands Mitigation

Fencing of hay stacks and livestock feedlines has been historically used to mitigate particularly difficult conflicts on private lands. Targeted fencing of golf course greens and sand traps fall through spring has also been successful in some situations for mitigating elk and bison presence and associated damage in these areas. It is important to note that the county has a "wildlife-friendly" fence policy and does not support extensive fencing that is impermeable to wildlife in residential areas.

Methods, Assumptions, and Constraints Common to All Strategies

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes, particularly population sizes. Measurements of the Jackson bison herd will be based on the annual mid-winter census and sex and age classification survey performed by NER, GRTE, and WGFD biologists. This survey occurs one day in February and includes ground counts of animals on feed at the NER and aerial counts of outlying bison across their winter ranges on the refuge, park, and Bridger-Teton National Forest.

Elk population estimates will also be based on mid-winter aerial and ground counts. However, the mid-winter counts are undertaken during a single survey period and do not necessarily represent either peak or cumulative abundance of elk on feed. Rather than basing progress toward the number of elk on feed for the entire season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 elk were fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000.

We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both

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Table 3. Summary of potential Step Down Plan constraints.

Policy

- ESA[1] Lynx – limits on habitat impacts
- Greater Sage Grouse – core area protection
- 2007 BEMP/EIS (federal actions/lands)
  - No fertility control
  - No test and slaughter
  - Limited tribal harvest
- Bison/elk hunt end date (Feb. 1st)
  - WGFD, brucellosis safety
- Carcass disposal (Feb. 15th)
  - WGFD, brucellosis safety
- Forest Service winter closure (Dec. 1st – April 30th)
- Easement limitation (NER boundary)

Winter Feeding

- Only during non-hunting periods

Harvest

- State regulations

Vegetation Restoration/Protection

- Bison/elk distribution
- Exotic plant species management

Private Lands

- Owner agreements

Social

- Hunter density (safety; hunt quality)
- Elk/bison winter mortality levels
- Public safety (ungulate/vehicle collisions)
- Disease
- Land-use conflicts (agricultural and residential)

Biological

- Disease (bison/elk/cattle commingling)
- Sage grouse habitat conflicts
- Fencing/wildlife conflicts
- Elk herd distribution
  - summer segment distribution goals

Funding

- Easement purchase
- Plan implementation

[1]Endangered Species Act

species on supplemental winter feeding.

Initial success of the MSP will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP does not provide specific measurement criteria to determine when the NER has successfully attained the objective of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage", we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. This level was chosen to define success because it suggests that elk and bison will be predominately foraging on free standing natural and cultivated forage rather than on supplemental feed.

Several management constraints are common to the strategies discussed below (Table 3). Many law and policy constraints are applicable but we include here only those most pertinent. Endangered Species Act (16 USC 1531 et seq.) requirements for wolves, grizzly bears, lynx, and others apply. Lynx requirements for maintaining certain habitat types could limit methods used and areas considered for habitat improvements in GRTE and the BTNF. Such improvements could increase elk and bison use of native winter range off the Refuge while simultaneously reducing use of feedlines. Similarly, compliance with the 2015 sage grouse amendment to the 1990 Bridger-Teton National Forest Land and Resource Management Plan and the Wyoming greater sage-grouse core area protection executive order (2011-5 and supplement 2013-3) could affect habitat manipulations. NEPA compliance conducted as part of the BEMP/EIS constrains what federal actions can be taken as a part of this plan. State regulations constrain late (winter) hunt and carcass disposal timing to protect against brucellosis contamination, since February-April represent the period bison and elk are most likely to transmit the disease. Restrictions on hunting timing also result from BTNF winter range closures, immediately east of the NER and elsewhere, December 1 to April 30. Additional details about these and other

constraints will be included in discussions about specific strategies that follow.

Strategies

This section describes the management action this MSP proposes to implement. As such, it unveils the heart of management changes proposed to begin the process of transitioning to greater reliance of bison and elk on native forage during winter. Fundamentally, the strategies discussed in this plan represent an experiment designed to achieve Phase I objectives of 5,000 elk and 500 bison on NER and are a first step towards reducing reliance on supplemental feeding while meeting the sustainable population goals identified in the BEMP.

Initial strategies for achieving sustainable population goals identified in the BEMP (Table 1) are presented by the objectives below. The primary management actions available to the agencies to achieve Phase I objectives are modifications to winter feeding and hunting seasons. To a lesser extent, vegetation protection and restoration can be important, particularly for improving long-term ecological function and enhancing natural production of native forage. Private lands are also an integral component as changes in elk and bison distribution occur and new challenges develop. The likely consequences of implementing these strategies were evaluated in the BEMP. The most relevant of these are summarized in Appendix 1.

Objective: 1) *Implement a phased reduction of animals on NER feed to 5,000 elk and 500 bison, and, 2) influence elk and bison to rely predominantly on native habitat* (Table 1).

The first phase will be to reduce the number of elk on NER feed to approximately 5,000 and achieve a target population of about 500 bison. The second phase will be to adaptively manage bison and elk populations to achieve desired conditions, with animals relying predominately on available native habitat (NER, GRTE, and USFS lands) and cultivated forage (NER).

As previously mentioned, the concept of reducing winter feeding after more than 100 years of the practice, and the associated behavioral conditioning of elk and bison to its presence, represents a formidable challenge that must be approached cautiously and systematically. Efforts to scale back elk supplemental feeding operations in other parts of North America have been rare and fraught with controversy (Smith 2001). The strategies discussed below have been developed in this context, with appropriate feedback mechanisms through rigorous monitoring and frequent evaluation. Inability to meet this objective under the strategies presented here would trigger a thorough evaluation and consideration of more aggressive strategies when the BEMP is updated in 2022.

Chronic Wasting Disease

Since 1997, NER has cooperated with WGFD to conduct intensive surveillance for CWD in the JEH unit. GRTE has also collaborated with WGFD to collect samples from the ERP and from road-killed cervids. Although this effort indicates that CWD is not currently found in the JEH, continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence annually will be critical to ensure a timely management response and limit the long-term population effects of the [USFWS and USNPS, 2007b]. Given that CWD has been detected within 40 miles of the JEH in moose, within 35 miles in deer, and within 175 miles in elk, this level of surveillance is warranted.

In 2016, the WGFD cooperated with federal agencies and other stakeholders to revise the 2006 Wyoming CWD Management Plan. The NER and USFWS Region 6 Wildlife Health Office staff participated in several meetings associated with this effort. The Wyoming CWD Plan lists several management responses for consideration if CWD be is detected on or adjacent to State or NER elk feedgrounds. Early detection of CWD in the JEH is essential to allow implementation of management responses.

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The BEMP (2007) identifies the management response to the arrival of CWD as following the State of Wyoming CWD Plan in effect in 2007. The Wyoming CWD Plan was updated and significantly changed in 2016. In light of changes in the Wyoming State CWD Plan, and the results of CWD Studies completed since 2007, the NER management response to CWD will be reviewed and updated in a NER Disease Contingency Plan, as identified in the NER Comprehensive Conservation Plan (2016). The CWD section of the NER Disease Contingency Plan will remain consistent with the goals of the BEMP. The NER Disease Contingency Plan is scheduled to be completed in 2017.

Winter Feeding

Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the long run, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning animals to "expect" feed to be available later in the winter; this could build cohorts of animals that rely primarily on native winter range. To reduce supplemental feeding, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, which is the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require assistance with focused mitigation measures.

As bison and elk behavioral responses are better understood, and targeted mitigation on private lands is achieved as needed, feeding delays will be extended depending on several variables (Table 4, Fig. 9). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence on feeding initiation date, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Forage availability would also be affected by the numbers of elk and bison on the NER. And finally, the distribution of animals, particularly on private, livestock producing lands would be considered in determining feeding initiation date.

A primary concern of manipulating feeding is elk winter mortality, particularly among calves. As food becomes limited in winter, calves are usually the first to experience nutritional deficit and winter mortality because they are displaced by more dominant animals, they have limited fat reserves, and are more susceptible to cold temperatures than larger animals. Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years (Appendix 1).

In the early years of MSP implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date during the period of MSP implementation.

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The MSP winter feeding strategy would include the establishment of additional key forage index sites and on-going measurements at those sites throughout the winter.

Harvest

Currently the JEH is at the Wyoming Game and Fish Commission established objective of 11,000 animals, which means there is less flexibility in manipulation of harvest regimes than there would be if the herd was above objective. Initially there would be little change in elk harvest programs on the NER, with the exception of allowing a limited number of any elk permits throughout the season, considering allowing bow hunting near developed areas (roads and buildings) and shifting the season about a week later (Table 4). Allowing a limited number of any elk permits would be consistent with providing sport hunting recreation on National Wildlife Refuges (NWRS Improvement Act; 1997) and the NER CCP [USFWS, 2015] and possibly encourage more hunters to participate in antlerless elk hunts. Monitoring programs and consideration of bull ratios in the GRTE summer segment (since most park bulls migrate to the NER) would help inform levels of proposed take. Bow hunting in areas currently closed to firearms will likely increase harvest by eliminating "no-hunt" areas which can become sanctuaries for large numbers of elk. Shifting the hunt one week later is consistent with later migrations and will improve harvest effectiveness (Fig. 9).

General elk harvest patterns in GRTE would continue to be based on need for harvest, summer segment population estimates, herd status relative to population objective, herd demographic parameters, herd-wide distribution of harvest, and mitigation for impacts on other resources and visitor activities.

Elk herd population objectives are reviewed every five years by the Wyoming Game and Fish Commission and adjusted as necessary. Agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. Lowering the population would help compensate for reduced use of traditional native winter range and increased growth of short-distance migrants which has led to significant increases of winter elk concentrations on the NER.

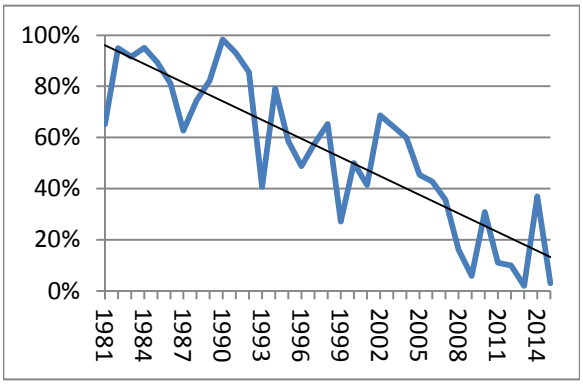


Figure 9. The percentage of elk that wintered on NER counted there on December 1, showing progressively later annual fall/winter arrival of elk to the NER during the past several decades.

The annual fall/winter arrival of elk to the NER during the past several decades has been occurring progressively later. This trend may necessitate extending the elk hunting season later into the year to achieve harvest objectives.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later end dates that are commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution. Special limited hunts designed to discourage bison from attempting to leave the NER via the south boundary into the town of Jackson will also be considered. If progress toward reaching the herd objective of 500 animals continues and the objective is reached, WGFD will adjust harvest quotas in the context of the objective, as necessary, to address population changes through time.

A cattle guard was installed on the Refuge Road

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near the east end of Broadway Avenue to help prevent bison and elk herds from entering the Town of Jackson. This will reduce the potential for dangerous human/wildlife interactions.

Currently, the effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives, but also that elk are sensitive to hunting pressure which can cause elk movements to areas that cause management issues for WGFD. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st in the future.

Annual herd-wide population estimates, elk summer herd segment estimates in GRTE and NER, temporal and spatial harvest patterns, and animal-fed-days would be monitored, and the resulting information would be used to inform ongoing evaluation of elk and bison management harvest programs (Figs. 9 and 10).

Hazing

No change in hazing practices is anticipated initially under this MSP framework.

Private Lands Mitigation

Delaying the onset of NER feeding is likely to result in changes in bison and elk distribution (Appendix 1). Some elk or bison may move to private lands in search of forage. Of greatest concern is the potential for elk or bison to commingle with cattle of cow/calf operations, where brucellosis transmission could have considerable consequences, such as requiring depopulation of the cattle herd.

Several strategies would be employed to mitigate potential problems (Table 4), including providing incentives for non-breeding cattle operations (because brucellosis transmission to slaughter-bound cattle is not economically important), increased fencing in some limited areas to separate elk/bison from livestock feed lines, haze elk/bison away from livestock feed lines and purchase private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal Wildlife Conflict Technician positions which are supervised by the WGFD. These Technicians are also critical to the success of an expanded monitoring program vital to the MSP (see Monitoring section below).

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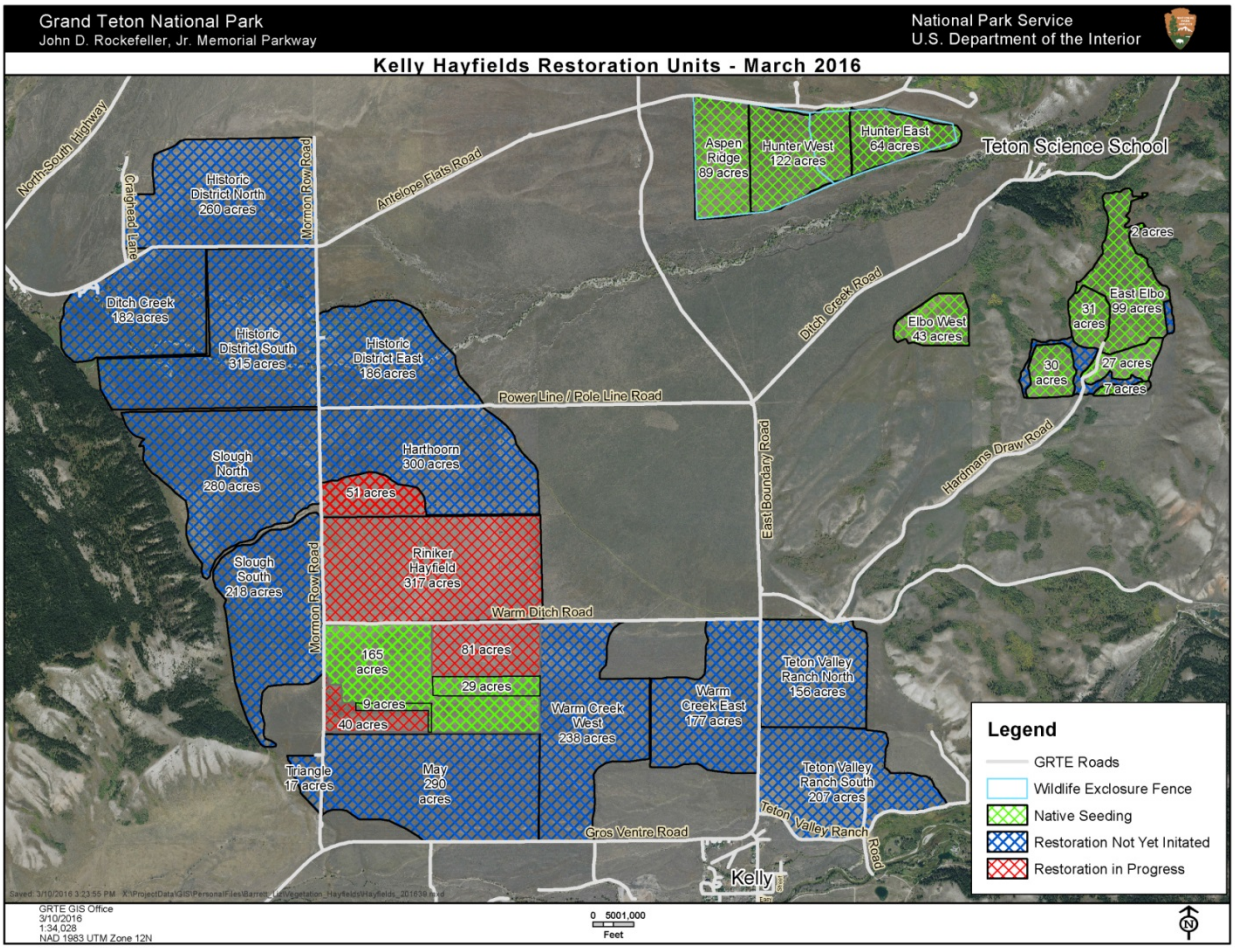


Figure 9. Units and status for the Kelly Hayfields ecological restoration effort in Grand Teton National Park, March 2016.

A database will be established to track non-agricultural conflicts on private lands to determine trends which will help evaluate the effectiveness of MSP mitigation efforts.

Preventing elk and especially bison from entering the Town of Jackson is essential in maximizing publicsafety and minimizing private property conflicts. Currently, bison are hazed northward when they drift south of Miller Butte. A cattle guard was installed on the Refuge Road just north of Broadway Avenue. This barrier is designed to prevent elk/bison from entering the Town of Jackson.

Vegetation Restoration/Protection

The varied approaches to restore the Kelly Hayfields in GRTE (4,500 acres) was initiated in 2008 following 2 years of research and field studies (Moeny 2008). The approach to ecological restoration includes serial treatments to 1) remove non-native species (e.g., herbicide application and prescribed burning); 2) seed native shrub, grass, and forb species; and 3) treat subsequent invasive plants by applying herbicides and, where appropriate, construct temporary fences to protect recently seeded pastures from colonization of non-native species and damage from large herbivores during early phases of restoration.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres within 7 pasture units are currently under restoration treatment and 3,265 acres remain non-native grass pasture (as of 2016; Figure 9).

The non-native grass pastures are divided into 13 pasture treatment areas and are projected to be likely restored by 2035. As of 2016, approximately 745 acres are seeded with native vegetation, and 89 acres are considered fully restored. Maintenance of restored ecological conditions, however, will likely require management efforts in perpetuity to keep non-native species from colonizing restored areas. All 1,235 acres that are underway toward ecological restoration are being monitored for native plant establishment, invasive plant infestations, including cheatgrass spread. Park staff will continue to monitor and adaptively adjust treatments and restoration strategies according to our results.

Objective: *Maintain natural bull-to-cow ratios in park summer herd* (Table 1).

National Park Service management policy (NPS 2006) provides guidance for maintaining naturally regulated wildlife populations, free from the impacts of humans, to the greatest extent possible. The final BEMP identified a goal of maintaining park elk bull:cow ratios (a common way of expressing sex and age ratios in wild ungulate populations) near 35 adult bulls per 100 adult cows, based on estimates of what this ratio would be in a herd free from the effects of human harvest. The sex and age ratios of most North American elk populations are affected by sport hunting and herd managers generally maintain lower bull ratios.

Harvest

Based on summer bull ratios for elk in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded refuge hunting opportunities are considered.

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Table 4. Comparison of current and primary MSP components and parameters.

Action	Current Management	Management	Comment
Winter Feeding:			
Feed	Pelleted alfalfa	Pelleted alfalfa	No change
Ration	Full ration average: 8-12 lbs/day/elk	No Change	No change, to minimize calf mortality. Note average daily ration over the entire feed season is lower than a full ration because feed rate is gradually increased at the beginning of the feed season and gradually reduced at the end to facilitate rumen acclimation
	20-22 lbs/day/bison	20 lbs/day/bison	
Start criteria:			
Available standing forage	300 lbs/acre, as measured at traditional key index sites	Generally later; index sites to be increased in number and distribution	Influencing factors: -time of season -forage availability -number of elk/bison on NER -elk/bison distribution
End criteria:			
Available forage	Based on a snow cover index and subjective estimate of when residual or new forage is adequate	Generally 1 week earlier than current management	Ongoing development of more objective criteria for future implementation ongoing
Monitoring:			
Animals on feed	Mid-winter census	Elk/bison fed days[1]	
Proportion of JEH on NER	Mid-winter census	Mid-winter census	
feed			
Calf mortality	2008-2015 Average: 3.3% (range 1.1-9.0%)	Potentially higher than current levels but less than native winter range	
Elk/bison distribution – collars	Almost no documented use of private lands during feeding operations	Unknown, but likely higher use of private lands than current management	
Elk Winter mortality (all age classes)	2008-2015 Average:	<=3%	
	1.2% (range 0.6-1.9%)		

Table 4. Comparison of current and primary MSP components and parameters.

Action	Current Management	Management	Comment
Elk summer range segment Proportions for NER wintering elk	Approximately -40% GTNP North of Moose -35% South Snake River -10% Gros Ventre/Flat Creek -10% Teton Wilderness -5% Southern Yellowstone	Unknown, but will be monitored based on summer distribution of radio collared elk	Based on summer distribution of elk that were randomly radio collared on NER.
Harvest, National Elk Refuge elk:			
Frequency	Annual	Annual	
Begin Date	2nd week October	No Change	Modified as necessary
End Date	3nd week December	No Change	Modified as necessary
Structure	- 1 week initial drawing	- 1 week initial drawing	
	- 1 week left over 1st served	- 1 week left over 1st served	
	- partial week alternate	- partial week alternate	
	-daily 1st served alternates	- daily 1st served alternates	
Refuge permit types	- 1st week any elk	- Primarily antlerless only	
	- Antlerless only remainder of season	- limited any elk permits throughout season	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries		Consider expanding to allow bow hunting near developed areas	
Harvest, National Elk Refuge bison:			
Frequency	Annual	Annual	
Begin date	August 15th	August 15th	Modified as necessary
End date	2nd or 3rd week January	Consider later dates as appropriate	Modified as necessary
Hunting Season Structure	As per WGFD	As per WGFD	
Refuge permit types	Any bison or cow/calf per state license	Any bison or cow/calf per state license	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries	Limited to north of Nowlin Creek area	Consider escorted hunting in South Unit as needed	Guided hunts in South Unit when authorized
Harvest, Grand Teton NP elk:			
Frequency	As needed	As needed	
Begin Date	3rd week October	3rd week October	Modified as necessary
End Date	2nd week December	2nd week December	Modified as necessary
License types	Antlerless only	Antlerless only[2]	
Special regulations:	Cartridge limits	Cartridge limits	

Table 4. Comparison of current and primary MSP components and parameters.

Action	Current Management	Management	Comment
	Bear spray required	Bear spray required	
	Hunter safety card required	Hunter safety card required	
Harvest, Bridger-Teton NF, Elk Hunt Area 80:			
Begin Date			
End Date		15-Dec	Would require change in winter closure dates
Harvest, Elk Hunt Area 78			
Structure			Changes at discretion of WGFD
License Types			
Private Lands Mitigation:			
Cattle commingling		Incentives for non-breeding operation	
Hay depredation		Increased fencing	
Landscape damage			
Easement acquisition			
Vegetation Restoration/ Protection: Elk Refuge			
Vegetation Restoration/ Protection: Grand Teton	Herbicide treatments, prescribed burning, native seed propagation and planting, and protection and maintenance of restored pastures	Same as Current Management for remaining non-native grasslands in Kelly Hayfields	

[1]Number elk and bison on feed per day, totaled by feeding season.

[2]Any elk licenses could be offered if bull ratios in the park consistently exceed BEMP criteria.

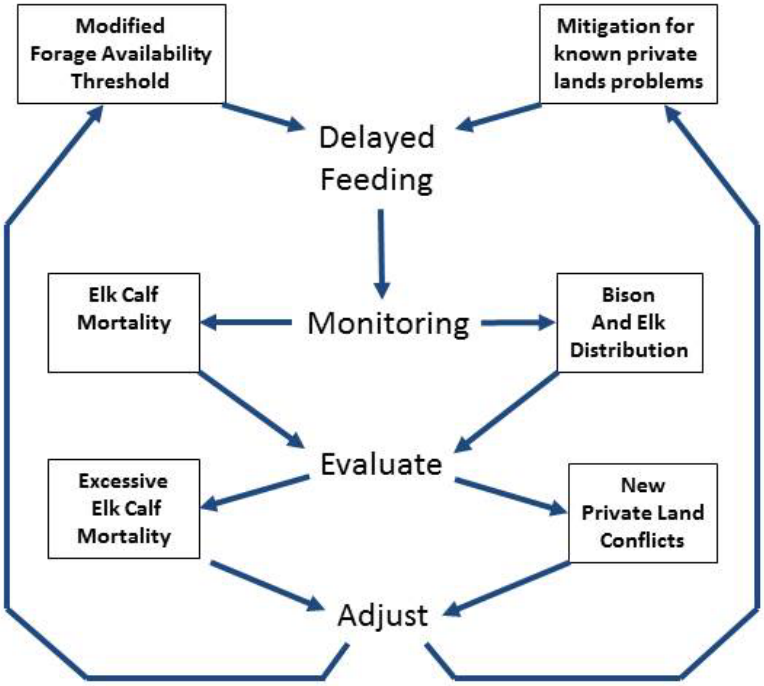


Figure 10. Framework for delayed feeding strategy under MSP.

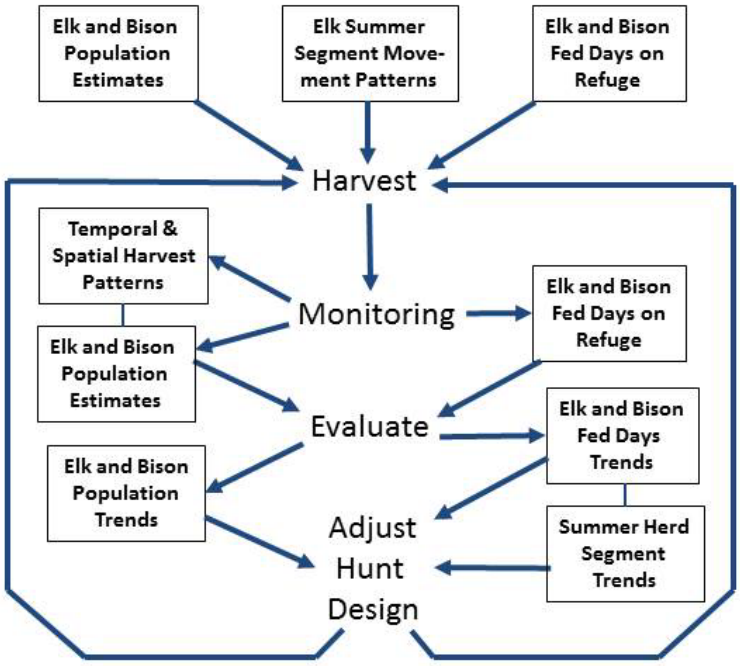


Figure 11. Framework for harvest strategy under MSP.

Strategies Considered But Rejected

The BEMP considered several additional strategies for elk and bison management that, for a variety of reasons, were not selected for implementation in the preferred alternative and Record of Decision. The agencies reconsidered a subset of these during the development of this MSP (Table 5). Since they were not part of the ROD, additional NEPA compliance would be necessary to incorporate any of them into this MSP, and thus they are not being considered at this time.

Table 5. Strategies considered but rejected.

Strategy Considered	Reason Rejected
Fertility control in elk	Judged not reasonable or feasible in BEMP, primarily due to major technical, social, and financial hurdles[1]. For MSP discussed primarily with regard to the difficult to harvest herd segment in Hunt Area 78 on private lands, where federal agencies have no jurisdiction.
Fertility control in bison	Impacts discussed at length in BEMP[2]. Not considered for MSP because current hunting programs appear effective at slowly moving the herd toward the 500 animal herd objective.
Agency reduction of bison or elk	Not considered necessary or desirable on federal lands because current hunting programs that utilize sport hunters are effective at meeting herd objectives.
Altering rations of supplemental feed	Rejected as a strategy because reducing daily feed ration below 8 lbs/elk would be enough feed to encourage elk to remain on NER but would result in unacceptably high elk calf mortality rates.
Private Lands Hunting Coordinator	The WGFD contacted private landowners and ranchers in the Spring Gulch area and discussed this concept to enhance elk harvest of short distance migrants. Generally, landowner interest was low.

MODELS OF SYSTEM DYNAMICS

Models provide a simplified representation of the biological system being managed. We will use modeling to quantify the effects of our management actions on 2 key responses of interest, elk distribution and winter elk calf mortality. (ADD: range of elk calf mortality in non-fed populations.)

There are a suite of possible factors that affect the proportion of elk on NER feedgrounds versus native winter range. Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

An increase in calf elk winter mortality is a potential result of reduced feed season length. Several factors influence winter calf elk survival on NER (Fig. 13). Models will be used to assess the effects of available forage on winter calf elk survival (Appendix 4). Over time this will allow us to assess the effects of our principal management strategy (reducing feed season length) relative to winter elk calf survival.

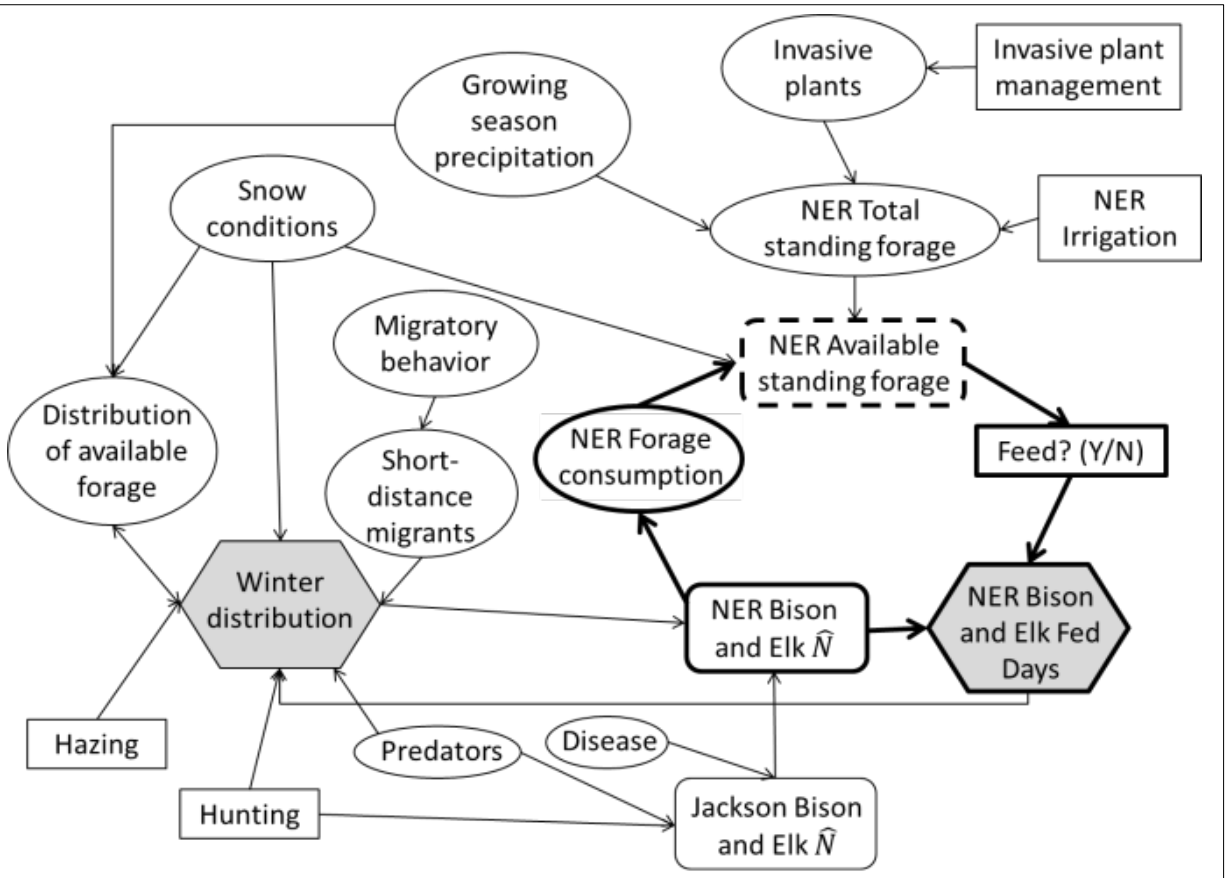


Figure 12. Diagram depicting the factors that potentially influence outcomes identified in the Bison and Elk Management Plan (BEMP; USFWS 2007a). Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

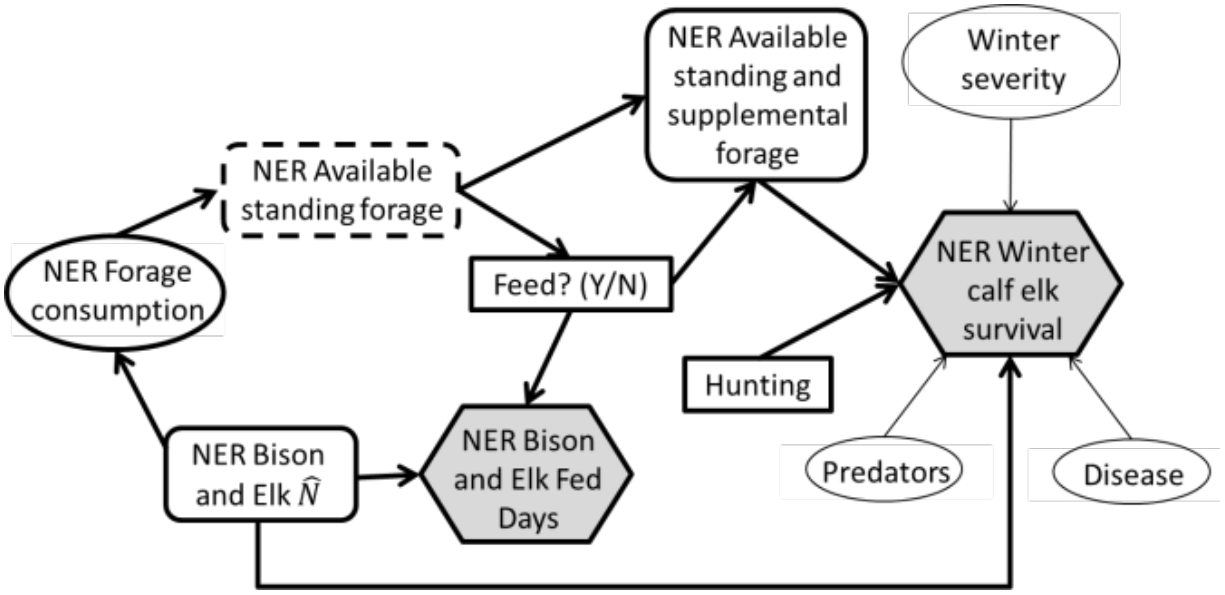


Figure 13. Diagram depicting the factors that potentially influence bison and elk fed days on the National Elk Refuge and winter calf elk survival. Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

MONITORING

Feeding Initiation Monitoring

NER uses weekly field estimates of the amount of forage available to elk to determine feeding initiation date. Currently measurements are taken at key index sites representing areas preferred by elk on NER (see supplemental materials at end of this section). These methods will be enhanced by 1) increasing the number of sampled sites to better represent the total amount of forage available to elk on the southern half of NER; 2) increasing the precision of estimates at each site by increasing the number of observers; and 3) extending the monitoring period later in the winter to assess the relationship between available forage and elk and bison distribution.

To better represent the total amount of forage available on the southern half of NER, a subsample of current key index sites will be retained to facilitate comparison with historic data, but additional random sample sites stratified by elk habitat preference will be added. Historic elk distribution mapping and elk GPS collar data (NER unpublished data) suggest that the areas most preferred by elk on southern NER are associated with moderate to high forage production and green vegetation. Because the distribution of forage production and greenness characteristics vary annually based on irrigation and precipitation patterns, we will annually map areas preferred and not preferred by elk and sample sites will be randomly selected within each of these mapped categories. At least 3 historic key index sites, 3 random sites in areas preferred by elk, and 3 sites in areas not preferred by elk will be sampled each week from late December through the initiation of supplemental feeding.

Currently the NER biologist is the only person trained in the techniques used to estimate available forage (see supplemental materials). At least 2 additional personnel will be trained in these techniques. This will provide a backup in the event of future personnel changes and will facilitate error estimates of the available forage measurements at each site.

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Currently NER and WYGFD biologists monitor available forage conditions at least weekly from late December until average available forage at key index sites nears the threshold level of 300 lbs. per acre and feeding is initiated. The principal MSP strategy is to delay the initiation of supplemental feeding after average forage production reaches the 300 lbs/ac level at key index sites. Therefore the monitoring period will be extended to include this period of delayed feeding.

Proportion of Elk Wintering on NER

A principal MSP goal is to reduce the number of elk wintering on NER. Our strategy will be to effect redistribution of elk to native winter range from NER over time via shortening the duration of the feed season, and thus slowly conditioning elk to seek food elsewhere. As feeding periods are shortened, the probability of younger elk age classes discovering NER feedgrounds will be reduced, and, hypothetically, that proportion of the JEH that utilizes NER feedgrounds will decline over time. We will measure this effect by examining changes in the winter distribution of the JEH. WGFD annual trend/classification count data provide a multi-year baseline data set to measure changes in the winter distribution of the JEH and categorizes observations by location. In each year, we will calculate the proportion of total classified elk in the JEH that are classified on NER feedgrounds. We will compare the 3-year running average post MSP implementation to the pre-implementation baseline. The pretreatment baseline will be comprised of data from 2008 2016, a time period that represents BEMP implementation prior to MSP actions (Figure 13).

Elk Fed Days and Bison Fed Days

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. We further assume the variables elk-fed-days (EFD) and bison-fed-days (BFD) are a proxy for these conditions. EFD and BFD will be calculated annually for each species based on the following formulas:

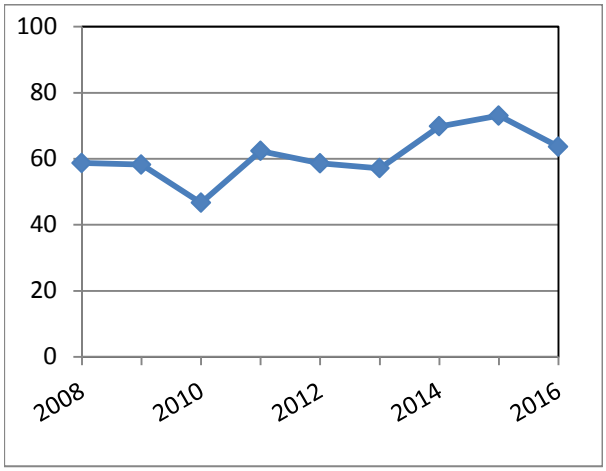


Figure 14. Proportion of the Jackson Elk Herd that was classified on NER feedgrounds in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

EFD= ∑ Total elk counted on feed during daily feedground counts for duration of feed season

BFD= ∑ Total bison counted on feed during daily feedground counts for duration of feed season

Because EFD and BFD are influenced by feed season length and the number of animals on feed, the MSP strategy of delaying the initiation of supplemental feeding will inherently reduce the number of EFD and BFD through a reduction in average feed season length. We believe that EFD will be further reduced by encouraging a greater proportion of the JEH to winter on native winter range, thereby reducing the number of elk occupying NER feedgrounds. We will evaluate changes in EFD and BFD by comparing the 3-year running average post MSP implementation compared to mean EFD and BFD from 2008–2015. The running average is an appropriate comparison because it will help

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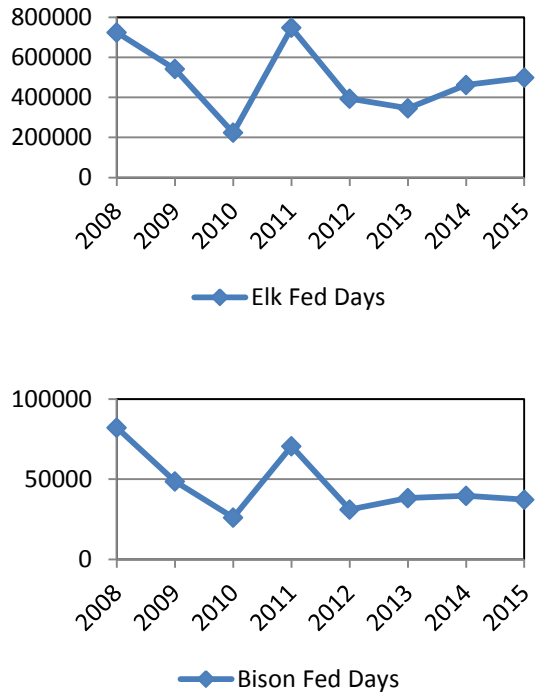


Figure 15. Elk Fed Days (EFD) and Bison Fed Days (BFD) in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the Management Step Down Plan (2008-2015). These values represent the pretreatment baseline which will be compared to the 3-year running average EFD and BFD post MSP implementation.

account for wide annual variation in EFD and BFD associated with winter severity (Figure 15)

Elk Winter Mortality Monitoring

NER has used consistent methods to monitor winter elk mortality since 1982. Each winter NER biologists and other refuge staff conduct a survey of all non-hunting related winter elk mortalities that occur on NER from November through April. Mortalities are tallied by age/sex class and percent mortality is calculated using the corresponding number of elk classified on NER feedgrounds as the denominator. We will continue to monitor elk winter mortality using the same methods post-MSP implementation, which will allow trend comparisons to the pre MSP baseline (Figure 15). Under the MSP framework, we believe the 3-year running averages for total and calf winter elk mortality will be within the range of variation exhibited by the pre MSP baseline. Historic monitoring suggests that calf and total mortality are sensitive to winter severity and disease outbreaks, and that winter mortality occasionally exceeds >3% total mortality and >10% calf mortality. Post-MSP mortality in excess of these levels may warrant shortening the feeding initiation delay in subsequent years.

Elk Collaring

One of the MSP's principal strategies is to shorten the length of the feed season to encourage elk use of native winter range, but we anticipate that this strategy will also result in an increase in elk conflicts on surrounding private land in the town of Jackson and the Spring Gulch areas, potentially including large groups of elk. To quantify this effect and provide real-time information to WGFD and NER managers to facilitate a response, we propose maintaining a sample of 50 GPS-collared elk that winter on NER throughout the MSP implementation period. Forty-five elk represents approximately 0.5% (1 in 200) of the NER winter elk population. This sample size will not be sufficient to detect all elk movements from NER to surrounding private lands, particularly movements by small groups of mature bull elk, but it will be sufficient to detect and quantify significant movements of cow/calf/yearling elk groups compared to pre-MSP baseline data.

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NER has elk GPS-collar data available from the 2008-2013, which represents the post-BEMP, pre-MSP baseline period. We hypothesize that elk movements from NER to surrounding private lands will increase during the MSP implementation period compared to the pre-treatment baseline. This will be tested by comparing the number of incidents that elk left NER for surrounding private lands (per elk/per year), and the proportion of elk GPS fixes on NER versus private lands during time periods of interest. The principal time period of interest is late December–March because this represents the period after the NER elk hunting season, and prior to, and during, NER feeding operations. This is the season when changes to the NER feeding program would be most likely to result in elk distribution changes.

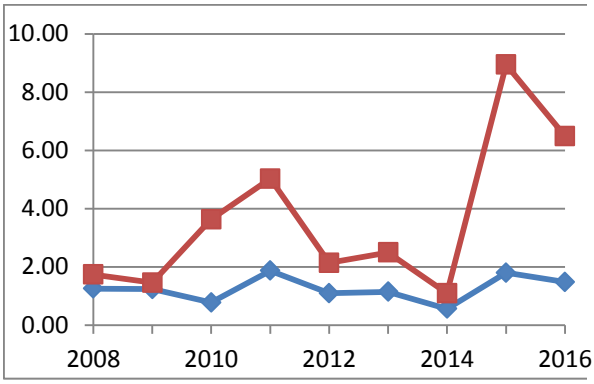


Figure 16. Total (blue) and calf (red) elk winter mortality (%) on NER in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

Thirty adult cow elk were captured on NER feedgrounds in February 2016 and Telonics Iridium GPS collars were deployed with a 90 minute fix interval. Collars will be deployed on up to 50 additional adult cow elk in February-March 2017. Given 83% annual survival for adult cow elk in the JEH (Cole and Foley et al. 2015) and 3-year collar life, approximately 10 additional elk will need to be collared each year in winter 2018 and 2019 to maintain the 50 elk desired sample size over the life of the MSP implementation period.

Ancillary data that will be collected and analyzed during the elk capture and collar data analysis process includes brucellosis seroprevalence, pregnancy rate, and elk summer range determination for comparison to the findings of Cole and Foley et al. (2015).

Disease

The primary purpose of limiting reliance on supplemental feeding is to reduce the prevalence of endemic elk and bison diseases and mitigate transmission risk associated with the introduction of novel diseases. We hypothesize that brucellosis seroprevalence will decline post MSP implementation. There are no recent brucellosis seroprevalence data for elk on the NER, but >50 elk will be captured during elk collaring operations in winter 2016, and each elk will be tested for brucellosis exposure. The 2016 Brucellosis seroprevalence rate will be the pre-treatment baseline to evaluate post MSP change. Chronic wasting disease (CWD) has been monitored in the JEH since 1997, and since 2008 it has been monitored with sufficient sample size to detect 1% prevalence with 95% confidence. No CWD positive cases have been detected in the JEH, which given the long term persistence of the disease, provides overwhelming evidence that CWD is not currently endemic to the JEH. However, most evidence suggests that the distribution of CWD is increasing and that its introduction to the JEH is inevitable. Early detection is critical to ensure an adequate management response, and therefore ongoing monitoring at sample sizes sufficient to detect 1% CWD prevalence with 95% confidence is necessary. CWD is sampled by testing tissues collected primarily from hunter harvested elk, and past experience suggests that 2 full time technicians working from September-December are necessary to ensure minimum sample size. Typical costs associated with 2 technicians are $32,000 per year.

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Data Collected for Modeling

Table 6. Variables to be used in models to explain elk winter distribution in the Jackson Elk Herd and elk calf mortality on NER.

VARIABLE	SOURCE	Elk Winter Distribution Model	Elk Calf Mortality Model
Proportion Jackson Elk Herd on NER Feedgrounds	WGFD/NER Jackson Elk Herd February Classification Count	Yes	No
Proportion Jackson Elk Herd from South Snake River summer segment	Determined from elk GPS collar data for elk captured on NER	Yes	No
Number of wolf packs in the Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated total wolf numbers in Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated number of wolves using NER in winter	NER observations	Yes	Yes
Total NER herbaceous forage biomass	NER forage production survey data	Yes	Yes
Snow Water Equivalent	NOAA snowtell site data	Yes	Yes
NER Winter elk Mortality (calf)	NER winter elk mortality survey	No	Yes
Snow Depth	NOAA Snowtell sites and NER measurements	Yes	Yes
Available Forage	NER and GTNP monitoring in winter months	Yes	Yes
NER Elk and Bison Fed Days	NER feeding records and daily feedground estimates of elk and bison	Yes	Yes
NER Feeding Start Date	NER feeding records	Yes	Yes
Gros Ventre Feeding Start date	WGFD feeding records	Yes	No
Elk Hunting Pressure by Hunt Area	Estimated number of hunter days from WGFD completion reports	Yes	Yes

To facilitate modeling, we will collect data on the following associated variables (Table 6). The table lists variables and how they relate to our efforts to use modeling to explain changes in elk distribution and elk calf mortality relative to our principal action of reducing feed season length.

EVALUATION/FUTURE MANAGEMENT

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Consequently, we anticipate that the strategies outlined in this plan will be in place for a minimum of 5 years, after which an initial evaluation of the program will be made. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented at an annual management MSP update/report, completed by NER staff by the end of March for the previous year.

Consistent with objectives outlined in the BEMP, the long-term goal of this plan is reduce the reliance of bison and elk on intensive supplemental feeding, using adaptive management principles through a structured framework of management actions, to achieve a desired condition of animals relying predominately on native habitat on NER, GRTE, and USFS lands, and on NER cultivated forage. But because there is no precedent for what this plan proposes, there are few responses to proposed management actions that can be predicted to a degree of certainty commensurate with establishing definable thresholds or other objective criteria for success in the short term.

Factors that will be considered in evaluating the success of the program will include the trend of EFD and BFD, type and frequency of private lands conflicts, the proportion of the JEH wintering on the NER, presence or absence of CWD and other infectious diseases, elk and bison population size and distribution, elk calf winter mortality, and public support. These are complex, dynamic, and interwoven components that, together with the MSP, make up the framework for decreasing reliance on supplemental feeding. As such, the effects of changing biological, social, and political conditions on these components will be part of the evaluation process.

In the context of this larger framework, however, we believe evaluation of the trend in EFD and BFD will be most important after the first 5 years of MSP implementation. The direction and magnitude of the trend observed will provide a preliminary basis for evaluation and decisions about continued management actions. Initial success with reduced feeding will be associated with a declining trend in EFD and BFD, with greater magnitudes indicating higher degrees of success. However, determinations of overall program success will necessarily include evaluation of all system components. For example, gains in reduced feeding come could be accompanied by an increase in private land conflicts, which would affect overall success determinations. While the overriding strategy will be to decrease feeding as aggressively as possible while gauging effects on other system components, overall measures of program success through time will necessarily involve evaluating a matrix of effects. These evaluations will be included in annual MSP reports.

As proposed and new management strategies are implemented and evaluated under this plan, at some point in the future it may become apparent that meeting reduced feeding goals will not possible without reducing elk and/or bison population objectives. Population objectives for both herds are set by Wyoming Game and Fish Commission and are evaluated regularly by WGFD personnel, including public review through annual season setting meetings. The BEMP supported the State herd objectives of 500 bison and 11,000 elk, and thus due to NEPA requirements any further consideration of reduced herd sizes by the NER or GRTE are beyond the scope of this plan. However, Wyoming Game and Fish Commission changes to Jackson bison or elk herd objectives are not constrained by the BEMP.

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Investigating the potential effects of climate change on elk and bison management will also be important in the long-term. During implementation of this plan, we will collect a variety of data that could be drawn upon for this purpose.

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PUBLIC OUTREACH AND EDUCATION

The practice of winter feeding is inexorably woven into the historic fabric of Jackson Hole. Elk are identified with the rich and unique legacy for which Jackson Hole is known around the world. De-emphasizing the supplemental feeding program will be a major paradigm shift for the residents of Jackson Hole, Teton County, and the State of Wyoming.

An effective Public Outreach and Education program is essential for effective MSP implementation. The practice of feeding elk evokes passionate responses from those that oppose and those that support this practice. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk/bison herd management methods.

A detailed communication plan to guide outreach and education efforts can be found in Appendix 3.

SCHEDULE

Table 7. Proposed implementation schedule for the MSP.

Action	Date
Public outreach and education	November 2016
Initiate private lands conflicts mitigation contacts/actions	January, 2017
Implement enhanced forage monitoring	January, 2017
Initiate changes in supplemental feeding protocol	January/February 2017
GPS Collar 30-40 elk (Iridium platform)	March 2017
Monitoring/Evaluation/Annual Report	June 2017

BUDGET

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
National Elk Refuge:					
Monitoring:					
Seasonal Biological Technician (0.5 FTE, GS-7)	$24,000	$25,000	$26,000	$27,000	$28,000
Bison/elk fed days					
Mid-winter census					
Elk summer herd segment distribution[1]					
Expanded standing forage estimates[1]					
Chronic Wasting Disease, 2 seasonal bio.-techs	$32,000	$32,000	$32,000	$32,000	$32,000
Winter bison/elk distribution					
Irrigation					
50 Elk radio telemetry collars; Iridium Platform	$115,000	$25,000	$25,000	$25,000	$25,000
Bison barrier maintenance at NER south entrance	$500	$500	$500	$500	$500
Step Down Management Plan annual reporting	$2,000	$2,000	$2,000	$2,000	$2,000
Private lands:					
Easements / Leases (Private Foundations)	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000
Conflict mitigation technicians (WGFD)	$91,000	$91,000	$91,000	$91,000	$91,000
Hazing (helicopter)	$6,000	$6,000	$6,000	$6,000	$6,000
Vegetation restoration/protection[1]					
Public Outreach and Education	$11,000	$1,000	$1,000	$1,000	$1,000
Subtotal					
Grand Teton National Park:					
Monitoring:					
Summer elk classification/distribution	$10,000	$11,000	$12,000	$13,000	$14,000
Collaborative elk monitoring (GRTE portion)	$5,000	$5,000	$5,000	$5,000	$5,000
Vegetation Restoration/Protection					
Monitoring	$16,000	$16,000	$18,000	$18,000	$12,000
Temporary bison fencing	$24,000				
Temporary fence maintenance	$6,000	$8,000	$8,000	$4,000	
Hayfields restoration	$84,000	$70,000	$70,000	$31,000	
Exotic plant mitigation	$50,000	$52,000	$46,000	$32,000	$16,000
Elk Reduction Program (subject to annual review)					
Hunter harvest evaluation	$1,500	$1,500	$1,500	$1,500	$1,500
Harvest age distribution	$2,000	$2,000	$2,000	$2,000	$2,000
CWD monitoring (0.15 FTE, GS-6)	$7,000	$7,000	$7,000	$7,000	$7,000
Law Enforcement and Visitor Protection (0.15 FTE for 20 LE and support staff; supplies, and permitting)[3]	Unknown				

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
Subtotal					
Wyoming Game and Fish Department:[2]					
Subtotal					
Grand Total					

[1]See detail in Appendix

[2] Dependent on size of elk reduction program; current annual expenditures are approx. $295,000 for 0.15 FTE for 20 LE and support staff; supplies, and permitting.

[3]Through Interagency Agreement

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APPENDIX 1. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007).

Populations

- Jackson elk herd objective of 11,000 would be maintained.
- New Jackson bison herd objective of 500 established.

Winter Feeding

- Supplemental feeding could be delayed or could occur earlier compared to current practices.
- Changes [to feeding program could] include alterations in the timing of feeding and providing supplemental feed in fewer years.
- Ration or pellet composition might need to be changed.
- Supplemental feeding would be initiated according to established criteria, including pre-winter forage production, assessments of forage utilization (done jointly by WGFD and NER personnel), elk condition and movements, and potentially on the January 1 index of winter severity calculations for elk (Farnes, Heydon, and Hansen 1999).
- Mechanical means could be used to increase forage access for elk after snow crusting events.
- Changes in the refuge supplemental feeding program could begin to affect elk nutrition (negligible adverse effect on NER elk from lower nutrition).
- Displacement of elk by bison during competition for standing forage would decrease as the bison herd is reduced.
- Aggressive social interactions involving competition for food among elk and bison would increase overall as feeding periods are reduced.

Winter Distribution

- Elk densities on the NER would decline due to more reliance on standing forage and wider distribution.
- Elk use of lands surrounding the NER would increase, including:
    - USFS lands east of the NER
    - Gros Ventre feedgrounds possibly
    - Southern GRTE
    - State feedgrounds south of the NER
- Most of winter distribution shift would involve elk in the Yellowstone, Teton Wilderness, and Gros Ventre segments.
- As ungulate numbers decreased and supplemental feeding was reduced, competition and aggressive social interactions on the refuge would also be reduced.
- Elk and bison distribution would increase as the animals relied more on native winter range.
- Fewer animals would be present on the refuge.

Mortality

- As supplemental feeding is reduced, natural factors such as climate and native forage availability would have a greater influence on numbers, movements, distribution, and mortality.
- More elk would be subject to natural factors affecting mortality, including loss of body condition, predation, and starvation.
- Increased mortality on and off the refuge would mainly affect older elk and calves, and some prime bulls entering the winter energetically stressed due to rut activities.
- Late winter calf ratios could decrease as a result of higher winter calf mortality

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- Average winter mortality on the refuge would increase from 1%–2% annually to an estimated 1%–5%.
- Overall, a higher total winter mortality rate of approximately 5% could be expected.

Disease

- Reductions in supplemental feeding or elk numbers would reduce the potential for impacts due to tuberculosis, septicemic pasturelosis, and CWD.
- The health and sustainability of the Jackson elk herd would be increased gradually as supplemental feeding was reduced and there was greater reliance on standing forage and wider ungulate distribution.
- Health and sustainability of the Jackson elk herd would be enhanced in the long term.
- Wider distribution of elk would result in moderate reductions in both the prevalence and potential transmission of brucellosis, as well as potential for spread of diseases not yet in the population.

Private Lands

- The agencies would work closely with the WGFD and landowners, including livestock producers, to coordinate actions that would prevent conflicts due to elk dispersal and to defray costs of managing potential conflicts. Preventing access to food/hay rewards on private lands would be vital for effective management.
- Private land conservation easements within NER boundaries would promote wider distribution.

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APPENDIX 2. Monitoring Supplemental Materials: Feeding Initiation Methods

At each sample site, 10 subplots will be measured at every 5 steps along the random bearing determined for each site. At each subplot a 13.27" diameter metal sampling ring will be placed on the ground. The amount of forage available to elk within the sampling ring (dry weight in grams) will be visually estimated. The 13.27" diameter subplot allows easy conversion from grams to lbs. per acre (each gram is equivalent to 100 lbs. per acre). During annual forage production sampling, refuge biologist Eric Cole has made approximately 1,000 of these visual estimates per year for 17 years, and 33% of Cole's estimates have been verified by clipping and weighing. Therefore, Cole will be the principal estimator, but additional personnel will be trained in these techniques to provide redundancy in the event of personnel changes, and to increase the number of observers to facilitate estimation of error.

Estimating available forage within the sample ring at each subplot is relatively straightforward when snow cover is limited, but estimating how much of the forage is accessible to elk when snow is dense, deep and crusted can be subjective. To decrease the subjectivity of the estimation process, if the area under the sample ring is covered with snow, only forage that can be exposed with a gloved hand will be included in the estimate of available forage. Forage that is fouled with manure and/or flush with the ground due to trampling and/or encrusted in ice will not be included in the estimate of available forage. At each subplot the estimate of available forage (dry weight g) will be converted to an equivalent lbs./acre value (1 gram=100 lbs./acre). The arithmetic mean of available forage (lbs./acre) for the 10 subplots provides an estimate of available forage for each index site. There are 3 sample site categories: 1) Historic Key Index Sites that have been used since 2007, 2) New randomly selected sites within areas preferred by elk, and 3) New randomly selected sites in areas not preferred by elk. Historic key index sites were not randomly selected, but were instead selected to represent areas most preferred by elk on the south end of NER. These were the sites used to determine when supplemental feeding would be initiated from 2007 until the implementation of the MSP. To facilitate comparison with pre-MSP data, we will continue to use mean lbs. per acre across historic key index sites to determine the 300 lbs. per acre threshold. However, post MSP implementation we will delay feeding initiation by 2 weeks once the 300 lbs./acre level has been reached. We will concurrently sample at randomly selected sites stratified on an annual basis between areas highly preferred and not highly preferred by elk. This will enable us to quantify the relationship between mean forage availability at historic key index sites and random sites over time.

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APPENDIX 3. Communication Plan

Communication Goals

Prior to the MSP's Implementation

- Utilize a variety of outreach methods to inform the public on the goals and timing of the MSP implementation and possible effects on wintering herds.
- Utilize a variety of outreach methods to inform the public on public comment opportunities.
- Identify and coordinate key messages and outreach with USFWS regional and national offices, State and federal agency partners, non-profits, elected officials, and other identified audiences.

During the MSP's Implementation

- Continue to utilize a variety of outreach methods to describe current management actions as well as measurable and noticeable changes on the landscape, in animal behavior, or in animal health.
- Provide a comprehensive overview of the MSP by providing links and references to previous outreach and background information.

Communication Objectives

- Work with current media contacts to promote news of the MSP via print, radio, Web, and social media platforms.
- Utilize new media and social media tools to provide information on why the MSP was developed, what public comment opportunities exist, and how the plan is being implemented.
- Plan, coordinate, and execute public meetings to allow for public comment and questions on the plan.
- Develop and provide methods for the public to submit written comments on the MSP.
- Monitor print media on Refuge elk and bison management to see how the Step own Plan objectives and reactions are being portrayed to the public.

Current Outreach Resources

- National Elk Refuge web site
- National Elk Refuge news release list
- (approximately 300 contacts)
- National Elk Refuge Twitter site (1,039 followers)
- Bison and Elk Management Plan web site (http://www.fws.gov/bisonandelkplan/)
- Space for an 11" x 17" poster in the Visitor Center on Refuge management topics
- Display panels in the Visitor Center theater for temporary displays

Available Supporting Outreach Resources

- USFWS Mountain–Prairie External Affairs staff
- USFWS Mountain–Prairie web site, including the
- "Top Stories" feature
- USFWS Mountain–Prairie Twitter site USFWS Mountain-Prairie Region Facebook page
- USFWS National Wildlife Refuge System

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- Facebook page
- USFWS Facebook page

Previous Outreach Efforts

- NER routinely writes and disseminates news releases on Refuge management activities, including the Comprehensive Conservation Plan, supplemental feeding, herd health monitoring, and forage production.
- Post the above news stories as Content.
- Management System (CMS) articles.
- Post CMS news story promos so they prominently appear on the home page, linking readers to the articles.
- Send out Twitter messages linking viewers back to the news stories.
- Prepare, upload and provide links to Adobe PDF versions of news stories with additional photos where additional images are available and/or help understand or visualize the content.
- Utilized the Conservation link on the web Content
- Management System to post information about the Bison and Elk Management Plan and the draft Comprehensive Conservation Plan.
- Retained and provided a link to the original Bison and Elk Management web page (http://www.fws.gov/bisonandelkplan/) that was developed during the planning process. The web site includes links to the Final Plan/EIS, Record of Decision, Federal Register Notice of Availability for both the Record of Decision and Final Plan/EIS, associated news releases, public meeting highlights, and other related documents. Note: the National Elk Refuge does not manage the site.

Additional Outreach Opportunities

- Public meetings in Jackson and other identified locations.
- Service produced video; video could be posted to the National Elk Refuge's multimedia web page, or USFWS Mountain–Prairie home page "Top Video" feature.
- Live radio interview on KHOL (Jackson, WY radio)
- Wyoming Public Radio interview with Refuge management staff
- Interviews with local print media sources
- Updates at community leader meetings such as Rotary Club, Jackson Hole Chamber of Commerce board meetings, and interagency breakfast meetings (with Federal agencies and local elected officials).

Target Audiences

Internal

- Regional and National USFWS Leadership
- Refuge permanent staff
- Refuge seasonal staff
- Refuge volunteers

External

- Congressional representatives
- State of Wyoming leadership
- Federal agency partners, particularly Grand Teton National Park and the Bridger–Teton National

Forest
- Wyoming Game & Fish Department
- Other NER partners, including county and town agencies and local nonprofit organizations
- Local elected officials
- Private landowners in proximity to the National
- Elk Refuge or neighboring Federal lands
- Tribes
- Local and state media
- Local public

Key Outreach Topics

- Overview of BEMP objectives
- Strategy to change elk/bison behavior
- Threat of disease
- Natural mortality rates
- Anticipated winter distribution changes for bison/elk
- Mitigate negative effects on private lands
- Change elk behavior and distribution while avoiding increased mortality.
- Explain the historic reasons a supplemental feeding program began and why it was continued.
- Explain the NER's limited large ungulate carrying capacity and the disproportionate impact of bison on available forage; 3 elk = 1 bison.

DRAFT

APPENDIX 4. Models

Elk winter distribution model

The proportion of the JEH that winter on the NER will be linked to factors hypothesized to influence elk winter distribution using a generalized linear mixed effects model (GLMM). A GLMM can account for a proportional response variable (i.e., constrained to the interval 0–1) using a log link and binomially-distributed errors. A GLMM also includes fixed and random effects, with the latter capturing residual model variance otherwise not explained by fixed effects. Year will be including as a random effect, providing several benefits. First, we don't assume years are independent and comprise all of the factor levels of interest. Instead, the effect of year is treated as a random variable, with individual year effects realizations of that distribution. This allows inference to non-sampled factor levels, i.e. years, by estimating a latent population-level proportion of elk expected to winter on the NER regardless of fixed effect influences. Thus, the random year effect can be considered a latent variable describing elk behavior manifested as observed winter distribution. Second, because year effects are not treated as independent, estimated effects of year on the proportion of JEH elk wintering on the NER are dependent on all factor levels, leading to greater precision when estimating individual year effects (Kéry 2010).

The full GLMM incorporating fixed effects for each factor identified as influencing elk winter distribution is:

$$P_t = \beta_{0(t)} + \beta_1 * AFI_t + \beta_2 * SDM_t + \beta_3 * WP_t + \beta_4 * GSP_t + \beta_5 * SWE_t + \varepsilon_t$$

where the random intercept and residual model variance are

$B_{0(t)} \sim N(\mu_{\beta_0}, \sigma^2_{\beta_0})$, and

$\varepsilon_t \sim N(0, \sigma^2)$, respectively.

Fixed effects include 1) per capita available forage at initiation of winter feeding (*AFI*) , 2) proportion of the JEH that are short-distance migrants (*SDM*), 3) number of wolf packs present on JEH native winter range (*WP*), 4) growing season (May–August) precipitation for the Wyoming Snake Drainage climate division (*GSP*; a proxy for available forage on native winter range), and 5) snow water equivalent on 1 January at Thumb Divide (*SWE*; a proxy for early winter severity).

Elk calf winter survival and forage deficits

The Forage Accounting Model of Hobbs et al. (2003) has as an output weekly available forage biomass for the NER (sum of predictions for 30 × 30 m cells). These predictions account for snow conditions using a proxy of SWE and decrement total available biomass by 35% to account for unpalatable plants within the total estimate.

While calf survival is a function of multiple factors the primary management action influencing calf survival is supplemental winter feeding. Current winter feeding initiation criteria lead to calf survival generally higher than in unfed populations. Proposed feeding initiation criteria will result in later initiation of supplemental feed, which will be most influential to calf survival. There is currently little

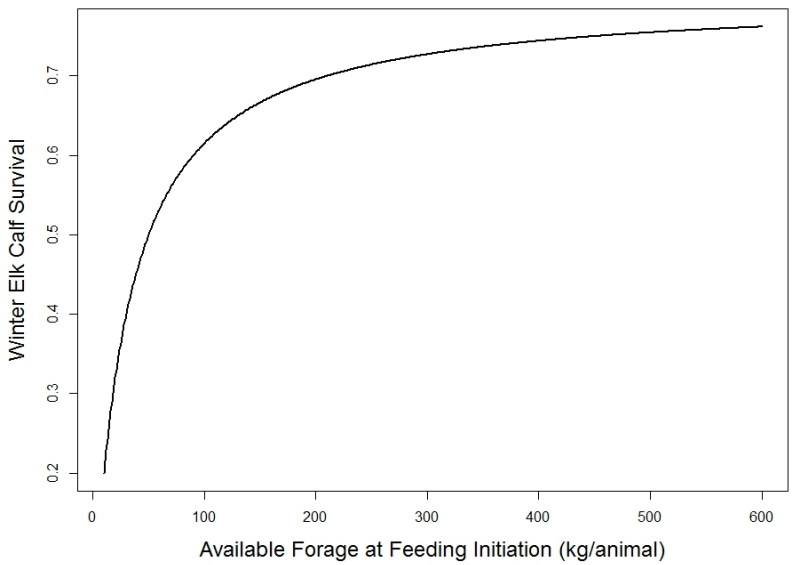
DRAFT

understanding regarding the relationship between initiation of winter feeding and calf survival, except that current feeding initiation criteria result in high calf survival. We believe a threshold level of available forage at initiation of winter feeding exists such that winter calf survival reaches an asymptote. Below this threshold, calf survival is hypothesized to decline quickly with reductions in available forage at winter feeding initiation. Available forage at the initiation of winter feeding will be related to on elk calf winter survival using a saturating function (i.e., Holling type-II functional response; Fig. 6) by

$$S_t = \frac{aAFI_t}{b + AFI_t}.$$

The parameters *a* and *b* determine how calf survival is related to available forage. Maximum calf survival is *a*, and *b* represents the value of available forage to an individual when survival is 50% of *a* (Hilborn and Mangel 1997).

Although this approach doesn't capture forage deficits *per se*, it does provide a potentially sensitive proxy for this concept. It is assumed that a forage deficit for calves would occur at a point on the curve of the relationship between calf survival and available forage at initiation of supplemental feeding. Modeling the response of winter calf elk survival to changes in feeding initiation criteria facilitates our ability to maximize the influence of feeding initiation criteria on winter distribution while minimizing the likelihood of a large mortality event.



Hypothesized relationship between winter survival of elk calves and per capita available forage at initiation of winter feeding on the National Elk Refuge.

BASIC COMMUNICATIONS STRATEGY

SECTION I: GENERAL INFORMATION

1. **Plan title:** Release of the National Elk Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA)

2. **DTS number: 44T**

3. **What is the action triggering this communications plan?** *(Please explain in no more than three sentences)*

The CCP and EA have been approved since September 2015, so this announcement is overdue. A separate engagement strategy for the Bison and Elk Management step-down plan is currently in development and will be available for leadership review soon.

4. **What is the proposed date to announce this action? Why has that date been selected?** *(Please note whether this date is flexible)*

We propose to release this CCP/EA as soon as possible and no later than September 2016.

SECTION II: GOALS AND MESSAGES

5. **What are our primary communications goals?**

Our primary communications goal is to inform our primary partners at the Wyoming Game and Fish Department, National Park Service, U.S. Forest Service, and the local public that the CCP/EA have been finalized and that certain activities under the CCP are underway. Our secondary communications goal is to draw a clear line between the CCP/EA and the Bison and Elk Management Plan, separating those items in the minds of our constituents and indicating to interested stakeholders that information about the latter plan is forthcoming this Fall.

6. **What are our key messages?** *(List no more than four!)*

- The purpose of Comprehensive Conservation Plans is to guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will

implement to protect species, manage habitats, and support compatible, public recreational and other uses.

- A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on the important feedback received during the comment period and these meetings, the Service has selected a preferred management alternative (Alternative D).
- Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem, one of the largest relatively intact ecosystems on the planet.
- The CCP and EA are companion documents to the National Elk Refuge Bison and Elk Management Plan and its contents, including supplemental feeding, are not part of today's announcement. A separate announcement and a series of meetings on the Bison and Elk Management Plan are forthcoming this Fall.

SECTION III: IMPLEMENTATION

7. Who is leading this communications effort? *(Check one. Note if the response is neither of these, you should be using either a Partnership, Full or Targeted plan)*

(•) **Region** ( ) **HQ**

8. Which programs and/or regions does this issue involve?

The National Elk Refuge (R6)

Refuges (R6)

External Affairs (R6)

9. Implementation timeline:

Date	Time	Tactic	Responsible
August 12	COB	Draft news release and comms plan, submit to NER staff for review	Ryan Moehring
August 19	COB	Review outreach package and return any edits to Ryan Moehring	NER Staff
ASAP?	COB	Refuges Planning re-submits package to *Federal Register*	Toni Griffin
Day before release	10:00 a.m. MDT	Contact Scott Talbot, Director WGFD	Steve Kallin
Day before release	10:00 a.m. MDT	Congressional notifications	Ryan Moehring
Day of release *(Day available in the Reading Room)*	10:00 a.m. MDT	Distribute press release	Ryan Moehring
Day of release	10:00 a.m. MDT	Post press release on R6 website and FWS homepage. Also, post link to press release on social media	Rob Mansheim
Day of release	10:00 a.m. MDT	Email Dear Interested Party Letter to interested stakeholders.	NER staff

10. Which communications tools are needed to support these strategies and tactics? *(Be as specific as possible about the products identified and who will produce them)*

Tool	Responsible	Due Date
News Release	Ryan Moehring	8/12/16
Communications Plan	Ryan Moehring	8/12/16
Dear Interested Party Letter	NER Staff	? (Is this needed?)

11. Which agencies, organizations and/or individuals should be notified?

Stakeholder Name	Contact Info	Pro/Anti/ Neutral	Contact By
Grand Teton National Park	xxx	xxx	xxx
National Park Service, Intermountain Region	xxx	xxx	xxx
U.S. Forest Service	xxx	xxx	xxx
Wyoming Game and Fish Department	xxx	xxx	xxx
Who else?	xxx	xxx	xxx

12. Who are the primary points of contact for this action?

Media coordinators *(For national-level plans, list at least one person from HQ Public Affairs and others from region/program if appropriate. For regional-level plans, only regional coordinators are required. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Congressional coordinators *(Optional. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Subject matter experts available for interview *(Must be approved by HQ Public Affairs for an HQ-led announcement or Regional Public Affairs for region-led announcement. Enter name, email and phone)*

- Steve Kallin, 307-201-5409; Steve_Kallin@fws.gov

Additional technical experts for reference *(Enter name, email and phone)*

- Eric Cole, 307-201-5432; Eric_Cole@fws.gov

SECTION IV: DOCUMENT INFO

13. Date Created **Created By**

8/12/2016	Ryan Moehring

14. Date last edited **Edited By**

3/7/2017	44T

SECTION V: CONGRESSIONAL CONTACT LISTS

Delegation Contacts

Member Title	State	Member Name	STAFF_EMAIL
Senator	Wyoming	John Barrasso	brian_clifford@barrasso.senate.gov; kaitlynn_glover@ba kristi_wallin@barrasso.senate.gov
Senator	Wyoming	Michael Enzi	alison_mcguire@enzi.senate.gov karen_mccreery@enzi.senate.gov
Representative	Wyoming	Cynthia Lummis	landon.stropko@mail.house.gov tucker.fagan@mail.house.gov

Committee Contacts

N/A

From:	Ryan Moehring
To:	Steve Kallin; Lori Iverson; Eric Cole; Mike Blenden
Cc:	Toni Griffin
Subject:	NER CCP/EA Communications Package
Date:	Friday, August 12, 2016 12:31:00 PM
Attachments:	NER CCP News Release.docx NER CCP Comms Strategy.docx
Importance:	High

All,

Thanks for your time on the phone yesterday. Per our discussion, I spent the morning putting together a communications strategy and news release for the NER CCP/EA. See attached and please provide me with feedback and edits **by COB next Friday 8/19**. Note: there are several highlighted sections in the comms plan that require NER staff attention. Note #2: I will be out of the office all next week and unable to discuss this, so if you want to chat and it can't wait until the week after next, this afternoon works best.

Also, I spent a bit of time thinking about our BEMP step-down engagement piece. That thought process, combined with a review of the materials Natalie provided and a reconciliation against what we are currently doing on the engagement front for the opening of Rocky Flats NWR, leads me to think that we need four primary items to fully meet our engagement obligations and best position ourselves for success:

1) A news release like the attached
2) A comms plan like the attached (to include items such as interested party letters)
3) A series (one or two may be sufficient) of facilitated meetings with partners (WGFD, NPS, USFS) to identify partner concerns and obstacles and chart a path forward together
4) Once those meetings are complete, a series of facilitated workshops or listening sessions (2-4?) for the local community so we can explain our plan and provide them with opportunities to understand what is already decided and what decision space still exists where they can impact management decisions. If at all possible, these meetings would be co-hosted by us and our partners but facilitated by a third party.

Steve, I do know what your funding situation looks like, but my suggestion would be to hire an outside firm/contractor (local = better) to set up and facilitate these sessions so 1) they feel collaborative and not FWS top-down; and 2) you and your staff can fully participate instead of having to facilitate.

Of course these are just a few preliminary thoughts and we can further refine as needed, but based on recent discussions in the RO around "engagement", I think this will get us close. One thing is certain: time is of the essence, so we should get a game plan together ASAP.

Finally, Mike, please let us know if you were able to catch Will today re: releasing the CCP/EA.

Thanks again, everyone, and please share your thoughts when you have a moment.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

Web |Facebook | Twitter | Flickr | YouTube

News Release

U.S. FISH AND WILDLIFE SERVICE
Mountain-Prairie Region
134 Union Boulevard
Lakewood, Colorado 80228

For Immediate Release
September XX, 2016

Management Plan Completed for National Elk Refuge

Contact: Ryan Moehring, (303) 236-0345, Ryan_Moehring@fws.gov

LAKEWOOD, Colo. – The U.S. Fish and Wildlife Service (Service) has released a final Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) that will guide management of the National Elk Refuge in Jackson Hole, Wyoming for the next 15 years. The management decisions included in the CCP are a result of thorough environmental review and input from the local community and other stakeholders.

Quote from Steve?

A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on the important feedback received during the comment period and these meetings, the Service has selected a preferred management alternative (Alternative D).

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem, one of the largest relatively intact ecosystems on the planet.

The final CCP/EA is available online and hard copies are available at the refuge office. For questions about the CCP/EA, please call 307-733-9212.

The CCP and EA are companion documents to the National Elk Refuge Bison and Elk Management Plan and its contents, including supplemental feeding, are not part of today's announcement.

Established in 1912, the National Elk Refuge spans approximately 25,000 acres and provides wildlife with a variety of habitat types, including grassy meadows, marshes, forest, sagebrush, and rock outcrops. Although the refuge is best known for the large herd of wintering elk in the world, nearly 175 species of birds and at least 47 mammal species have been observed on the refuge. In addition to the large herd of elk, a free-roaming bison herd also winters at the refuge. Each year, more than 300,000 people visit the National Elk Refuge to witness these mesmerizing wildlife spectacles.

To learn more about the refuge,
visit: https://www.fws.gov/refuge/National_Elk_Refuge/about.html.

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. We are both a leader and trusted partner in fish and wildlife conservation, known for our scientific excellence, stewardship of lands and natural resources, dedicated professionals, and commitment to public service.

For more information on our work and the people who make it happen, visit http://www.fws.gov/mountain-prairie/. Connect with our Facebook page at http://www.facebook.com/USFWSMountainPrairie, follow our tweets at http://twitter.com/USFWSMtnPrairie, watch our YouTube Channel at http://www.youtube.com/usfws and download photos from our Flickr page at http://www.flickr.com/photos/usfwsmtnprairie/.

– FWS –

From: Ryan Moehring
To: Iverson, Lori
Subject: Re: interesting comment
Date: Wednesday, August 17, 2016 9:38:42 PM

The engagement strategy is for the step down plan. Noreen will not release the CCP until she sees measurable progress on the engagement strategy for that step-down. I'm waiting for a response from you, Steve, et al to my email proposing the four components of that strategy. The CCP will continue to rot until Noreen gets what she asked for. If anything is unclear we can discuss upon my return Monday.

Sent from my iPhone

On Aug 17, 2016, at 8:00 AM, Iverson, Lori <lori_iverson@fws.gov> wrote:

> I'm still unclear why there needs to be an engagement strategy for the CCP. There are no "engagement opportunities" remaining. We had public meetings, comment periods, etc. All that remains is an announcement that the CCP was signed 11 months ago. Maybe I'm missing something ...
>
> L.
>
> Lori Iverson
> Outreach & Visitor Services
> U.S. Fish & Wildlife Service
> National Elk Refuge
> PO Box 510 / 675 East Broadway
> Jackson, WY 83001
> Phone: 307.201.5433
> Cell: 307.690.4375
> Fax: 307.733.9729
> lori_iverson@fws.gov
> National Elk Refuge photo gallery
> National Elk Refuge web site
> Twitter: @NatlElkRefuge
>
> "If the person you are talking to doesn't appear to be listening, be patient. It may simply be that he has a small piece of fluff in his ear." - Winnie the Pooh
>
> On Tue, Aug 16, 2016 at 10:20 PM, Ryan Moehring <ryan_moehring@fws.gov> wrote:
>
> > Another reason to get cracking on the engagement strategy so the RD will release the CCP!
> >
> > Sent from my iPhone
> >
> > On Aug 16, 2016, at 1:32 PM, Iverson, Lori <lori_iverson@fws.gov> wrote:
> >
> > > Saw someone today at the post office who asked about the CCP.

Word on the street is we're waiting until a decision is made on the grizzly bear delisting before we release the CCP. Just sayin' ...

Lori

Lori Iverson
Outreach & Visitor Services
U.S. Fish & Wildlife Service
National Elk Refuge
PO Box 510 / 675 East Broadway
Jackson, WY 83001
Phone: 307.201.5433
Cell: 307.690.4375
Fax: 307.733.9729
lori_iverson@fws.gov
National Elk Refuge photo gallery
National Elk Refuge web site
Twitter: @NatlElkRefuge

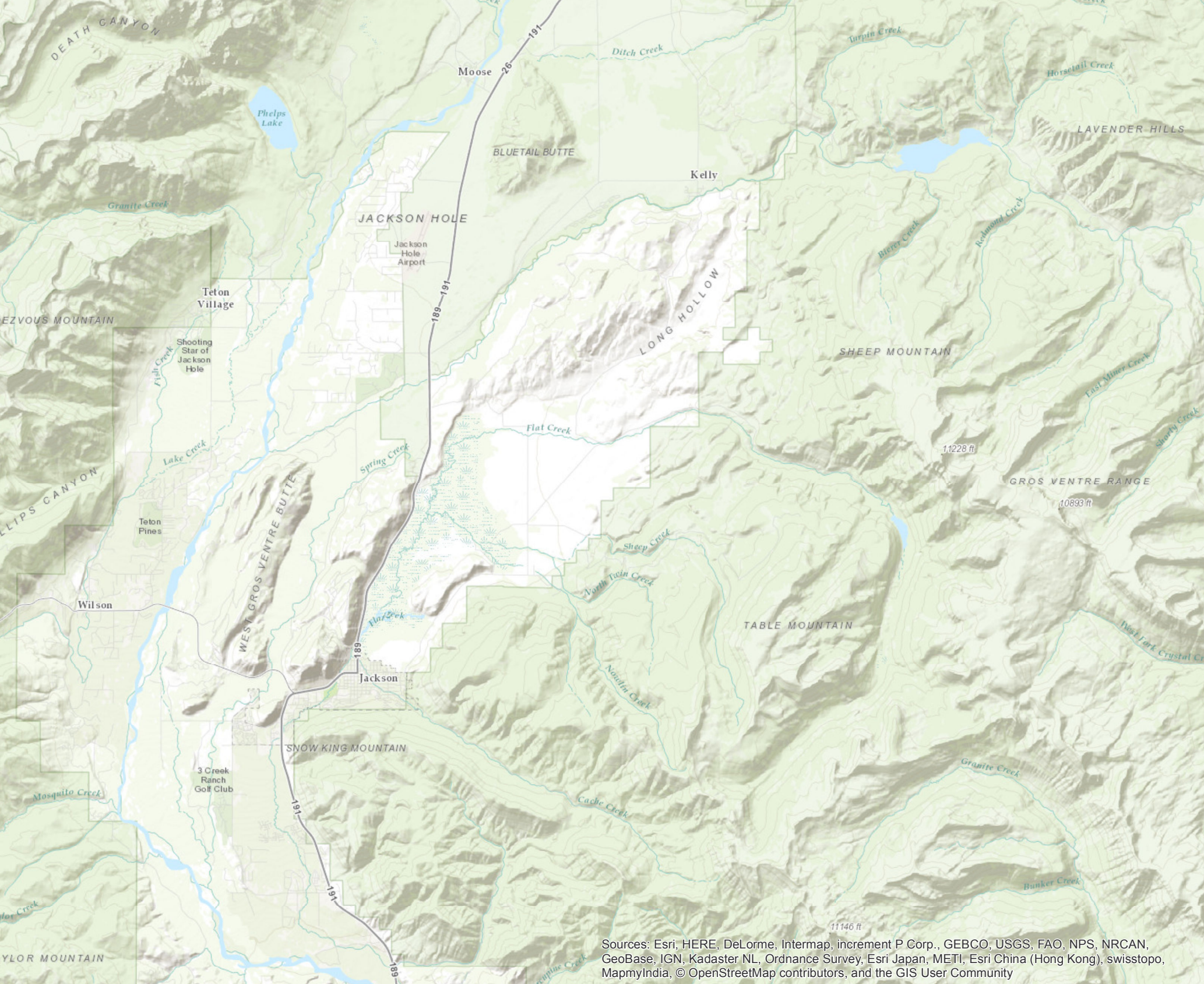
"If the person you are talking to doesn't appear to be listening, be patient. It may simply be that he has a small piece of fluff in his ear." - Winnie the Pooh

From: Will Meeks
To: Steve Kallin; Mike Blenden
Cc: Maureen Gallagher
Subject: NER AMP meeting
Date: Thursday, August 18, 2016 12:49:17 PM

Steve/Mike,

Once completed, will you please provide me an update/summary of the discussion and any decisions made? Thanks.

Will Meeks
U.S. Fish and Wildlife Service
Mountain Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Frequently Asked Questions and Map Showing Desired Elk/Bison Winter distribution
Eric Cole 17 August 2016

Peer review comments indicated that are likely to be frequently asked questions associated with the Step Down Plan to reduce reliance on supplemental feeding. The planning team agreed at the 12 August 2016 meeting, that incorporating a Frequently Asked Questions (FAQ) section into the document would be useful. There will be a summary section that lists all FAQs but also callouts or bullets (exact format to be determined) that list the FAQ and response in the relevant section of the document. We agreed that the FAQ callouts would focus reader attention to key points in the document and help convey the most important issues. The exact format for inserting FAQs into relevant sections of the document might have to wait until the final version of the draft.

List of Possible FAQs and responses:

Q1: Why is the MSP vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?

A1: This is the first time that the strategy of delaying feed season initiation has been employed to reduce reliance on supplemental feeding. There is uncertainty regarding the effects of this strategy on elk and bison distribution and elk winter mortality, and therefore it is important to maintain flexibility in plan implementation to avoid significant unintended negative consequences. Unintended negative consequences the MSP seeks to avoid include 1) elk or bison moving to areas where they damage property, risk human safety, or commingle with livestock, and 2) elk winter mortality levels significantly higher than baseline levels.

Q2: Why were reductions to the Jackson Elk Herd and Jackson Bison Herd population objectives not considered as a strategy to reduce reliance on supplemental feeding?

A2: The BEMP has clear population objectives of 5,000 elk wintering on NER and 500 wintering bison. Modifying those population objectives would require additional NEPA analysis. The BEMP also agreed to support State elk herd objectives. The WGFD completed a public process in 2016 to set the population objective for the overall Jackson Elk Herd, and that objective remains unchanged at 11,000 elk.

Q3: The BEMP has an objective of 5,000 elk wintering on NER. Why has that objective not been achieved through increased elk harvest?

A3: The overall Jackson Elk Herd population has declined and is currently close to the 11,000 elk objective, but the number of elk wintering on NER has been well above the 5,000 elk objective since implementation of the BEMP in 2007 (Mean =7,100 elk). When the analysis was conducted for the BEMP, elk winter distribution data suggested that 5,000 elk could winter on NER while still maintaining 11,000 elk in the Jackson Elk Herd overall. However, the proportion of the Jackson Elk Herd that winters on NER has increased significantly over time, and based on current elk distribution it is no longer possible to winter 5,000 elk on NER and maintain 11,000 elk in the overall Jackson Elk Herd. Although

increasing elk harvest above current levels would likely allow us to achieve the 5,000 elk objective for NER, it would also reduce the overall Jackson Elk Herd population below the 11,000 objective. If increasing elk harvest in not plausible, the only other option to meet the 5,000 elk objective on NER is to change winter elk distribution, which is the principal strategy of the MSP.

Q4: Why is your principal strategy to delay the start of the feed season?

A4: By delaying the start of the supplemental feed season we decrease the probability that elk that use native winter range or state feed grounds will discover NER feed grounds. Because elk use of feed grounds is a learned behavior, over time this could increase the proportion of elk that winter on native winter range, reduce the number of elk that move from the Gros Ventre drainage to NER, and decrease the NER wintering elk population. The resulting shift in elk distribution would allow us to achieve the 5,000 elk objective for NER. Because 5,000 elk and 500 bison is close to the estimated carrying capacity of NER habitat, less feeding will be necessary at these population levels.

Q5: Will delaying the start of the feed season result in elk starvation?

A5: Our goal is to delay elk feeding a sufficient amount of time to affect elk distribution without causing an increase in elk mortality.

Issues Related to Map Showing Desired Elk and Bison Winter Distribution:

At the 12 August, 2016 meeting, the team agreed that a map or maps that portray areas of acceptable winter elk and bison distribution versus not acceptable areas should be created, but this raises a number of questions that get to the heart of the document:

1)Season is important. Because we are concerned about the effects of the MSP management action to delay feeding on elk and bison distribution, the focus of the map should be the places that we do not want to see elk and bison during winter months as a result of management action (delaying feeding) on NER. It might not necessary to map where we want elk and bison, which could be anywhere other than the “no-go” zones. From a management perspective, does it really matter where elk and bison are as long as they are not in the no-go areas?

2)We might need separate polygons/maps for elk versus bison no-go areas. For example it might be acceptable for elk to leave NER and move into the Gros Ventre drainage but not bison. Is the area on NER south of Miller Butte a no-go zone for bison under this plan? It is now under current management practices.

3) What about Cache Creek? Cache Creek contains winter closures and designated winter range but would large numbers of elk leaving NER for this area be a problem because of the potential of these animals to subsequently leave the drainage for Game Creek and South Park?

4)Minimum Polygon Size? Too small and the map is unmanageable, but too large and important areas of concern are missed. For example do we have a separate polygon for Kelly as an elk and bison no go area? Do we just draw a large polygon around the complex of private lands east, southeast and

northeast of NER and call it a no-go area or do we look at things on a finer scale? For example do we break out areas in spring gulch where hunting is practical and hunting seasons are open until February? The scale and minimum polygon size question also gets to the question of flexibility. If we get too specific on the map, then it sets unrealistic expectations by the public that we might not be able to fulfill.

Please see my draft map (draft elk and bison no go map 8_17_2017.jpg) where I discuss some of the issues above. It would be useful if drew your own polygons and notes on the attached blank map (basemap for elk and bison.pdf), then scan and return to me with comments. We might need another round of discussion about the map(s) if we can't reconcile different ideas and versions. For now I am just putting a placeholder for where we might want the map(s) in the draft MSP document. I would like to resolve the issues discussed above before Kerry and Forest Service GIS invest too much time on a final version of the map.

From:	Cole, Eric
To:	Steve Kallin; Cris Dippel; Doug Brimeyer; Dale Deiter; Sarah Dewey; Brad Hovinga; Dave Gustine; Kerry Murphy; Steve Cain
Subject:	Feeding Step Down Plan, FAQs and Map Issues for your review and comment
Date:	Thursday, August 18, 2016 4:35:13 PM
Attachments:	basemap for elk and bison.pdf draft elk and bsion no go map 8_17_2016.JPG Draft NER Step Down Plan Post Peer Review Copy_Aug 2016.docx Frequently Asked Questions Summary.docx

---

Per our discussion at the 12 August 2016 meeting, I have incorporated some peer reviewer concerns into a track changes version of the draft (see attached). I know that there are a number of formatting issues in the draft, but my main interest is in content at this point. We will make it pretty at the end.

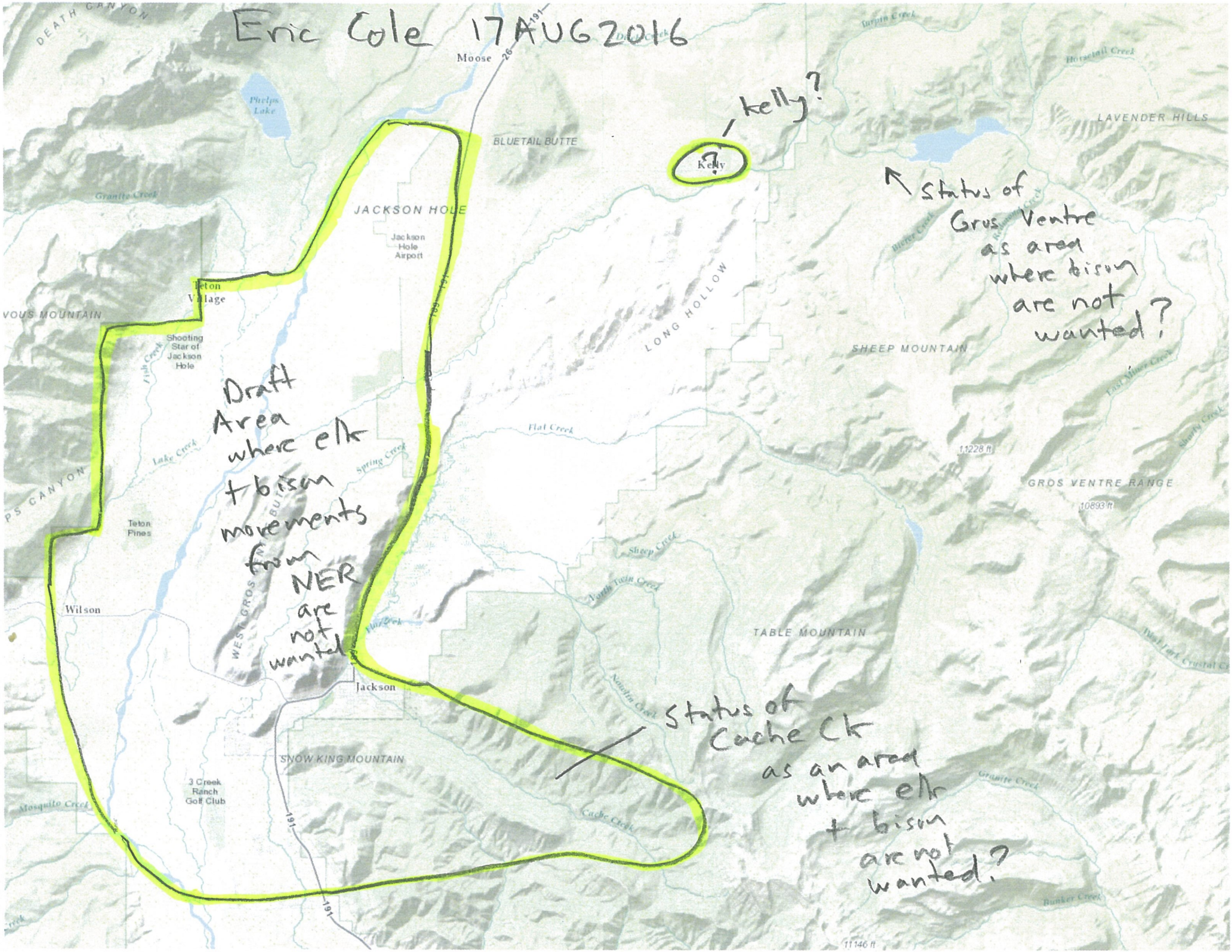
I have also attached a summary of Frequently Asked Questions (FAQs) which includes issues with the map of desired/not desired elk and bison distribution that require your comment.

I am particularly interested in whether you think the FAQs and responses are appropriate, any additional FAQs and responses that you would like to see, and comments/revisions to the map that shows areas that we do not want elk and bison to be located in the winter. Although Kerry has generously offered to have Forest Service staff create the map, there are a number of issues that I have summarized at the end of the Frequently Asked Questions Summary.doc regarding the map that we need to work out first. I have provided an example map (draft elk and bison no go map.jpg) as a first stab at this. If you would like to draw and annotate on my map or the blank basemap that I have provided with you own ideas for polygons that would be useful. Just scan them and email them to me.

We would like to keep this process moving as expeditiously as possible to facilitate a timely review by the agencies, and your response is appreciated.

Thanks,

Eric Cole
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Eric Cole 17AUG2016
Moose
Kelly?
Kelly
BLUETAIL BUTTE
LAVENDER HILLS
JACKSON HOLE
Jackson Hole Airport
Teton Village
Shooting Star of Jackson Hole
LONG HOLLOW
SHEEP MOUNTAIN
Status of Gros Ventre as area where bison are not wanted?
Draft Area where elk + bison movements from NER are not wanted
Flat Creek
GROS VENTRE RANGE
Teton Pines
Wilson
Jackson
TABLE MOUNTAIN
SNOW KING MOUNTAIN
3 Creek Ranch Golf Club
Status of Cache Ck as an area where elk + bison are not wanted?
Granite Creek
Cache Creek
Mosquito Creek
Bunker Creek

BISON AND ELK MANAGEMENT STEP DOWN PLAN

A Structured Framework for Reducing Reliance on Supplemental Winter Feeding

National Elk Refuge
Grand Teton National Park

DRAFT

August~~July 28,~~ 2016

BISON AND ELK MANAGEMENT STEP DOWN PLAN

For the

National Elk Refuge,
Grand Teton National Park,
John D. Rockefeller, Jr. Memorial Parkway
Teton County, Wyoming

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EXECUTIVE SUMMARY

Overview

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands, focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The final plan directed the NER and GRTE (in conjunction with the Wyoming Game and Fish Department: WGFD) to maintain the state's elk herd objective of 11,000; establish a bison population objective of 500; restore habitat on the NER and in GRTE; continue hunting bison and elk on the NER; continue the elk reduction program, when necessary, in GRTE; allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available; and develop a dynamic, structured framework and Step Down Management Plan for decreasing the need for supplemental feeding on the NER. ***This Bison and Elk Management Step Down Plan (MSP) was developed to specifically addresses the criteria for a structured framework referenced in the Record of Decision.***

Background

Winter feeding of elk in Jackson was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. The loss of available winter range in Jackson Hole due to new ranching operations and a growing town resulted in significant numbers of elk dying during several severe winters in the late 1800s and early 1900s. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, established the National Elk Refuge. Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding.

Bison were extirpated outside Yellowstone National Park (YNP) by the mid-1880s but in 1948 were reintroduced to Jackson Hole when 20 bison from YNP were released near Moran, Wyoming. The herd remained small until discovering elk feedlines in 1980, when the population began sustained population growth. Bison and elk that winter on the NER are migratory and occupy summer ranges predominantly to the north.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER (Boyce 1989), high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases (Murie 1951, Franson and Smith 1988, Samuel et al. 1991), which is currently demonstrated by ~~in~~ the high level of brucellosis in the elk and bison herds (Cross et al. 2010, Kamath et al. 2016). It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands (Smith et al. 2004), thereby reducing other wildlife associated with woody vegetation., ~~unusually low winter mortality, which affects predators and other species and requires intensive hunting programs.~~

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. The potential risk of catastrophic disease outbreaks and the need to mitigate this threat is a vital component in achieving the BEMP Sustainable Populations Goal.

Comment [CE1]: This might be worth its own callout

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Objectives

This MSP addresses several objectives under a broader BEMP goal of sustainable populations, which directed the agencies to: 1) develop a dynamic, structured framework for reducing NER supplemental feeding; 2) implement a phased reduction of animals on feed: a) Phase 1, to 5,000 elk and 500 bison, and b) Phase 2, elk and bison rely predominantly on native habitat; 3) maintain natural elk bull-to-cow ratios in park summer herd; and 4) enhance public outreach/education. The BEMP further stated that consideration criteria for implementing the 2nd phase of reduced feeding would include some or all of: 1) the level of forage production and availability on the National Elk Refuge, 2) desired herd sizes and age/sex ratios, 3) effective mitigation of bison and elk co-mingling with livestock on private lands , 4) winter distribution patterns of elk and bison, 5) prevalence of brucellosis, chronic wasting disease, and other wildlife diseases, and 6) public support. **In short, the overall objective of this plan is to provide a path for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives and public support.**

Strategies

Elk have been fed for some period during nearly every winter on the National Elk Refuge since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during a time of year when natural forage is typically most limited is powerful to both species, and their knowledge of its existence has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Attempting to modify this behavior on a large scale is unprecedented and will necessarily require investigation, constant evaluation, adaptive modifications to the approach when indicated, and repeated trials.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into the 3 broad categories of 1) timing and intensity of winter feeding, 2) timing and intensity of hunting, and 3) herd segment specific and overall harvest levels.

Measuring the success of MSP strategies will require knowledge of several bison and elk herd attributes. Because we are interested in reducing the intensity of elk and bison feeding throughout the entire winter season, which includes both the number of animals on feed and the duration of feeding, we will use measurements of elk-fed-days (EFD; the total number of elk fed per day per season derived from daily feedground estimates) and bison-fed-days (BFD; the total number of bison fed per day derived from daily feedground estimates) to evaluate feeding intensity. For example, if 5,000 elk were fed for 100 days during a given winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD. Average baseline feeding intensity during the post-BEMP to pre-MSP period from 2008-2016 was 487,838 EFD (range = 223,614-746,800), and 45,224 BFD (range = 26,035-82,124). Reductions in EFD and BFD compared to these baselines will represent progress in meeting feeding reduction objectives under the MSP. Reductions in EFD and BFD could be achieved through reducing the length of the feed season, reducing the number of elk and bison on feed, or some combination of both factors.

Initial success of MSP implementation will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP did not provide specific measurement criteria for the definition of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage" we will consider this objective met when the 3-year running average of elk and

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bison fed days is <50% of baseline for 5 years in a row. These levels of reduction are consistent with elk and bison predominantly relying on free standing forage rather than supplemental feed.

Similarly there are population-specific objectives derived from the BEMP and Phase 1 of the MSP for 5,000 elk wintering on NER and 500 bison wintering in the Jackson Hole area. Progress towards these objectives will be measured using annual classification counts and the average number of elk and bison counted during daily feedground estimates.

Chronic Wasting Disease. As of 2016, CWD has been detected within 40 miles of the Jackson Elk Herd (JEH) in moose, within 35 miles in deer, and within 175 miles in elk. Continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence will take place. Some aspects of CWD response planning could change based on implementation of WGFD's CWD management plan (WGFD 2016).

Winter Feeding. Currently, the initiation of supplemental winter feeding occurs when available forage drops to 300 lbs/acre along transects in areas with highly preferred grasses. This protocol will change to delay the initiation of feeding.

The strategy of delaying the start of supplemental feeding is to encourage elk and bison to use native winter range, especially those individuals that have not previously received a food reward on the Refuge. Over time, it's anticipated a cohort of animals will develop that are not conditioned to the Refuge supplemental feeding program, which will reduce herd concentrations and the risk of disease transmission.

To reduce supplemental feeding overall, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk and bison fed days, the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years of MSP implementation, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require focused mitigation measures.

As bison and elk behavioral responses are better understood, feeding delays will be extended to encourage a redistribution of elk and bison to native winter range. However other factors outside of the scope of this plan such as wolf numbers and distribution could reduce the effectiveness of this strategy.

Variables that influence feeding initiation date will be considered (Table 4, Fig. 10). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. And finally, the distribution of animals, particularly on private, livestock producing lands, would be considered prior to delaying feeding initiation date.

Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate

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these effects in future years.

In the early years of MSP implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date as the MSP is implemented.

Harvest. Few options for manipulating elk hunting are currently available because the JEH is at or near the 11,000 WGFD objective. Proposed changes include allowing limited any elk permits, allowing a bow season near developments on the NER, delaying the elk season so it will better coincide with migration timing, and alternating areas that are closed and open to hunting over time to encourage animal movements or facilitate harvest.

Based on summer bull ratios in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded hunting opportunities are considered.

The proportion of the Jackson Elk Herd that winters on NER has increased in the past 2 decades. This trend is correlated with a decline in elk use of native winter range and an increase in the proportion of NER elk that occupy winter ranges immediately adjacent to the Refuge. If efforts to encourage increased use of native winter range are unsuccessful, agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. This will provide a level of harvest flexibility more commensurate with addressing changes in herd distribution.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution or discouraging bison from attempting to leave the NER via the south boundary into the town of Jackson. ~~Serious consideration will be given to reducing the bison herd population objective in the future through collaboration with WGFD. Lowering the Jackson Bison Herd objective and population would reduce winter NER forage consumption and further reduce the need for supplemental feed. Genetic diversity could be addressed by periodically introducing bison from other herds.~~

The effectiveness of NER late-season harvest regimes is influenced by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could help reduce winter elk numbers on the Refuge. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st .

Private Lands Mitigation. Several strategies would be employed to mitigate likely changes in bison and elk distribution, including providing incentives for non-breeding cattle operations, increased fencing in limited areas to separate elk and bison from livestock feed lines, hazing elk and bison away from livestock feed lines, and purchasing private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal wildlife conflict technician positions supervised by WGFD.

Vegetation Restoration. Various approaches to restore the Kelly Hayfields in GRTE (4,500 acres) were initiated in 2008. Work will likely be complete in 2035. Objectives of ecological restoration include restoring abandoned

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hayfields to native plant communities to improve wildlife forage and habitat, and providing visitor opportunities to enjoy wildlife viewing within a natural setting. The restoration process involves removal of non-native vegetation, collecting and propagating native seeds and plants, as well as the seeding of native plants.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres are currently under restoration treatment and 3,265 acres remain non-native pasture. Maintenance of restored ecological conditions will require management efforts in perpetuity to keep non-native species from colonizing restored areas. The park will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Strategies Considered But Rejected

Strategies considered but rejected include fertility control in elk and bison, agency reduction of either elk or bison, and altering rations of supplemental feed. These strategies were rejected because they were not included in the BEMP preferred alternative and/or because there was not support for them by cooperating agencies.

Models and Monitoring

Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

A robust monitoring program will be necessary to track the effects of actions implemented under this plan. Critical monitoring components will include: 1) enhanced forage production and availability sampling; 2) measuring animal abundance and distribution including differences in some sex and age classes; 3) determining elk and bison fed days each feeding season; 4) estimating winter mortality; 5) brucellosis seroprevalence rates; and 6) CWD surveillance. In many cases, attribute baselines for the period preceding implementation of this plan have been developed for comparison after the plan is implemented.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Actions completed each year, the results of monitoring programs, and any proposed changes in management direction will be presented in an annual MSP update/report, completed by NER staff by the end of June.

Public Outreach/Education

De-emphasizing the supplemental feeding program will be a major paradigm shift especially for the residents of Jackson Hole and Teton County, but will also be of interest to others in Wyoming and across the nation familiar with the long history of feeding elk on the National Elk Refuge. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk and bison herd management methods. A detailed communication plan has been developed that identifies key messages and utilizes a variety of outreach methods, including print, video, and voice material, utilizing social media, and meetings with elected officials, state and local governments, agency and tribal partners, community organizations, stakeholders, and the general public.

Schedule

GPS collars were deployed on 30 adult cow elk in February 2016. Assuming adequate funding, , additional GPS collars will be deployed in winter 2017. Public outreach, private lands conflict mitigation and contacts, and enhanced forage

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monitoring will occur in fall 2016 through January 2017. Reductions in feed season length will begin in winter 2017.

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INTRODUCTION

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands. It included directives for forthcoming development of adaptive management practices to address several objectives in the plan, including a desired future condition of elk and bison relying predominantly on native forage. This MSP has been developed expressly for that purpose.

Bison and Elk Populations

While Jackson Hole is probably best known for the splendor and ruggedness of the Teton Range, the Jackson bison and elk herds rank among the top characterizing features of the valley. Both figure prominently in Jackson Hole's history and culture, although bison were absent from the valley for about 100 years between the mid-1800s and mid-1900s.

The JEH occupies approximately 8,000 km^2 in the upper Snake River watershed north of the town of Jackson (Fig. 1). Much of the herd is migratory, moving between distinct wintering and summer ranges. Primary wintering areas include the Buffalo Valley, lower elevations of the Gros Ventre River drainage, the NER, and areas adjacent to the NER on Bridger-Teton National Forest (BTNF) lands. Summering areas occur throughout the herd's range and for convenience are divided into five geographic regions that include GRTE, Yellowstone National Park (YNP), the Gros Ventre drainage, Teton Wilderness, and Southwest Boundary area, which includes private and public lands in the vicinity of GRTE's southwest boundary.

In the late 1800s, when elk populations all over North America were being extirpated, the residents of Jackson Hole protected elk from "tusk hunters" and large-scale commercial hunting operations. Elk are just as important to today's residents of the valley. Thousands of people each year have the opportunity to see elk at close range on the refuge while riding on horse-drawn sleighs. Thousands of pounds of shed elk antlers are sold at an annual antler auction each spring in the town square. Elk are important to backcountry users as well as to people that never leave the road. Jackson Hole is a popular destination for instate and out-of-state elk hunters. The draw of elk to visitors contributes significantly to the local economy.

Winter feeding of elk in Jackson Hole began in 1910 and was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. According to historical reports, before Euro-American settlement some Jackson elk wintered in the southern portion of Jackson Hole (present location of the NER town of Jackson) and may have used areas outside Jackson Hole, including the Green River and Wind River basins to the south and east, respectively, and the Snake River basin to the southwest in what is now eastern Idaho (Allred 1950; Anderson 1958; Blair 1987; Barnes 1912; Sheldon 1927). Radio-collar studies have documented small numbers of Jackson elk wintering in each of these areas in recent times as well (NER and GRTE, unpublished data). Over time, changes in land use and development in these areas, over hunting, and establishment of feedgrounds probably reduced the use of these areas by Jackson elk.

By the end of the 19th century the JEH was believed to be largely confined to Jackson Hole and the immediately surrounding area, where wintering conditions are often harsh. Significant numbers of elk died during several severe winters in the late 1800s and early 1900s> Primary reasons for these mortality events included the loss of available winter range in Jackson Hole from new ranching operations and a and

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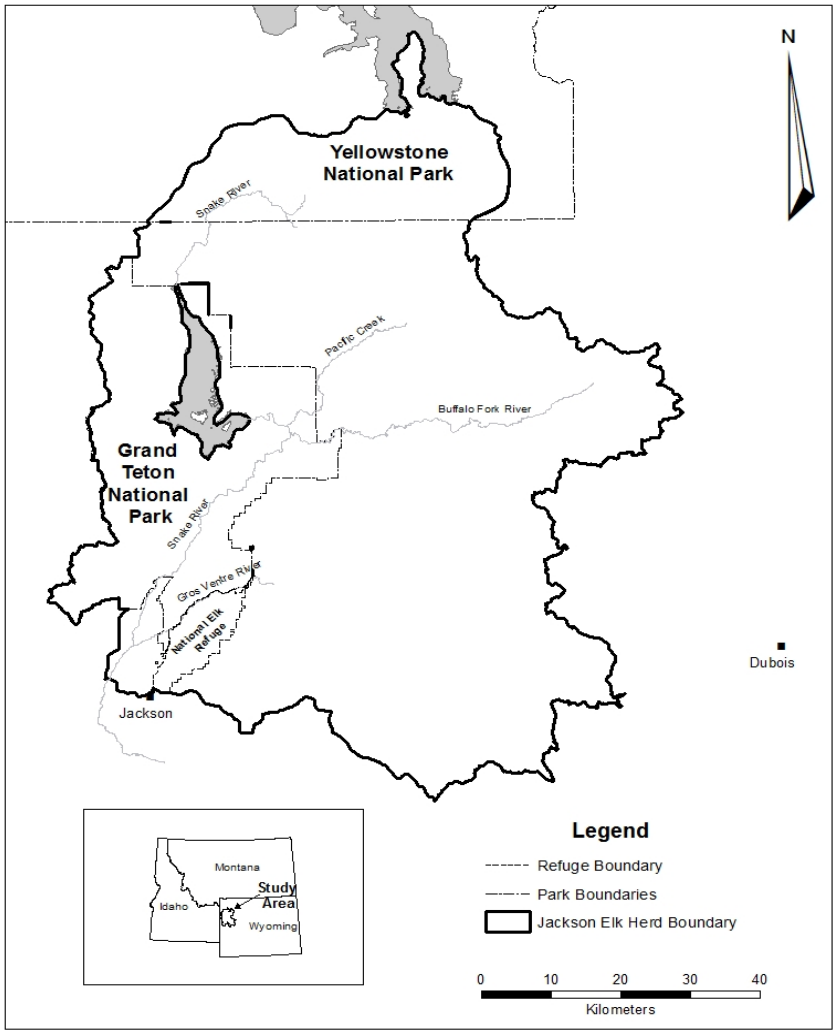


Figure 1. Jackson elk and bison herd ranges, including the National Elk Refuge, Grand Teton and Yellowstone National Parks, and Bridger-Teton National Forest. [include bison range, labels for continental divide and Bridger-Teton National Forest, and in Legend Jackson elk herd unit]. Also Gros Ventre drainage and state feedgrounds because they are referenced in text

expansion of Jackson. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, appropriated $45,000 for the purchase of lands and maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first winter census in the area was conducted in 1912 and showed about 20,000 elk residing in Jackson Hole and the

Hoback River drainage (the latter is not within the JEH's range).

Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding. In recent times the population has fluctuated near the herd objective of 11,000 that was adopted by the WGFD (Fig. 2).

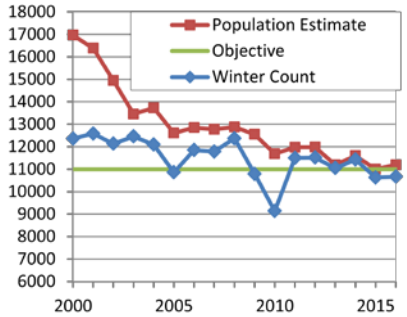


Figure 2. Winter Counts, population estimates, and herd objective for the Jackson elk herd, 2000-2016.

An iconic symbol of the American West, bison are also popular with visitors and residents. Because so few opportunities remain to see bison in the wild, viewing and photographing them in GRTE with the Teton Range in the background is a treasured opportunity for many of the valley's visitors. Similar to elk, there is also a high level of interest in bison hunting. Bison are of particular interest to nearby American Indian tribes and tribes in other parts of the United States because the animals are central to their culture and tradition.

Bison are native to Jackson Hole, as evidenced by the presence of prehistoric bison remains throughout the valley, but were extirpated outside Yellowstone National Park by the mid-1880s. In 1948, 20 bison from YNP were reintroduced to the 1,500-acre Jackson Hole Wildlife Park near Moran. The Jackson Hole Wildlife Park was a private, non-profit organization sponsored by the New York Zoological Society, the Jackson Hole Preserve, Inc., and the WGFD. A population of 15–30 bison was maintained in a large enclosure there until 1963, when brucellosis was discovered in the herd (likely transferred with the original 20 animals from YNP). At that time, all the adult animals were destroyed, but four vaccinated yearlings and five vaccinated calves were retained. In 1964 twelve certified brucellosis free bison from Theodore Roosevelt National Park were added to the herd. In 1968 the herd (down to 11 animals) escaped the confines of the wildlife park, and a year later the decision was made to allow them to range freely. The expansion of GRTE in 1950 had enveloped the Wildlife Park, and this allowed the bison to range freely and was consistent with National Park Service wildlife management policy. The herd remained small and wintered mostly in the Snake River bottoms in GRTE until 1975, when it followed the winter environmental gradient to the NER and began wintering there. The use of standing forage by bison on the NER was viewed as natural behavior thus acceptable to managers. In 1980, however, bison discovered and utilized supplemental feed provided to elk in winter, and they have continued to do so ever since.

The discovery of supplemental feed by bison has had several consequences, including a significant increase in the population's growth rate (Fig 3). Bison on the elk feedlines have at times disrupted feeding operations and displaced and injured elk. To minimize conflicts between bison and elk, managers have provided separate feedlines for bison since 1984. As the population has grown, separating elk and bison on feedlines has become increasingly difficult, and a variety of feeding strategies are employed to help reduce displacement of elk.

As the herd has grown it has maintained fairly stable movement patterns, wintering almost entirely on the NER and summering within GRTE and adjacent lands on the BTNF (Fig. 1).

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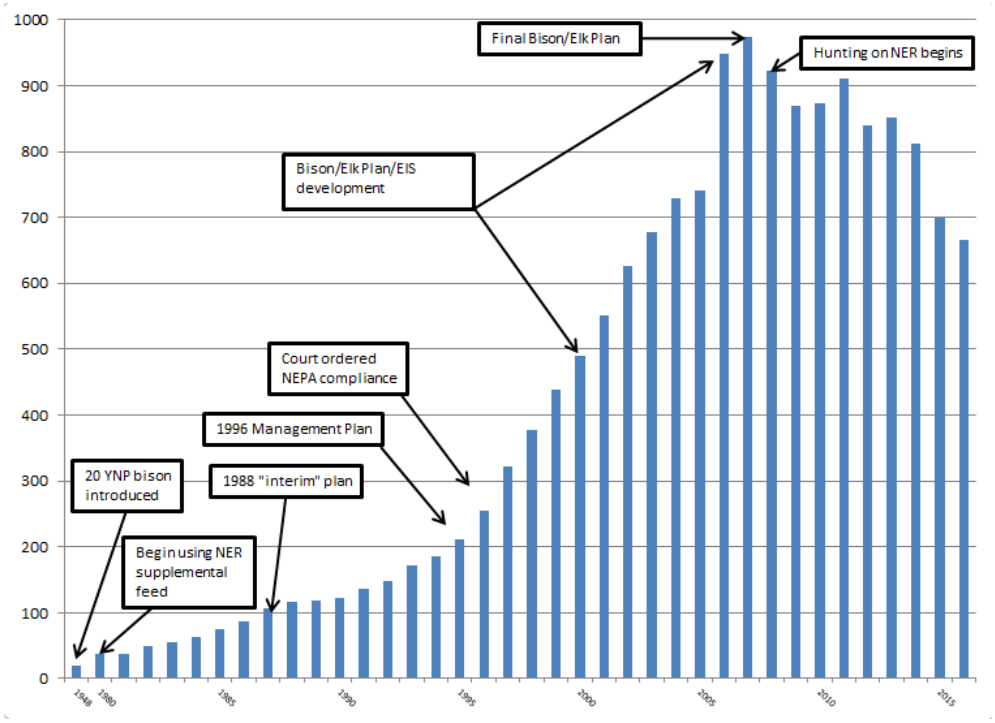


Figure 3. Population growth and planning history for the Jackson bison herd, 1948-2016.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands and thereby reducing availability of these habitats to other wildlife as well as unusually low winter mortality, which has affected predators and other species and has required intensive hunting programs.

Planning History

Jackson's bison and elk populations have been the subject of previous planning efforts. Elk management and research has been guided by the Jackson Hole Cooperative Elk Studies Group since it was established in 1958. The group consists of biologists and agency administrators from the NER, GRTE, YNP, BTNF, and WGFD, who meet at least annually to coordinate management of the population and its habitat. Coordination of bison management began soon after they started frequenting the NER in 1976 and using supplemental feed provided to elk in 1980 (Fig. 3). Release of an "Interim" plan that called for maintaining a herd of 90-110 bison while data were gathered for a long term plan occurred in 1988. It was followed by implementation of a sport hunt outside GRTE, administered by WGFD. This plan was halted after litigation in which the plan's violation of NEPA was successfully argued by plaintiffs.

In 1996, after considerable herd growth, a new long term management plan and environmental

assessment for the Jackson bison herd was released (Fig 3). This plan had strong support and called for maintaining a herd size of 350-400 bison, but it was shelved a year later when plaintiffs from the earlier litigation successfully argued that, because the plan failed to consider the effects of feeding elk on bison management, it also violated NEPA and was not sufficient. This led to development of the draft bison and elk management plan and environmental impact statement from 2000-2006 and release of the final plan in 2007 (Fig 3).

The 2007 Bison and Elk Management Plan (BEMP; USFWS 2007) considered six alternatives for bison and elk management focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The primary management scenarios presented in the alternatives included the status quo, terminating elk and bison hunting on the NER and the elk reduction program in GRTE, brucellosis vaccination options, restoring habitat, improving forage, and decreasing or phasing out supplemental winter feeding.

The final BEMP (USFWS 2007; www.fws.gov/bisonandelkplan) which set management direction for 15 years or until a subsequent plan is developed, proposed to maintain the state's elk herd objective of 11,000, establish a bison population objective of 500, restore habitat in the NER and GRTE, continue hunting bison and elk on the NER, continue the elk reduction program in GRTE in concert with the parks enabling legislation, allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available, and develop a dynamic framework of management actions which adaptively decrease the need for supplemental feeding on the NER. ***This Bison and Elk Management MSP was developed to address the latter and specifically addresses the criteria for a structured framework listed on page 5 of the Record of Decision*** **(Fig. 4).** It does not address other on-going bison and elk management actions already prescribed by the BEMP.

The BEMP scheduled the completion of the MSP for 2008. However, litigation challenging the BEMP in 2008 led to the decision to postpone its development until litigation was resolved. As of March 2015, two court rulings have upheld the 2007 BEMP and ROD. In a lawsuit against the BEMP and its author agencies (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2010), plaintiffs argued that the BEMP violated the National Wildlife Refuge System Improvement Act (National Wildlife Refuge System Improvement Act 1997) by disrupting the biological integrity of the Refuge, and that the plan and the accompanying EIS violated NEPA because they were insufficiently detailed to allow a reasonably complete discussion of mitigation. The crux of the plaintiff's argument was that the plan did not set a specific date for the cessation of supplemental feeding. In response, the agencies argued that the plan constituted a valid exercise of discretion and that it and the EIS were sufficiently detailed to satisfy the requirements of NEPA. In March 2010, the United States District Court for the District of Columbia sided in favor of the agencies in this case. In 2011, the plaintiffs appealed this ruling to the United States Court of Appeals for the District of Columbia Circuit. This Court affirmed the District Court ruling (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2011).

National Environmental Protection Act Compliance

The 2007 BEMP/EIS and ROD satisfied NEPA requirements for current bison and elk management through a detailed analysis of alternative management actions and their likely effect on the environment, and substantial involvement of the public in the process. This MSP does not duplicate or add to this process. It is designed to tier off of the BEMP as a dynamic implementation guide to one part of the preferred alternative outlined in the BEMP ROD. As such, references to NEPA covered in the BEMP

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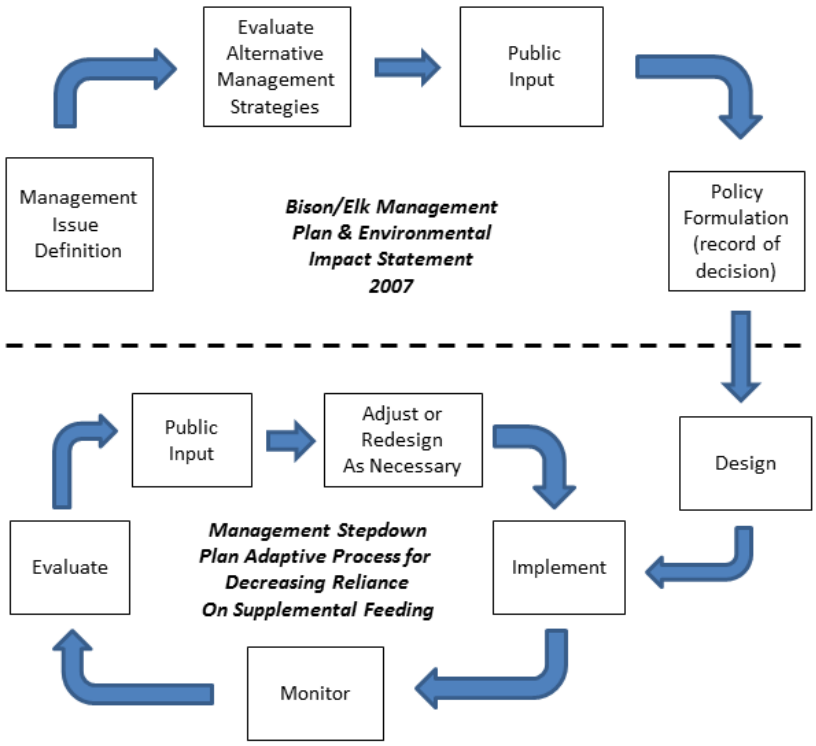


Figure 4. Management step down planning for supplemental feeding on the National Elk Refuge and its relationship to the 2007 Bison/Elk Management Plan and Environmental Assessment.

will be included where necessary in this document, and the discussion of any action that would require additional NEPA compliance will be explicitly stated as such in that context.

Management Step Down Planning

The use of adaptive management plans has gained popularity in natural resource management planning because, by definition, they allow modifications of strategy based on monitoring results and outcomes toward reaching specific goals or objectives. Four elements generally included in an adaptive management approach include: 1) well defined and mutually agreed upon objectives; 2) knowledge (including descriptive models) of the dynamics of the system being managed; 3) clearly articulated management actions and strategies; and 4) a monitoring program to evaluate responses of the system to management actions (Walters 1986).

This MSP utilizes adaptive management planning principles but is not intended to include all of the adaptive management planning elements outlined in the Department of Interior Adaptive Management Technical Guide (2007). This MSP is more accurately described as a "structured framework" of adaptive management actions that progressively transitions from supplemental winter feeding to greater reliance on free-standing forage (BEMP ROD p.5).

Table 1. 2007 Bison/Elk Management Plan Goals and Objectives (Step Down Plan objectives shaded)

Goal: Habitat Conservation

Objectives:

- Conserve important private lands.
- Increase forage production.
- Minimize non-native plants.
- Protect sagebrush grasslands.
- Restore willow, aspen, and cottonwood.
- Perpetuate natural mosaic of plant communities.

Goal: Sustainable Populations

Objectives (BEMP pages 135-136):

- Develop structured framework for reducing NER supplemental feeding.
- Phase reduction of animals on feed: 1) to 5,000 elk and 500 bison, and 2) elk and bison rely predominantly on native habitat.
- Maintain 35:100~~natural~~ bull-to-cow ratios in park summer elk herd.
- Ensure a genetically viable bison herd with close to an even sex ratio.
- Enhance public outreach/education.

Goal: Elk and Bison Numbers

Objectives:

- Maintain state elk herd objective of 11,000.
- Maintain a genetically viable bison population of about 500 animals.

Goal: Disease Management

Objectives:

- Manage brucellosis transmission risk from elk and bison to livestock.
- Manage feeding to reduce brucellosis transmission among bison and elk.
- Educate hunters about wildlife disease human health hazards.

OBJECTIVES

The management direction and desired conditions stated in the BEMP called for the NER and GRTE staffs to work with others (agencies, partners, etc.) to "adaptively manage elk and bison in a manner that contributes to the State's herd objectives yet allows for the biotic integrity and environmental health of the resources to be sustained," so that the public can enjoy a variety of compatible wildlife-dependent recreational opportunities. Under the BEMP's 4 primary goals, 20 associated objectives were identified (Table 1). This MSP addresses four objectives under the goal of sustainable populations (Fig. 5).

The reduction of animals on feed at the NER was proposed to be spread over two phases. In Phase 1, the aim is to reduce the average number of elk on feed to 5,000 (while maintaining WGFD's 11,000 elk herd objective), and reduce the winter

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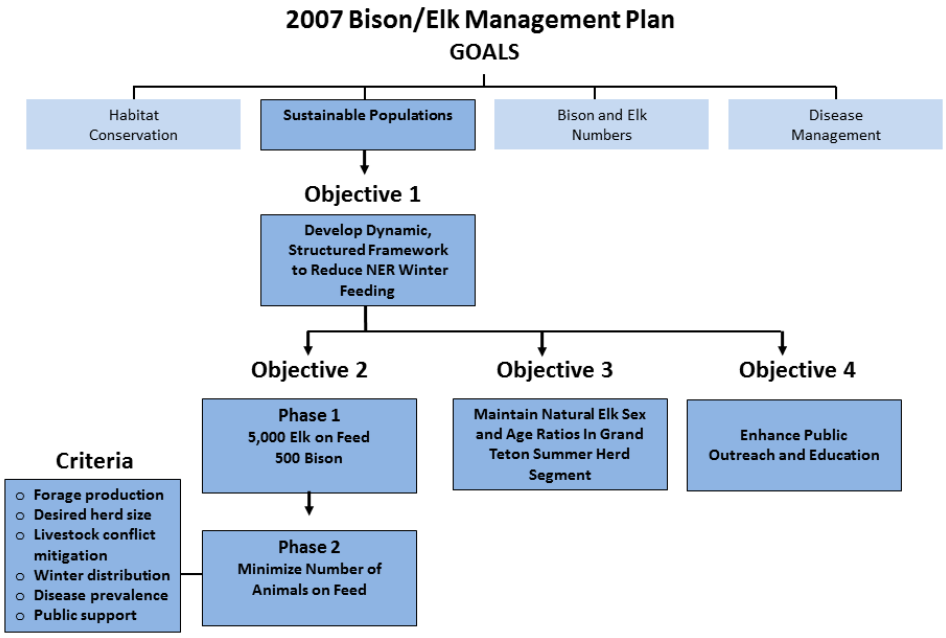


Figure 5. Relationship of MSP to the 2007 Bison/Elk Management plan goals, phasing of objectives, and consideration criteria for reducing the reliance of elk and bison on supplemental feed during Phase 2.

population of bison to the BEMP recommended, and WGFD adopted, objective of 500. In Phase 2, the overall objective is to reduce the reliance of bison and elk on supplemental feed (USFWS and USNPS 2007a). Desired conditions include animals relying predominantly on native habitat and cultivated forage on NER. Important consideration criteria for implementing Phase 2 will include: 1) the level of forage production and availability on the NER and adjacent winter ranges; 2) maintenance of desired herd sizes and age/sex ratios; 3) the ability to effectively mitigate bison and elk livestock conflicts; such as co-mingling on private lands during high risk disease transmission periods; 4) maintaining desirable winter distribution patterns of elk and bison; 5) the prevalence of brucellosis, chronic wasting disease, and other wildlife diseases; and 6) public support. In short, the overall objective of this plan is to outline a framework for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives.

This Plan focuses on management actions to initially achieve Phase 1 objectives. However, if successful, these actions will continue to be used to achieve the Phase 2 objective of reducing reliance on supplemental feeding while considering the six criteria listed above.

MANAGEMENT ACTIONS AND STRATEGIES

Background

The principle goal of reducing reliance on

supplemental feeding is to limit transmission of density dependent diseases in elk and bison while simultaneously minimizing winter mortality in elk. We will attempt to achieve this goal by experimentally reducing feed season length and closely monitoring elk and bison distribution and winter mortality.

Elk have been fed on the NER each year in all but 9 winters since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during winter months is powerful to both species, and their knowledge of NER feed grounds has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Because use of feed grounds is a learned behavior, decreasing feed season length will potentially reduce the likelihood of elk that winter on native range finding NER feed grounds. Over time this could result in a greater percentage of elk using native winter range relative to NER feed grounds. Because it is largely unprecedented, the concept of modifying this behavior on such a large scale is daunting and poses questions for which there are no immediate answers. In some cases, the likelihood a specific management strategy's success will only be able to be roughly estimated, and unanticipated results are likely. Closely monitoring forage availability, elk and bison distribution, and elk mortality will allow us to evaluate the effectiveness of management actions and adjust management actions as needed should unintended negative consequences arise.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into 3 broad categories: 1) timing and duration of winter feeding; 2) timing and intensity of hunting; and 3) herd segment specific and overall harvest levels.

Important Changes Since 2007

The BEMP was developed based on data collected and knowledge that existed up until its ROD. Since then, important changes have taken place, some of which are advantageous to this effort and some of which are not.

A primary change that will facilitate meeting objectives under this plan is the reduction of the bison population from nearly 1,200 animals in 2007 to about 675~~66~~ during winter 2015-2016 (Fig. 3) through hunting programs administered by WGFD. Licensing changes enacted in 2014 included a reduction in the bison cow/calf license fee (from $416 to $263 for residents and $2522 to $1022 for non-residents) and eliminating the once-in-a-lifetime restriction on a successful bison hunter to only those that successfully harvested a bull. Continued progress toward the 500 animal herd objective will require sustained harvest success.

During the same period, the Jackson Elk Herd has declined from nearly 13,000 to its objective of 11,000, but because the proportion of the JEH that winters on NER has increased dramatically (Fig. 6), this will make achieving the Phase I objective of 5,000 elk on feed and any future elk population reductions more difficult. Preliminary analysis~~modeling~~ suggests that the increasing proportion of the JEH wintering on NER has been associated with 1) Declines in elk use of native winter range and movemements of elk from State feedgrounds in the Gros Ventre drainage to NER.~~changes in elk winter distribution associated with wolves (NER, unpublished data)~~ and 2) increasing~~high~~ numbers of elk that summer immediately adjacent to NER (Cole and Foley et al. 2015).

Refuge-wide herbaceous forage production averaged 14,387 (SD = 4,125) tons during 1998–2013. In recent years irrigation of approximately 3,600 acres has increased refuge-wide forage

Comment [CE3]: Alternative location for FAQ callout on why elk harvest cannot be increased to meet 5,000 elk objective

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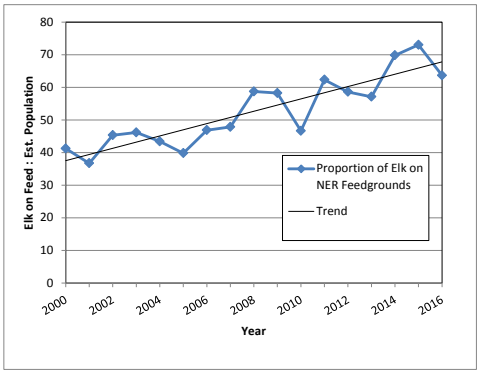


Figure 6. Increasing trend of National Elk Refuge elk on feed as a proportion of the Jackson Elk Herd estimated population size.

production by approximately 10% compared to what would have been produced with precipitation alone, and by 15% in the southern portion of NER which receives the greatest use by elk and bison.

Since 2007, the general awareness of climate change among the public has greatly increased. A strong, credible body of scientific evidence shows that climate change is occurring, is caused largely by human activities, and poses significant risks for a broad range of human and natural systems (National Academy of Science 2010). Ecological systems in the GYE are likely to be affected and associated changes may have implications for elk and bison management. Moderate term to long term effects of climate change in Jackson Hole will likely include increases in average temperature, a reduction in the duration and distribution of snow cover, an increase in the number of frost free days, increased wildfire frequency, and changes in plant community composition and structure including loss of forest and shrub cover and an increase in invasive plants (Riginos and Newcomb 2015). The net effect of these changes relative to the implementation of the MSP remains uncertain.

Current Management

Ongoing primary management actions on the NER include winter feeding, harvest, irrigation, and hazing. In GRTE, harvest of elk during the Elk Reduction Program takes place, when necessary, in collaboration with WGFD, and restoration of previously cultivated and irrigated sagebrush-grasslands is ongoing. Fundamental components of each of these will be briefly described below to provide a basis for comparison to MSP strategies that will follow.

Chronic Wasting Disease

Supplemental feeding has occurred in all but 9 winters on NER since 1912, and although this strategy minimizes winter elk mortality from starvation, contributes to Wyoming state elk herd objectives, eliminates commingling with livestock, and keep elk off adjacent roadways, elk occur at numbers and densities well in excess of carrying capacity (Smith et al. 2004, Lubow and Smith 2004). Considerable evidence suggests that Chronic Wasting Disease (CWD) transmission and prevalence are density dependent (Peters et al. 2000, Williams et al. 2002). Monello et al. (2014) found that elk densities of 15-110/km^2 (0.06 to 0.45/ac) in Rocky Mountain National Park were associated with 13% CWD prevalence, and they predicted elk population declines when CWD prevalence exceeded 13%. NER elk densities range from 77-16,850/km^2 (0.31-68/ac; NER unpublished data), which suggests that the introduction of CWD to NER elk would have significant negative population effects over time.

Winter Feeding

Initiation of feeding has the primary objectives of 1) minimizing elk winter mortality, focusing on calves since they are the most susceptible age class, and 2) minimizing comingling of elk with cattle on nearby adjacent private lands. Winter feeding begins when available forage reaches approximately 300 lbs/ac. Historic radio telemetry data and observations of elk movements indicate that when available forage declines below 300 lbs/ac., some elk leave NER for surrounding private lands. Therefore, the purpose of this feeding "trigger" is to keep elk on the NER and prevent them from searching for forage off the NER, which would increase the

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potential of comingling with cattle causing damage to private lands, and moving across Highway 89 where the risk of vehicles hitting elk is high. This trigger is not a warning that a significant nutritional deficit threshold has been reached. Available winter forage for elk and bison on the NER is largely determined by biomass of forage produced during the previous growing season, rate of forage consumption during fall and winter, and how snow conditions affect forage availability.

Index sites are used to sample forage biomass and determine when feeding should be initiated. These sites are selected annually to represent plant communities that are highly preferred by elk due to plant species composition and the persistence of green vegetation. Weekly sampling begins in late December to estimate available forage biomass at each index site. When average available forage across index sites is below 300 lbs/ac, biologists typically recommend that supplemental feeding be initiated.

During 1995–2013, the average initiation of winter feeding in NER occurred 28 January (range = 30 December–28 February), and feeding was terminated on 3 April (range = 20 March–20 April). Variation in feeding initiation and termination dates has been based on winter conditions and a desire to avoid elk-cattle comingling on nearby private lands. Coordination of winter feeding dates on the NER and WGFD-operated Gros Ventre drainage feedgrounds (Alkali, Patrol Cabin, and Fish Creek) occurs annually to help minimize movement of elk between these areas. This coordination will continue regardless of the management strategy employed. The relationship of recent elk numbers and objectives for NER and WGFD-operated feedgrounds and native range is shown in Table 2.

Bison discovered refuge feeding operations in 1980, and since that time they have been fed each year to help minimize disruption to elk feeding operations. Because bison displace elk from feedlines, NER staff attempt to feed most bison in the northernmost refuge feedground and provide a heavy feed ration, which helps keep them in this area. This strategy prevents bison from mingling with elk and also prevents bison from moving to areas where conflicts with humans are more likely.

Harvest

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Table 2. Annual distribution of wintering elk from the Jackson Elk Herd during February classification counts, 2011–2016, relative to the current objective.

	OBJECTIVE	2011	2012	2013	2014	2015	2016	mean
NER	5,000	7,746	7,360	6,285	8,296	8,390	7,290	7,561
Gros Ventre	3,500	2,775	3,265	2,982	2,326	1,162	1,667	2,362
Native Range[1]	2,500	982	894	1,784	801	913	1,711	1,180
Total	11,000	11,503	11,519	11,051	11,423	10,465	10,668	11,105

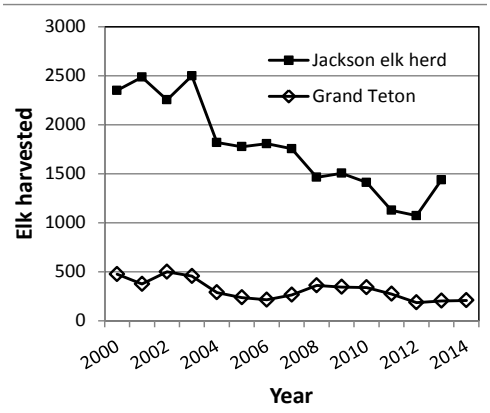


Figure 7. Estimated elk harvests for the Jackson Elk Herd and the amount of that harvest that occurs in Grand Teton National Park, 2000–2014.

Total hunter harvest of the JEH was gradually reduced over the last decade as the population neared objective (Fig. 7). Elk hunting on the NER (Hunt Area 77) typically begins in mid-October and ends in mid-December, with peak harvest in recent years occurring in late November to early December. From 2005 to 2015, 422 ± 102 (mean ± SD, range = 329-612) hunters harvested 196 ± 95 (range = 126-457) elk per year during the NER hunt.

The 1950 legislation that created GRTE provided for a controlled reduction of elk, when necessary, in specific portions of the park, primarily east of the Snake River. Elk reduction programs have taken place in the park each year since 1950 except two (1959 and 1960), when GRTE and WGFD officials agreed a reduction was not necessary (Figure 8). Season dates have varied over the years but recently have run from mid-October to early-December. The GRTE harvest accounts for about 25% of the JEH overall harvest, thus has been an important factor in regulating the population. Increased predation, likely a result of increases in grizzly bears and wolves over the last 20 years, has decreased the need for large harvests in GRTE.

Bison hunting begins 15 August and ends in early to mid-January. Most harvest occurs on the NER, with some additional harvest on private and BTNF lands. Since resuming the bison hunt in 2007, harvest has been 210 ± 45.5 (range 139-301) bison per year. This level of harvest has been sufficient to arrest the exponential growth of the population, reducing bison numbers from the peak in 2007 to about 700 animals in winter 2015 (Fig 3). Tribal bison harvest of up to 5 animals for ceremonial purposes was authorized in the BEMP. Translocation of wild bison to lands outside of Teton County is not currently permitted due to brucellosis concerns.

Bison hunting is not allowed in GRTE because of long standing NPS policy that prohibits most hunting in national parks. Bison quickly learned to take advantage of the safety of GRTE, which has made hunter harvest goals difficult to achieve. Many bison stay in GRTE during the hunting season, with only occasional short term movements to the NER, until severe winter conditions occur. In response, NER and WGFD managers have attempted to extend the hunt to late January while minimizing the conflict with the initiation of winter feeding. The unpredictable nature of winter conditions that time of year makes this challenging, and has (or could) result in the use of emergency season extensions or reductions.

Hazing

NER staff haze elk and bison to conserve winter forage, prevent year-round use of winter range, and in some cases to prevent elk and bison from moving to private lands or other areas where conflicts with humans are likely. Hazing using ATVs has proven most effective. The strategy is typically employed during 3 time periods: 1) in May to move elk and bison off NER that are lingering on NER winter range; 2) in July when some bison typically return to NER; and 3) in the period just prior to feeding initiation when elk and bison are most likely to leave NER for private lands. Hazing of elk and bison by WGFD staff also occurs on private lands adjacent to NER periodically throughout the year.

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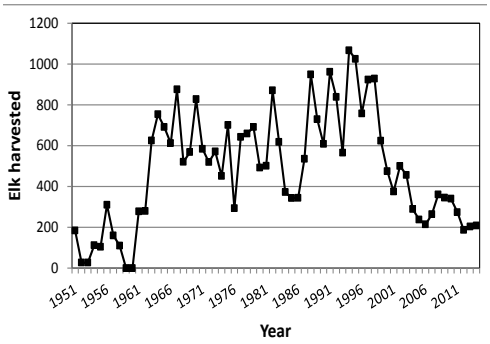


Figure 8. Elk harvest in Grand Teton National Park, 1950-2015.

Vegetation Restoration and Protection

The BEMP identified approximately 4,500 acres of previously irrigated and cultivated grasslands in GRTE in need of restoration to native sagebrush grasslands community. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. After 2 years of research and field studies, restoration efforts began in 2008. The restoration process involves several steps including: removal of non-native vegetation through repeated herbicide applications, collection and propagation of native grass, forb and shrub seeds and finally native seeding. Repeated herbicide treatments have been warranted prior to native seed planting as well as spot treatments of invasive weed species subsequent to native seeding. Substantial progress in this endeavor has been made since 2008, including 1,235 acres of previously cultivated lands under restoration treatment. Of the 1,235 acres undergoing treatment, 745 acres has been seeded with native grass, shrub, and select forb mixes, and 89 acres is considered fully restored. Two-hundred and seventy-five of these acres are currently fenced to reduce grazing pressure of early native vegetation establishment from bison and other ungulates. An additional 490 acres are targeted for native seeding in 2016 once removal of the invasive vegetation is successful. All treatments are monitored for native plant establishment and invasive plant infestations and treatments will be adjusted as necessary. Invasive plant treatments may have to continue indefinitely. GRTE will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Private Lands Mitigation

Fencing of hay stacks and livestock feedlines has been historically used to mitigate particularly difficult conflicts on private lands. Targeted fencing of golf course greens and sand traps fall through spring has also been successful in some situations for mitigating elk and bison presence and associated damage in these areas. It is important to note that the county has a "wildlife-friendly" fence policy and does not support extensive fencing that is impermeable to wildlife in residential areas.

Methods, Assumptions, and Constraints Common to All Strategies

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes, particularly population sizes. Measurements of the Jackson bison herd will be based on the annual mid-winter census and sex and age classification survey performed by NER, GRTE, and WGFD biologists. This survey occurs one day in February and includes ground counts of animals on feed at the NER and aerial counts of outlying bison across their winter ranges on the refuge, park, and Bridger-Teton National Forest.

Elk population estimates will also be based on mid-winter aerial and ground counts. However, the mid-winter counts are undertaken during a single survey period and do not necessarily represent either peak or cumulative abundance of elk on feed. Rather than basing progress toward the number of elk on feed for the entire season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in

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Table 3. Summary of potential Step Down Plan constraints.

Policy

- ESA[1] Lynx – limits on habitat impacts
- Greater Sage Grouse – core area protection
- 2007 BEMP/EIS (federal actions/lands)
  - No fertility control
  - No test and slaughter
  - Limited tribal ceremonial take ~~harvest~~
- Bison/elk hunt end date (Feb. 1st)
  - WGFD, brucellosis safety
- Carcass disposal (Feb. 15th)
  - WGFD, brucellosis safety
- Forest Service winter closure (Dec. 1st – April 30th)
- Easement limitation (NER boundary)

Winter Feeding

- Only during non-hunting periods

Harvest

- State regulations

Vegetation Restoration/Protection

- Bison/elk distribution
- Exotic plant species management

Private Lands

- Owner agreements

Social

- Hunter density (safety; hunt quality)
- Elk/bison winter mortality levels
- Public safety (ungulate/vehicle collisions)
- Disease
- Land-use conflicts (agricultural and residential)

Biological

- Disease (bison/elk/cattle commingling)
- Sage grouse habitat conflicts
- Fencing/wildlife conflicts
- Elk herd distribution
  - summer segment distribution goals

Funding

- Easement purchase
- Plan implementation

[1]Endangered Species Act

the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 elk were fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000.

We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both species on supplemental winter feeding.

Initial success of the MSP will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP does not provide specific measurement criteria to determine when the NER has successfully attained the objective of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage", we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. This level was chosen to define success because it suggests that elk and bison will be predominately foraging on free standing natural and cultivated forage on NER and adjacent winter ranges rather than on supplemental feed.

Several management constraints are common to the strategies discussed below (Table 3). Many law and policy constraints are applicable but we include here only those most pertinent. Endangered Species Act (16 USC 1531 et seq.) requirements for wolves, grizzly bears, lynx, and others apply. Lynx requirements for maintaining certain habitat types could limit methods used and areas considered for habitat improvements in GRTE and the BTNF. Such improvements could

increase elk and bison use of native winter range off the Refuge while simultaneously reducing use of feedlines. Similarly, compliance with the 2015 sage grouse amendment to the 1990 Bridger-Teton National Forest Land and Resource Management Plan and the Wyoming greater sage-grouse core area protection executive order (2011-5 and supplement 2013-3) could affect habitat manipulations. NEPA compliance conducted as part of the BEMP/EIS constrains what federal actions can be taken as a part of this plan. State regulations constrain late (winter) hunt and carcass disposal timing to protect against brucellosis contamination, since February-April represent the period bison and elk are most likely to transmit the disease. Restrictions on hunting timing also result from BTNF winter range closures, immediately east of the NER and elsewhere, December 1 to April 30. Additional details about these and other constraints will be included in discussions about specific strategies that follow.

Strategies

This section describes the management action this MSP proposes to implement. As such, it unveils the heart of management changes proposed to begin the process of transitioning to greater reliance of bison and elk on native forage during winter. Fundamentally, the strategies discussed in this plan represent an experiment designed to achieve Phase I objectives of 5,000 elk and 500 bison on NER and are a first step towards reducing reliance on supplemental feeding while meeting the sustainable population goals identified in the BEMP.

Initial strategies for achieving sustainable population goals identified in the BEMP (Table 1) are presented by the objectives below. The primary management actions available to the agencies to achieve Phase I objectives are modifications to winter feeding and hunting seasons. To a lesser extent, vegetation protection and restoration can be important, particularly for improving long-term ecological function and enhancing natural production of native forage. Private lands are also an integral component as changes in elk and bison distribution occur and new challenges develop. The likely consequences of implementing these strategies were evaluated in the BEMP. The most relevant of these are summarized in Appendix 1.

Objective: 1) *Implement a phased reduction of animals on NER feed to 5,000 elk and 500 bison, and, 2) influence elk and bison to rely predominantly on native habitat* (Table 1).

The first phase will be to reduce the number of elk on NER feed to approximately 5,000 and achieve a target population of about 500 bison. The second phase will be to adaptively manage bison and elk populations to achieve desired conditions, with animals relying predominately on available native habitat (NER, GRTE, and USFS lands) and cultivated forage (NER).

As previously mentioned, the concept of reducing winter feeding after more than 100 years of the practice, and the associated behavioral conditioning of elk and bison to its presence, represents a formidable challenge that must be approached cautiously and systematically. Efforts to scale back elk supplemental feeding operations in other parts of North America have been rare and fraught with controversy (Smith 2001). The strategies discussed below have been developed in this context, with appropriate feedback mechanisms through rigorous monitoring and frequent evaluation. Inability to meet this objective under the strategies presented here would trigger a thorough evaluation and consideration of more aggressive strategies when the BEMP is updated in 2022.

Chronic Wasting Disease

Since 1997, NER has cooperated with WGFD to conduct intensive surveillance for CWD in the JEH unit. GRTE has also collaborated with WGFD to collect samples from the ERP and from road-killed cervids. Although this effort indicates that CWD is not currently found in the JEH, continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence annually will

Comment [CE4]: The map that shows where elk and bison should not be could be associated with this section

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be critical to ensure a timely management response and limit the long-term population effects of the [USFWS and USNPS, 2007b]. Given that CWD has been detected within 40 miles of the JEH in moose, within 35 miles in deer, and within 175 miles in elk, this level of surveillance is warranted.

In 2016, the WGFD cooperated with federal agencies and other stakeholders to revise the 2006 Wyoming CWD Management Plan. The NER and USFWS Region 6 Wildlife Health Office staff participated in several meetings associated with this effort. The Wyoming CWD Plan lists several management responses for consideration if CWD be is detected on or adjacent to State or NER elk feedgrounds. Early detection of CWD in the JEH is essential to allow implementation of management responses.

The BEMP (2007) identifies the management response to the arrival of CWD as following the State of Wyoming CWD Plan in effect in 2007. The Wyoming CWD Plan was updated and significantly changed in 2016. In light of changes in the Wyoming State CWD Plan, and the results of CWD Studies completed since 2007, the NER management response to CWD will be reviewed and updated in a NER Disease Contingency Plan, as identified in the NER Comprehensive Conservation Plan (2016). The CWD section of the NER Disease Contingency Plan will remain consistent with the goals of the BEMP. The NER Disease Contingency Plan is scheduled to be completed in 2017.

Winter Feeding

Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the long run, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning animals to "expect" feed to be available later in the winter; this could build cohorts of animals that rely primarily on native winter range. To reduce supplemental feeding, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, which is the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require assistance with focused mitigation measures.

Comment [CE6]: Consider FAQ on principle strategy of delaying feeding initiation here

As bison and elk behavioral responses are better understood, and targeted mitigation on private lands is achieved as needed, feeding delays will be extended depending on several variables (Table 4, Fig. 9). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence on feeding initiation date, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Forage availability would also be affected by the numbers of elk and bison on the NER. And finally, the distribution of animals, particularly on private, livestock producing lands would be considered in determining feeding initiation date. A primary concern of manipulating feeding is elk winter mortality, particularly among calves. As food becomes limited in winter, calves are usually the first to experience nutritional deficit and winter mortality because they are displaced by more dominant animals, they have limited fat reserves, and are more susceptible to cold temperatures than larger animals. Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the

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preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years (Appendix 1).

In the early years of MSP implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date during the period of MSP implementation.

The MSP winter feeding strategy would include the establishment of additional key forage index sites and on-going measurements at those sites throughout the winter.

Harvest

Currently the JEH is at the Wyoming Game and Fish Commission established objective of 11,000 animals, which means there is less flexibility in manipulation of harvest regimes than there would be if the herd was above objective. Initially there would be little change in elk harvest programs on the NER, with the exception of allowing a limited number of any elk permits throughout the season, considering allowing bow hunting near developed areas (roads and buildings) and shifting the season about a week later (Table 4). Allowing a limited number of any elk permits would be consistent with providing sport hunting recreation on National Wildlife Refuges (NWRS Improvement Act; 1997) and the NER CCP [USFWS, 2015] and possibly encourage more hunters to participate in antlerless elk hunts. Monitoring programs and consideration of bull ratios in the GRTE summer segment (since most park bulls migrate to the NER) would help inform levels of proposed take. Bow hunting in areas currently closed to firearms will likely increase harvest by eliminating "no-hunt" areas which can become sanctuaries for large numbers of elk. Shifting the hunt one week later is consistent with later migrations and will improve harvest effectiveness (Fig. 9).

General elk harvest patterns in GRTE would continue to be based on need for harvest, summer segment population estimates, herd status relative to population objective, herd demographic parameters, herd-wide distribution of harvest, and mitigation for impacts on other resources and visitor activities.

Elk herd population objectives are reviewed every five years by the Wyoming Game and Fish Commission and adjusted as necessary. Agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. Lowering the population would help compensate for reduced use of traditional native winter range and increased growth of short-distance migrants which has led to significant increases of winter elk concentrations on the NER.

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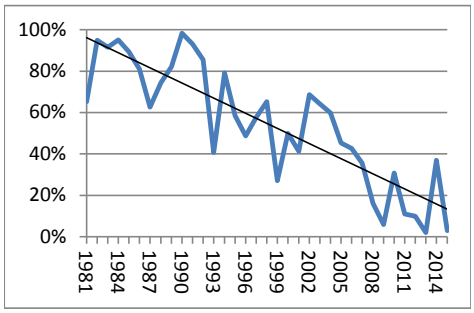


Figure 9. The percentage of elk that wintered on NER counted there on December 1, showing progressively later annual fall/winter arrival of elk to the NER during the past several decades.

The annual fall/winter arrival of elk to the NER during the past several decades has been occurring progressively later. This trend may necessitate extending the elk hunting season later into the year to achieve harvest objectives.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later end dates that are commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution. Special limited hunts designed to discourage bison from attempting to leave the NER via the south boundary into the town of Jackson will also be considered. If progress toward reaching the herd objective of 500 animals continues and the objective is reached, WGFD will adjust harvest quotas in the context of the objective, as necessary, to address population changes through time.

A cattle guard was installed on the Refuge Road near the east end of Broadway Avenue to help prevent bison and elk herds from entering the Town of Jackson. This will reduce the potential for dangerous human/wildlife interactions.

Currently, the effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives, but also that elk are sensitive to hunting pressure which can cause elk movements to areas that cause management issues for WGFD. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st in the future.

Annual herd-wide population estimates, elk summer herd segment estimates in GRTE and NER, temporal and spatial harvest patterns, and animal-fed-days would be monitored, and the resulting information would be used to inform ongoing evaluation of elk and bison management harvest programs (Figs. 9 and 10).

Hazing

No change in hazing practices is anticipated initially under this MSP framework.

Private Lands Mitigation

Delaying the onset of NER feeding is likely to result in changes in bison and elk distribution (Appendix 1). Some elk or bison may move to private lands in search of forage. Of greatest concern is the potential for elk or bison to commingle with cattle of cow/calf operations, where brucellosis transmission could have considerable consequences, such as requiring depopulation of the cattle herd.

Several strategies would be employed to mitigate potential problems (Table 4), including providing incentives for non-breeding cattle operations (because brucellosis transmission to slaughter-bound cattle is not economically important), increased fencing in some limited areas to separate elk/bison from livestock feed lines, haze elk/bison away from livestock feed lines and purchase private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal Wildlife Conflict Technician positions which are supervised by the

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WGFD. These Technicians are also critical to the success of an expanded monitoring program vital to the MSP (see Monitoring section below).

Vegetation Restoration/Protection

The varied approaches to restore the Kelly

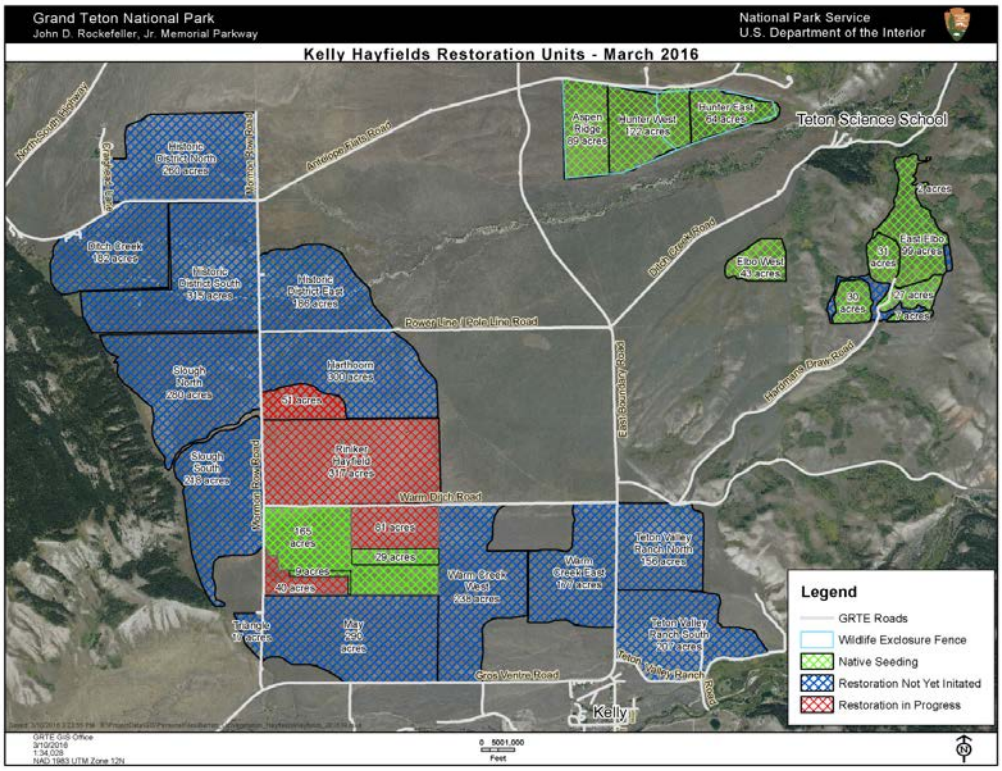


Figure 9. Units and status for the Kelly Hayfields ecological restoration effort in Grand Teton National Park, March 2016.

A database will be established to track non-agricultural conflicts on private lands to determine trends which will help evaluate the effectiveness of MSP mitigation efforts.

Preventing elk and especially bison from entering the Town of Jackson is essential in maximizing publicsafety and minimizing private property conflicts. Currently, bison are hazed northward when they drift south of Miller Butte. A cattle guard was installed on the Refuge Road just north of Broadway Avenue. This barrier is designed to prevent elk/bison from entering the Town of Jackson.

Hayfields in GRTE (4,500 acres) was initiated in 2008 following 2 years of research and field studies (Moeny 2008). The approach to ecological restoration includes serial treatments to 1) remove non-native species (e.g., herbicide application and prescribed burning); 2) seed native shrub, grass, and forb species; and 3) treat subsequent invasive plants by applying herbicides and, where appropriate, construct temporary fences to protect recently seeded pastures from colonization of non-native species and damage from large herbivores during early phases of restoration.

Of the 4,500 acres targeted for ecological

restoration in the Kelly Hayfields of GRTE, 1,235 acres within 7 pasture units are currently under restoration treatment and 3,265 acres remain non-native grass pasture (as of 2016; Figure 9). The non-native grass pastures are divided into 13 pasture treatment areas and are projected to be likely restored by 2035. As of 2016, approximately 745 acres are seeded with native vegetation, and 89 acres are considered fully restored. Maintenance of restored ecological conditions, however, will likely require management efforts in perpetuity to keep non-native species from colonizing restored areas. All 1,235 acres that are underway toward ecological restoration are being monitored for native plant establishment, invasive plant infestations, including cheatgrass spread. Park staff will continue to monitor and adaptively adjust treatments and restoration strategies according to our results.

Objective: *Maintain ~~natural~~ bull-to-cow ratios in park summer herd* (Table 1).

National Park Service management policy (NPS 2006) provides guidance for maintaining naturally regulated wildlife populations, free from the impacts of humans, to the greatest extent possible. The final BEMP identified a goal of maintaining park elk bull:cow ratios (a common way of expressing sex and age ratios in wild ungulate populations) near 35 adult bulls per 100 adult cows, based on estimates of what this ratio would be in a herd free from the effects of human harvest. The sex and age ratios of most North American elk populations are affected by sport hunting and herd managers generally maintain lower bull ratios.

Harvest

Based on summer bull ratios for elk in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded refuge hunting opportunities are considered.

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Table 4. Comparison of current and primary MSP components and parameters.			
Action	**Current Management**	**Management**	**Comment**
Winter Feeding:			
Feed	Pelleted alfalfa	Pelleted alfalfa	No change
Ration	Full ration average: 8-12 lbs/day/elk	No Change	No change, to minimize calf mortality. Note average daily ration over the entire feed season is lower than a full ration because feed rate is gradually increased at the beginning of the feed season and gradually reduced at the end to facilitate rumen acclimation
	20-22 lbs/day/bison	20 lbs/day/bison	
Start criteria:			
Available standing forage	300 lbs/acre, as measured at traditional key index sites	Generally later; index sites to be increased in number and distribution	Influencing factors: -time of season -forage availability -number of elk/bison on NER -elk/bison distribution
End criteria:			
Available forage	Based on a snow cover index and subjective estimate of when residual or new forage is adequate	Generally 1 week earlier than current management	Ongoing development of more objective criteria for future implementation ongoing
Monitoring:			
Animals on feed	Mid-winter census	Elk/bison fed days[1]	
Proportion of JEH on NER	Mid-winter census	Mid-winter census	
feed			
Calf mortality	2008-2015 Average: 3.3% (range 1.1-9.0%)	Potentially higher than current levels but less than native winter range	
Elk/bison distribution – collars	Almost no documented use of private lands during feeding operations	Unknown, but likely higher use of private lands than current management	
Elk Winter mortality (all age classes)	2008-2015 Average:	<=3%	
	1.2% (range 0.6-1.9%)		

Table 4. Comparison of current and primary MSP components and parameters.			
Action	**Current Management**	**Management**	**Comment**
Elk summer range segment Proportions for NER wintering elk	Approximately -40% GTNP North of Moose -35% South Snake River -10% Gros Ventre/Flat Creek -10% Teton Wilderness -5% Southern Yellowstone	Unknown, but will be monitored based on summer distribution of radio collared elk	Based on summer distribution of elk that were randomly radio collared on NER.
Harvest, National Elk Refuge elk:			
Frequency	Annual	Annual	
Begin Date	2nd week October	No Change	Modified as necessary
End Date	3nd week December	No Change	Modified as necessary
Structure	- 1 week initial drawing	- 1 week initial drawing	
	- 1 week left over 1st served	- 1 week left over 1st served	
	- partial week alternate	- partial week alternate	
	-daily 1st served alternates	- daily 1st served alternates	
Refuge permit types	- 1st week any elk	- Primarily antlerless only	
	- Antlerless only remainder of season	- limited any elk permits throughout season	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries		Consider expanding to allow bow hunting near developed areas	
Harvest, National Elk Refuge bison:			
Frequency	Annual	Annual	
Begin date	August 15th	August 15th	Modified as necessary
End date	2nd or 3rd week January	Consider later dates as appropriate	Modified as necessary
Hunting Season Structure	As per WGFD	As per WGFD	
Refuge permit types	Any bison or cow/calf per state license	Any bison or cow/calf per state license	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries	Limited to north of Nowlin Creek area	Consider escorted hunting in South Unit as needed	Guided hunts in South Unit when authorized
Harvest, Grand Teton NP elk:			
Frequency	As needed	As needed	
Begin Date	3rd week October	3rd week October	Modified as necessary
End Date	2nd week December	2nd week December	Modified as necessary
License types	Antlerless only	Antlerless only[2]	
Special regulations:	Cartridge limits	Cartridge limits	

Table 4. Comparison of current and primary MSP components and parameters.			
Action	**Current Management**	**Management**	**Comment**
	Bear spray required	Bear spray required	
	Hunter safety card required	Hunter safety card required	
Harvest, Bridger-Teton NF, Elk Hunt Area 80:			
Begin Date			
End Date		15-Dec	Would require change in winter closure dates
Harvest, Elk Hunt Area 78			
Structure			Changes at discretion of WGFD
License Types			
Private Lands Mitigation:			
Cattle commingling		Incentives for non-breeding operation	
Hay depredation		Increased fencing	
Landscape damage			
Easement acquisition			
Vegetation Restoration/ Protection: Elk Refuge			
Vegetation Restoration/ Protection: Grand Teton	Herbicide treatments, prescribed burning, native seed propagation and planting, and protection and maintenance of restored pastures	Same as Current Management for remaining non-native grasslands in Kelly Hayfields	
[1]Number elk and bison on feed per day, totaled by feeding season.			
[2]Any elk licenses could be offered if bull ratios in the park consistently exceed BEMP criteria.			

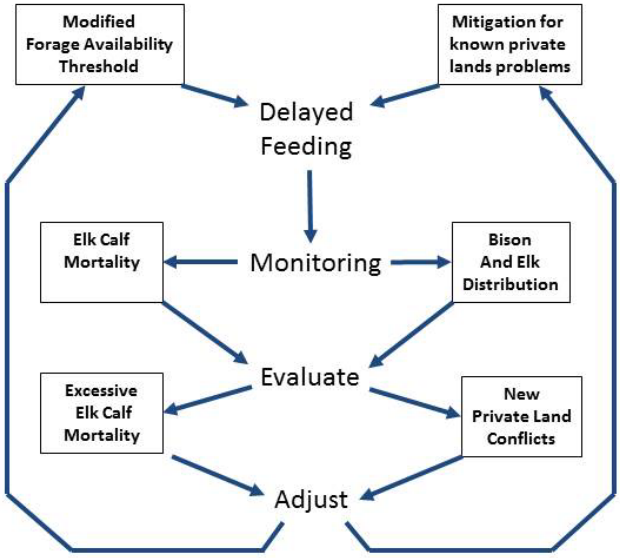


Figure 10. Framework for delayed feeding strategy under MSP.

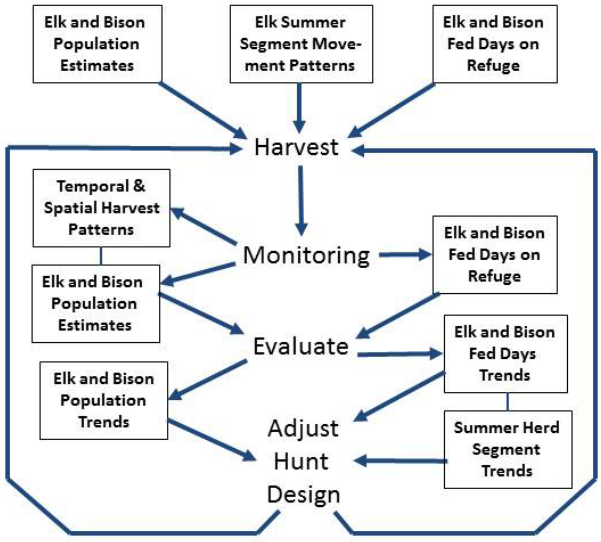


Figure 11. Framework for harvest strategy under MSP.

Strategies Considered But Rejected

The BEMP considered several additional strategies for elk and bison management that, for a variety of reasons, were not selected for implementation in the preferred alternative and Record of Decision. The agencies reconsidered a subset of these during the development of this MSP (Table 5). Since they were not part of the ROD, additional NEPA compliance would be necessary to incorporate any of them into this MSP, and thus they are not being considered at this time.

Table 5. Strategies considered but rejected.

Strategy Considered	Reason Rejected
Fertility control in elk	Judged not reasonable or feasible in BEMP, primarily due to major technical, social, and financial hurdles[1]. For MSP discussed primarily with regard to the difficult to harvest herd segment in Hunt Area 78 on private lands, where federal agencies have no jurisdiction.
Fertility control in bison	Impacts discussed at length in BEMP[2]. Not considered for MSP because current hunting programs appear effective at slowly moving the herd toward the 500 animal herd objective.
Agency reduction of bison or elk	Not considered necessary or desirable on federal lands because current hunting programs that utilize sport hunters are effective at meeting herd objectives.
Altering rations of supplemental feed	Rejected as a strategy because reducing daily feed ration below 8 lbs/elk would be enough feed to encourage elk to remain on NER but would result in unacceptably high elk calf mortality rates.
Private Lands Hunting Coordinator	The WGFD contacted private landowners and ranchers in the Spring Gulch area and discussed this concept to enhance elk harvest of short distance migrants. Generally, landowner interest was low.

MODELS OF SYSTEM DYNAMICS

Models provide a simplified representation of the biological system being managed. We will use modeling to quantify the effects of our management actions on 2 key responses of interest, elk distribution and winter elk calf mortality. (ADD: range of elk calf mortality in non-fed populations.)

There are a suite of possible factors that affect the proportion of elk on NER feedgrounds versus native winter range. Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

An increase in calf elk winter mortality is a potential result of reduced feed season length. Several factors influence winter calf elk survival on NER (Fig. 13). Models will be used to assess the effects of available forage on winter calf elk survival (Appendix 4). Over time this will allow us to assess the effects of our principal management strategy (reducing feed season length) relative to winter elk calf survival.

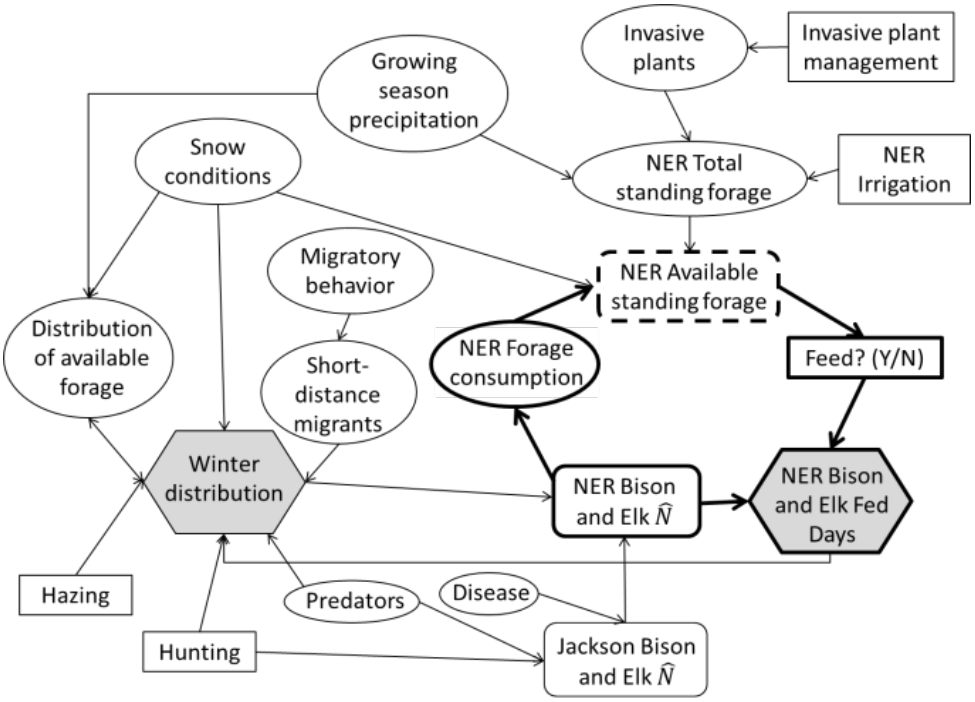


Figure 12. Diagram depicting the factors that potentially influence outcomes identified in the Bison and Elk Management Plan (BEMP; USFWS 2007a). Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

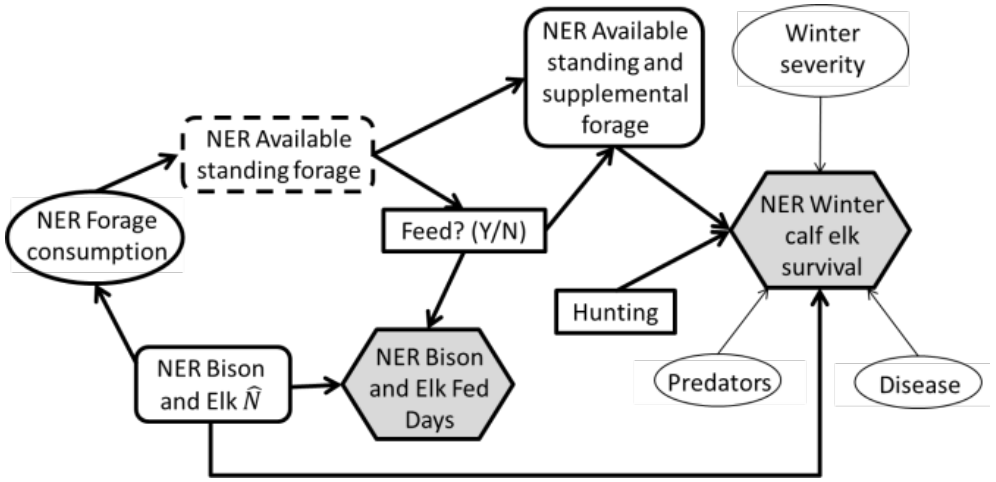


Figure 13. Diagram depicting the factors that potentially influence bison and elk fed days on the National Elk Refuge and winter calf elk survival. Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

MONITORING

Feeding Initiation Monitoring

NER uses weekly field estimates of the amount of forage available to elk to determine feeding initiation date. Currently measurements are taken at key index sites representing areas preferred by elk on NER (see supplemental materials at end of this section). These methods will be enhanced by 1) increasing the number of sampled sites to better represent the total amount of forage available to elk on the southern half of NER; 2) increasing the precision of estimates at each site by increasing the number of observers; and 3) extending the monitoring period later in the winter to assess the relationship between available forage and elk and bison distribution.

To better represent the total amount of forage available on the southern half of NER, a subsample of current key index sites will be retained to facilitate comparison with historic data, but additional random sample sites stratified by elk habitat preference will be added. Historic elk distribution mapping and elk GPS collar data (NER unpublished data) suggest that the areas most preferred by elk on southern NER are associated with moderate to high forage production and green vegetation. Because the distribution of forage production and greenness characteristics vary annually based on irrigation and precipitation patterns, we will annually map areas preferred and not preferred by elk and sample sites will be randomly selected within each of these mapped categories. At least 3 historic key index sites, 3 random sites in areas preferred by elk, and 3 sites in areas not preferred by elk will be sampled each week from late December through the initiation of supplemental feeding.

Currently the NER biologist is the only person trained in the techniques used to estimate available forage (see supplemental materials). At least 2 additional personnel will be trained in these techniques. This will provide a backup in the event of future personnel changes and will facilitate error estimates of the available forage measurements at each site.

Currently NER and WYGFD biologists monitor available forage conditions at least weekly from late December until average available forage at key index sites nears the threshold level of 300 lbs. per acre and feeding is initiated. The principal MSP strategy is to delay the initiation of supplemental feeding after average forage production reaches the 300 lbs/ac level at key index sites. Therefore the monitoring period will be extended to include this period of delayed feeding.

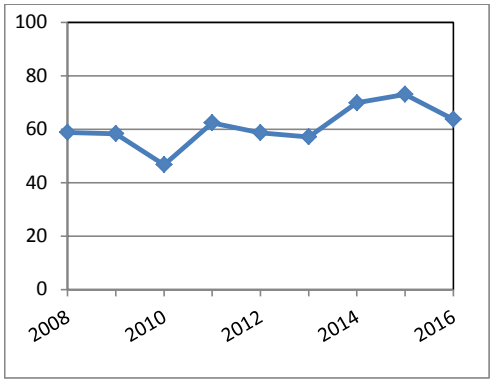


Figure 14. Proportion of the Jackson Elk Herd that was classified on NER feedgrounds in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

Proportion of Elk Wintering on NER

A principal MSP goal is to reduce the number of elk wintering on NER. Our strategy will be to effect redistribution of elk to native winter range from NER over time via shortening the duration of the feed season, and thus slowly conditioning elk to seek food elsewhere. As feeding periods are shortened, the probability of younger elk age classes discovering NER feedgrounds will be reduced, and, hypothetically, that proportion of the JEH that utilizes NER feedgrounds will decline over time. We will measure this effect by examining changes in the winter distribution of the JEH. WGFD annual trend/classification count data provide a multi-year baseline data set to measure changes in the winter distribution of the JEH and categorizes observations by location. In each year, we will calculate the proportion of total classified elk in the JEH that are classified on NER feedgrounds. We will compare the 3-year running average post MSP implementation to the pre-implementation baseline. The pretreatment baseline will be comprised of data from 2008 2016, a time period that represents BEMP implementation prior to MSP actions (Figure 13).

Elk Fed Days and Bison Fed Days

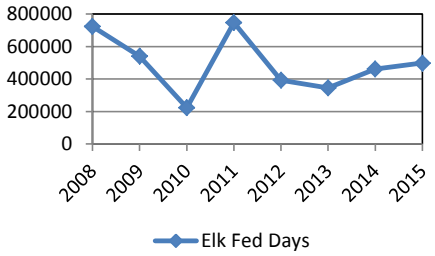
The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. We further assume the variables elk-fed-days (EFD) and bison-fed-days (BFD) are a proxy for these conditions. EFD and BFD will be calculated annually for each species based on the following formulas:

EFD= ∑ Total elk counted on feed during daily feedground counts for duration of feed season

BFD= ∑ Total bison counted on feed during daily feedground counts for duration of feed season

Because EFD and BFD are influenced by feed season length and the number of animals on feed, the MSP strategy of delaying the initiation of supplemental feeding will inherently reduce the number of EFD and BFD through a reduction in average feed season length. We believe that EFD will be further reduced by encouraging a greater proportion of the JEH to winter on native winter range, thereby reducing the number of elk occupying NER feedgrounds. We will evaluate changes in EFD and BFD by comparing the 3-year running average post MSP implementation compared to mean EFD and BFD from 2008–2015. The running average is an appropriate comparison because it will help

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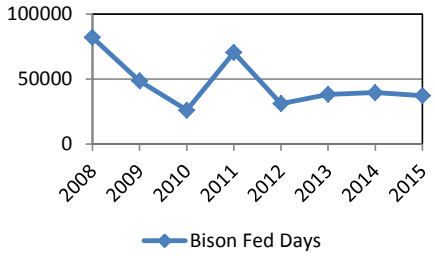


Figure 15. Elk Fed Days (EFD) and Bison Fed Days (BFD) in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the Management Step Down Plan (2008-2015). These values represent the pretreatment baseline which will be compared to the 3-year running average EFD and BFD post MSP implementation.

account for wide annual variation in EFD and BFD associated with winter severity (Figure 15)

Elk Winter Mortality Monitoring

NER has used consistent methods to monitor winter elk mortality since 1982. Each winter NER biologists and other refuge staff conduct a survey of all non-hunting related winter elk mortalities that occur on NER from November through April. Mortalities are tallied by age/sex class and percent mortality is calculated using the corresponding number of elk classified on NER feedgrounds as the denominator. We will continue to monitor elk winter mortality using the same methods post-MSP implementation, which will allow trend comparisons to the pre MSP baseline (Figure 15). Under the MSP framework, we believe the 3-year running averages for total and calf winter elk mortality will be within the range of variation exhibited by the pre MSP baseline. Historic monitoring suggests that calf and total mortality are sensitive to winter severity and disease outbreaks, and that winter mortality occasionally exceeds >3% total mortality and >10% calf mortality. Post-MSP mortality in excess of these levels may warrant shortening the feeding initiation delay in subsequent years.

Elk Collaring

One of the MSP's principal strategies is to shorten the length of the feed season to encourage elk use of native winter range, but we anticipate that this strategy will also result in an increase in elk conflicts on surrounding private land in the town of Jackson and the Spring Gulch areas, potentially including large groups of elk. To quantify this effect and provide real-time information to WGFD and NER managers to facilitate a response, we propose maintaining a sample of 50 GPS-collared elk that winter on NER throughout the MSP implementation period. Forty-five elk represents approximately 0.5% (1 in 200) of the NER winter elk population. This sample size will not be sufficient to detect all elk movements from NER to surrounding private lands, particularly movements by small groups of mature bull elk, but it will be sufficient to detect and quantify significant movements of cow/calf/yearling elk groups compared to pre-MSP baseline data.

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NER has elk GPS-collar data available from the 2008-2013, which represents the post-BEMP, pre-MSP baseline period. We hypothesize that elk movements from NER to surrounding private lands will increase during the MSP implementation period compared to the pre-treatment baseline. This will be tested by comparing the number of incidents that elk left NER for surrounding private lands (per elk/per year), and the proportion of elk GPS fixes on NER versus private lands during time periods of interest. The principal time period of interest is late December–March because this represents the period after the NER elk hunting season, and prior to, and during, NER feeding operations. This is the season when changes to the NER feeding program would be most likely to result in elk distribution changes.

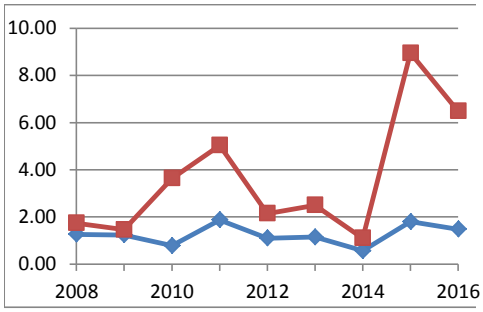


Figure 16. Total (blue) and calf (red) elk winter mortality (%) on NER in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

Thirty adult cow elk were captured on NER feedgrounds in February 2016 and Telonics Iridium GPS collars were deployed with a 90 minute fix interval. Collars will be deployed on up to 50 additional adult cow elk in February-March 2017. Given 83% annual survival for adult cow elk in the JEH (Cole and Foley et al. 2015) and 3-year collar life, approximately 10 additional elk will need to be collared each year in winter 2018 and 2019 to maintain the 50 elk desired sample size over the life of the MSP implementation period.

Ancillary data that will be collected and analyzed during the elk capture and collar data analysis process includes brucellosis seroprevalence, pregnancy rate, and elk summer range determination for comparison to the findings of Cole and Foley et al. (2015).

Disease

The primary purpose of limiting reliance on supplemental feeding is to reduce the prevalence of endemic elk and bison diseases and mitigate transmission risk associated with the introduction of novel diseases. We hypothesize that brucellosis seroprevalence will decline post MSP implementation. There are no recent brucellosis seroprevalence data for elk on the NER, but >50 elk will be captured during elk collaring operations in winter 2016, and each elk will be tested for brucellosis exposure. The 2016 Brucellosis seroprevalence rate will be the pre-treatment baseline to evaluate post MSP change. Chronic wasting disease (CWD) has been monitored in the JEH since 1997, and since 2008 it has been monitored with sufficient sample size to detect 1% prevalence with 95% confidence. No CWD positive cases have been detected in the JEH, which given the long term persistence of the disease, provides overwhelming evidence that CWD is not currently endemic to the JEH. However, most evidence suggests that the distribution of CWD is increasing and that its introduction to the JEH is inevitable. Early detection is critical to ensure a~~n adequate~~ management response, and therefore ongoing monitoring at sample sizes sufficient to detect 1% CWD prevalence with 95% confidence is necessary. CWD is sampled by testing tissues collected primarily from hunter harvested elk, and past experience suggests that 2 full time technicians working from September-December are necessary to ensure minimum sample size. Typical costs associated with 2 technicians are $32,000 per year.

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Data Collected for Modeling

Table 6. Variables to be used in models to explain elk winter distribution in the Jackson Elk Herd and elk calf mortality on NER.

VARIABLE	SOURCE	Elk Winter Distribution Model	Elk Calf Mortality Model
Proportion Jackson Elk Herd on NER Feedgrounds	WGFD/NER Jackson Elk Herd February Classification Count	Yes	No
Proportion Jackson Elk Herd from South Snake River summer segment	Determined from elk GPS collar data for elk captured on NER	Yes	No
Number of wolf packs in the Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated total wolf numbers in Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated number of wolves using NER in winter	NER observations	Yes	Yes
Total NER herbaceous forage biomass	NER forage production survey data	Yes	Yes
Snow Water Equivalent	NOAA snowtell site data	Yes	Yes
NER Winter elk Mortality (calf)	NER winter elk mortality survey	No	Yes
Snow Depth	NOAA Snowtell sites and NER measurements	Yes	Yes
Available Forage	NER and GTNP monitoring in winter months	Yes	Yes
NER Elk and Bison Fed Days	NER feeding records and daily feedground estimates of elk and bison	Yes	Yes
NER Feeding Start Date	NER feeding records	Yes	Yes
Gros Ventre Feeding Start date	WGFD feeding records	Yes	No
Elk Hunting Pressure by Hunt Area	Estimated number of hunter days from WGFD completion reports	Yes	Yes

To facilitate modeling, we will collect data on the following associated variables (Table 6). The table lists variables and how they relate to our efforts to use modeling to explain changes in elk distribution and elk calf mortality relative to our principal action of reducing feed season length.

EVALUATION/FUTURE MANAGEMENT

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Consequently, we anticipate that the strategies outlined in this plan will be in place for a minimum of 5 years, after which an initial evaluation of the program will be made. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented at an annual management MSP update/report, completed by NER staff by the end of March for the previous year.

Consistent with objectives outlined in the BEMP, the long-term goal of this plan is reduce the reliance of bison and elk on intensive supplemental feeding, using adaptive management principles through a structured framework of management actions, to achieve a desired condition of animals relying predominately on native habitat on NER, GRTE, and USFS lands, and on NER cultivated forage. But because there is no precedent for what this plan proposes, there are few responses to proposed management actions that can be predicted to a degree of certainty commensurate with establishing definable thresholds or other objective criteria for success in the short term.

Factors that will be considered in evaluating the success of the program will include the trend of EFD and BFD, type and frequency of private lands conflicts, the proportion of the JEH wintering on the NER, presence or absence of CWD and other infectious diseases, elk and bison population size and distribution, elk calf winter mortality, and public support. These are complex, dynamic, and interwoven components that, together with the MSP, make up the framework for decreasing reliance on supplemental feeding. As such, the effects of changing biological, social, and political conditions on these components will be part of the evaluation process.

In the context of this larger framework, however, we believe evaluation of the trend in EFD and BFD will be most important after the first 5 years of MSP implementation. The direction and magnitude of the trend observed will provide a preliminary basis for evaluation and decisions about continued management actions. Initial success with reduced feeding will be associated with a declining trend in EFD and BFD, with greater magnitudes indicating higher degrees of success. However, determinations of overall program success will necessarily include evaluation of all system components. For example, gains in reduced feeding come could be accompanied by an increase in private land conflicts, which would affect overall success determinations. While the overriding strategy will be to decrease feeding as aggressively as possible while gauging effects on other system components, overall measures of program success through time will necessarily involve evaluating a matrix of effects. These evaluations will be included in annual MSP reports.

As proposed and new management strategies are implemented and evaluated under this plan, at some point in the future it may become apparent that meeting reduced feeding goals will not possible without reducing elk and/or bison population objectives. Population objectives for both herds are set by Wyoming Game and Fish Commission and are evaluated regularly by WGFD personnel, including public review through annual season setting meetings. The BEMP supported the State herd objectives of 500 bison and 11,000 elk, and thus due to NEPA requirements any further consideration of reduced herd sizes by the NER or GRTE are beyond the scope of this plan. However, Wyoming Game and Fish Commission changes to Jackson bison or elk herd objectives are not constrained by the BEMP.

Comment [CE7]: Consider FAQ callout "**Why is the MSP vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?"**

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Investigating the potential effects of climate change on elk and bison management will also be important in the long-term. During implementation of this plan, we will collect a variety of data that could be drawn upon for this purpose.

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PUBLIC OUTREACH AND EDUCATION

The practice of winter feeding is inexorably woven into the historic fabric of Jackson Hole. Elk are identified with the rich and unique legacy for which Jackson Hole is known around the world. De-emphasizing the supplemental feeding program will be a major paradigm shift for the residents of Jackson Hole, Teton County, and the State of Wyoming.

An effective Public Outreach and Education program is essential for effective MSP implementation. The practice of feeding elk evokes passionate responses from those that oppose and those that support this practice. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk/bison herd management methods.

A detailed communication plan to guide outreach and education efforts can be found in Appendix 3.

SCHEDULE

Table 7. Proposed implementation schedule for the MSP.

Action	Date
Public outreach and education	November 2016
Initiate private lands conflicts mitigation contacts/actions	January, 2017
Implement enhanced forage monitoring	January, 2017
Initiate changes in supplemental feeding protocol	January/February 2017
GPS Collar 30-40 elk (Iridium platform)	March 2017
Monitoring/Evaluation/Annual Report	June 2017

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BUDGET

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

	Year				
Agency / Activity	**1**	**2**	**3**	**4**	**5**
National Elk Refuge:					
Monitoring:					
Seasonal Biological Technician (0.5 FTE, GS-7)	$24,000	$25,000	$26,000	$27,000	$28,000
Bison/elk fed days					
Mid-winter census					
Elk summer herd segment distribution[1]					
Expanded standing forage estimates[1]					
Chronic Wasting Disease, 2 seasonal bio.-techs	$32,000	$32,000	$32,000	$32,000	$32,000
Winter bison/elk distribution					
Irrigation					
50 Elk radio telemetry collars; Iridium Platform	$115,000	$25,000	$25,000	$25,000	$25,000
Bison barrier maintenance at NER south entrance	$500	$500	$500	$500	$500
Step Down Management Plan annual reporting	$2,000	$2,000	$2,000	$2,000	$2,000
Private lands:					
Easements / Leases (Private Foundations)	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000
Conflict mitigation technicians (WGFD)	$91,000	$91,000	$91,000	$91,000	$91,000
Hazing (helicopter)	$6,000	$6,000	$6,000	$6,000	$6,000
Vegetation restoration/protection[1]					
Public Outreach and Education	$11,000	$1,000	$1,000	$1,000	$1,000
Subtotal					
Grand Teton National Park:					
Monitoring:					
Summer elk classification/distribution	$10,000	$11,000	$12,000	$13,000	$14,000
Collaborative elk monitoring (GRTE portion)	$5,000	$5,000	$5,000	$5,000	$5,000
Vegetation Restoration/Protection					
Monitoring	$16,000	$16,000	$18,000	$18,000	$12,000
Temporary bison fencing	$24,000				
Temporary fence maintenance	$6,000	$8,000	$8,000	$4,000	
Hayfields restoration	$84,000	$70,000	$70,000	$31,000	
Exotic plant mitigation	$50,000	$52,000	$46,000	$32,000	$16,000
Elk Reduction Program (subject to annual review)					
Hunter harvest evaluation	$1,500	$1,500	$1,500	$1,500	$1,500
Harvest age distribution	$2,000	$2,000	$2,000	$2,000	$2,000
CWD monitoring (0.15 FTE, GS-6)	$7,000	$7,000	$7,000	$7,000	$7,000
Law Enforcement and Visitor Protection (0.15 FTE for 20 LE and support staff; supplies, and permitting)[3]	Unknown				

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
Subtotal					
Wyoming Game and Fish Department:[2]					
Subtotal					
Grand Total					

[1]See detail in Appendix
[2] Dependent on size of elk reduction program; current annual expenditures are approx. $295,000 for 0.15 FTE for 20 LE and support staff; supplies, and permitting.
[3]Through Interagency Agreement

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APPENDIX 1. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007).

Populations

- Jackson elk herd objective of 11,000 would be maintained.
- New Jackson bison herd objective of 500 established.

Winter Feeding

- Supplemental feeding could be delayed or could occur earlier compared to current practices.
- Changes [to feeding program could] include alterations in the timing of feeding and providing supplemental feed in fewer years.
- Ration or pellet composition might need to be changed.
- Supplemental feeding would be initiated according to established criteria, including pre-winter forage production, assessments of forage utilization (done jointly by WGFD and NER personnel), elk condition and movements, and potentially on the January 1 index of winter severity calculations for elk (Farnes, Heydon, and Hansen 1999).
- Mechanical means could be used to increase forage access for elk after snow crusting events.
- Changes in the refuge supplemental feeding program could begin to affect elk nutrition (negligible adverse effect on NER elk from lower nutrition).
- Displacement of elk by bison during competition for standing forage would decrease as the bison herd is reduced.
- Aggressive social interactions involving competition for food among elk and bison would increase overall as feeding periods are reduced.

Winter Distribution

- Elk densities on the NER would decline due to more reliance on standing forage and wider distribution.
- Elk use of lands surrounding the NER would increase, including:
    - USFS lands east of the NER
    - Gros Ventre feedgrounds possibly
    - Southern GRTE
    - State feedgrounds south of the NER
- Most of winter distribution shift would involve elk in the Yellowstone, Teton Wilderness, and Gros Ventre segments.
- As ungulate numbers decreased and supplemental feeding was reduced, competition and aggressive social interactions on the refuge would also be reduced.
- Elk and bison distribution would increase as the animals relied more on native winter range.
- Fewer animals would be present on the refuge.

Mortality

- As supplemental feeding is reduced, natural factors such as climate and native forage availability would have a greater influence on numbers, movements, distribution, and mortality.
- More elk would be subject to natural factors affecting mortality, including loss of body condition, predation, and starvation.
- Increased mortality on and off the refuge would mainly affect older elk and calves, and some prime bulls entering the winter energetically stressed due to rut activities.
- Late winter calf ratios could decrease as a result of higher winter calf mortality

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- Average winter mortality on the refuge would increase from 1%–2% annually to an estimated 1%–5%.
- Overall, a higher total winter mortality rate of approximately 5% could be expected.

Disease

- Reductions in supplemental feeding or elk numbers would reduce the potential for impacts due to tuberculosis, septicemic pasturelosis, and CWD.
- The health and sustainability of the Jackson elk herd would be increased gradually as supplemental feeding was reduced and there was greater reliance on standing forage and wider ungulate distribution.
- Health and sustainability of the Jackson elk herd would be enhanced in the long term.
- Wider distribution of elk would result in moderate reductions in both the prevalence and potential transmission of brucellosis, as well as potential for spread of diseases not yet in the population.

Private Lands

- The agencies would work closely with the WGFD and landowners, including livestock producers, to coordinate actions that would prevent conflicts due to elk dispersal and to defray costs of managing potential conflicts. Preventing access to food/hay rewards on private lands would be vital for effective management.
- Private land conservation easements within NER boundaries would promote wider distribution.

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APPENDIX 2. Monitoring Supplemental Materials: Feeding Initiation Methods

At each sample site, 10 subplots will be measured at every 5 steps along the random bearing determined for each site. At each subplot a 13.27" diameter metal sampling ring will be placed on the ground. The amount of forage available to elk within the sampling ring (dry weight in grams) will be visually estimated. The 13.27" diameter subplot allows easy conversion from grams to lbs. per acre (each gram is equivalent to 100 lbs. per acre). During annual forage production sampling, refuge biologist Eric Cole has made approximately 1,000 of these visual estimates per year for 17 years, and 33% of Cole's estimates have been verified by clipping and weighing. Therefore, Cole will be the principal estimator, but additional personnel will be trained in these techniques to provide redundancy in the event of personnel changes, and to increase the number of observers to facilitate estimation of error.

Estimating available forage within the sample ring at each subplot is relatively straightforward when snow cover is limited, but estimating how much of the forage is accessible to elk when snow is dense, deep and crusted can be subjective. To decrease the subjectivity of the estimation process, if the area under the sample ring is covered with snow, only forage that can be exposed with a gloved hand will be included in the estimate of available forage. Forage that is fouled with manure and/or flush with the ground due to trampling and/or encrusted in ice will not be included in the estimate of available forage. At each subplot the estimate of available forage (dry weight g) will be converted to an equivalent lbs./acre value (1 gram=100 lbs./acre). The arithmetic mean of available forage (lbs./acre) for the 10 subplots provides an estimate of available forage for each index site. There are 3 sample site categories: 1) Historic Key Index Sites that have been used since 2007, 2) New randomly selected sites within areas preferred by elk, and 3) New randomly selected sites in areas not preferred by elk. Historic key index sites were not randomly selected, but were instead selected to represent areas most preferred by elk on the south end of NER. These were the sites used to determine when supplemental feeding would be initiated from 2007 until the implementation of the MSP. To facilitate comparison with pre-MSP data, we will continue to use mean lbs. per acre across historic key index sites to determine the 300 lbs. per acre threshold. However, post MSP implementation we will delay feeding initiation by 2 weeks once the 300 lbs./acre level has been reached. We will concurrently sample at randomly selected sites stratified on an annual basis between areas highly preferred and not highly preferred by elk. This will enable us to quantify the relationship between mean forage availability at historic key index sites and random sites over time.

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APPENDIX 3. Communication Plan

Communication Goals

Prior to the MSP's Implementation

- Utilize a variety of outreach methods to inform the public on the goals and timing of the MSP implementation and possible effects on wintering herds.
- Utilize a variety of outreach methods to inform the public on public comment opportunities.
- Identify and coordinate key messages and outreach with USFWS regional and national offices, State and federal agency partners, non-profits, elected officials, and other identified audiences.

During the MSP's Implementation

- Continue to utilize a variety of outreach methods to describe current management actions as well as measurable and noticeable changes on the landscape, in animal behavior, or in animal health.
- Provide a comprehensive overview of the MSP by providing links and references to previous outreach and background information.

Communication Objectives

- Work with current media contacts to promote news of the MSP via print, radio, Web, and social media platforms.
- Utilize new media and social media tools to provide information on why the MSP was developed, what public comment opportunities exist, and how the plan is being implemented.
- Plan, coordinate, and execute public meetings to allow for public comment and questions on the plan.
- Develop and provide methods for the public to submit written comments on the MSP.
- Monitor print media on Refuge elk and bison management to see how the Step own Plan objectives and reactions are being portrayed to the public.

Current Outreach Resources

- National Elk Refuge web site
- National Elk Refuge news release list
- (approximately 300 contacts)
- National Elk Refuge Twitter site (1,039 followers)
- Bison and Elk Management Plan web site (http://www.fws.gov/bisonandelkplan/)
- Space for an 11" x 17" poster in the Visitor Center on Refuge management topics
- Display panels in the Visitor Center theater for temporary displays

Available Supporting Outreach Resources

- USFWS Mountain–Prairie External Affairs staff
- USFWS Mountain–Prairie web site, including the
- "Top Stories" feature
- USFWS Mountain–Prairie Twitter site USFWS Mountain-Prairie Region Facebook page
- USFWS National Wildlife Refuge System

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- Facebook page
- USFWS Facebook page

Previous Outreach Efforts

- NER routinely writes and disseminates news releases on Refuge management activities, including the Comprehensive Conservation Plan, supplemental feeding, herd health monitoring, and forage production.
- Post the above news stories as Content.
- Management System (CMS) articles.
- Post CMS news story promos so they prominently appear on the home page, linking readers to the articles.
- Send out Twitter messages linking viewers back to the news stories.
- Prepare, upload and provide links to Adobe PDF versions of news stories with additional photos where additional images are available and/or help understand or visualize the content.
- Utilized the Conservation link on the web Content
- Management System to post information about the Bison and Elk Management Plan and the draft Comprehensive Conservation Plan.
- Retained and provided a link to the original Bison and Elk Management web page (http://www.fws.gov/bisonandelkplan/) that was developed during the planning process. The web site includes links to the Final Plan/EIS, Record of Decision, Federal Register Notice of Availability for both the Record of Decision and Final Plan/EIS, associated news releases, public meeting highlights, and other related documents. Note: the National Elk Refuge does not manage the site.

Additional Outreach Opportunities

- Public meetings in Jackson and other identified locations.
- Service produced video; video could be posted to the National Elk Refuge's multimedia web page, or USFWS Mountain–Prairie home page "Top Video" feature.
- Live radio interview on KHOL (Jackson, WY radio)
- Wyoming Public Radio interview with Refuge management staff
- Interviews with local print media sources
- Updates at community leader meetings such as Rotary Club, Jackson Hole Chamber of Commerce board meetings, and interagency breakfast meetings (with Federal agencies and local elected officials).

Target Audiences

Internal

- Regional and National USFWS Leadership
- Refuge permanent staff
- Refuge seasonal staff
- Refuge volunteers

External

- Congressional representatives
- State of Wyoming leadership
- Federal agency partners, particularly Grand Teton National Park and the Bridger–Teton National

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Forest
- Wyoming Game & Fish Department
- Other NER partners, including county and town agencies and local nonprofit organizations
- Local elected officials
- Private landowners in proximity to the National
- Elk Refuge or neighboring Federal lands
- Tribes
- Local and state media
- Local public

Key Outreach Topics

- Overview of BEMP objectives
- Strategy to change elk/bison behavior
- Threat of disease
- Natural mortality rates
- Anticipated winter distribution changes for bison/elk
- Mitigate negative effects on private lands
- Change elk behavior and distribution while avoiding increased mortality.
- Explain the historic reasons a supplemental feeding program began and why it was continued.
- Explain the NER's limited large ungulate carrying capacity and the disproportionate impact of bison on available forage; 3 elk = 1 bison.

DRAFT

APPENDIX 4. Models

Elk winter distribution model

The proportion of the JEH that winter on the NER will be linked to factors hypothesized to influence elk winter distribution using a generalized linear mixed effects model (GLMM). A GLMM can account for a proportional response variable (i.e., constrained to the interval 0–1) using a log link and binomially-distributed errors. A GLMM also includes fixed and random effects, with the latter capturing residual model variance otherwise not explained by fixed effects. Year will be including as a random effect, providing several benefits. First, we don't assume years are independent and comprise all of the factor levels of interest. Instead, the effect of year is treated as a random variable, with individual year effects realizations of that distribution. This allows inference to non-sampled factor levels, i.e. years, by estimating a latent population-level proportion of elk expected to winter on the NER regardless of fixed effect influences. Thus, the random year effect can be considered a latent variable describing elk behavior manifested as observed winter distribution. Second, because year effects are not treated as independent, estimated effects of year on the proportion of JEH elk wintering on the NER are dependent on all factor levels, leading to greater precision when estimating individual year effects (Kéry 2010).

The full GLMM incorporating fixed effects for each factor identified as influencing elk winter distribution is:

$$P_t = \beta_{0(t)} + \beta_1 * AFI_t + \beta_2 * SDM_t + \beta_3 * WP_t + \beta_4 * GSP_t + \beta_5 * SWE_t + \varepsilon_t$$

where the random intercept and residual model variance are

$B_{0(t)} \sim N(\mu_{\beta_0}, \sigma^2_{\beta_0})$, and

$\varepsilon_t \sim N(0, \sigma^2)$, respectively.

Fixed effects include 1) per capita available forage at initiation of winter feeding (*AFI*) , 2) proportion of the JEH that are short-distance migrants (*SDM*), 3) number of wolf packs present on JEH native winter range (*WP*), 4) growing season (May–August) precipitation for the Wyoming Snake Drainage climate division (*GSP*; a proxy for available forage on native winter range), and 5) snow water equivalent on 1 January at Thumb Divide (*SWE*; a proxy for early winter severity).

Elk calf winter survival and forage deficits

The Forage Accounting Model of Hobbs et al. (2003) has as an output weekly available forage biomass for the NER (sum of predictions for 30 × 30 m cells). These predictions account for snow conditions using a proxy of SWE and decrement total available biomass by 35% to account for unpalatable plants within the total estimate.

While calf survival is a function of multiple factors the primary management action influencing calf survival is supplemental winter feeding. Current winter feeding initiation criteria lead to calf survival generally higher than in unfed populations. Proposed feeding initiation criteria will result in later initiation of supplemental feed, which will be most influential to calf survival. There is currently little

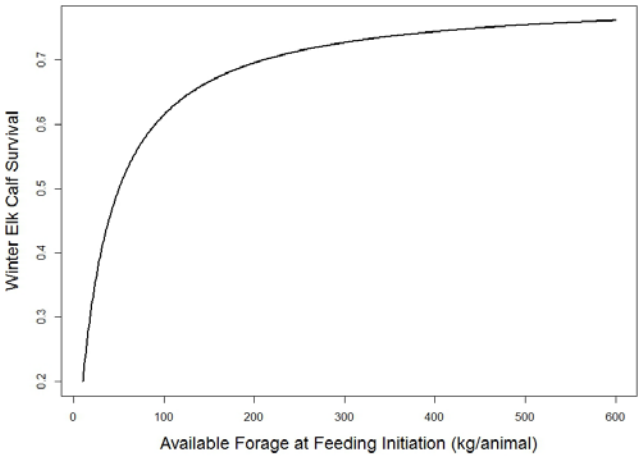
DRAFT

understanding regarding the relationship between initiation of winter feeding and calf survival, except that current feeding initiation criteria result in high calf survival. We believe a threshold level of available forage at initiation of winter feeding exists such that winter calf survival reaches an asymptote. Below this threshold, calf survival is hypothesized to decline quickly with reductions in available forage at winter feeding initiation. Available forage at the initiation of winter feeding will be related to on elk calf winter survival using a saturating function (i.e., Holling type-II functional response; Fig. 6) by

$$S_t = \frac{aAFI_t}{b + AFI_t}.$$

The parameters *a* and *b* determine how calf survival is related to available forage. Maximum calf survival is *a*, and *b* represents the value of available forage to an individual when survival is 50% of *a* (Hilborn and Mangel 1997).

Although this approach doesn't capture forage deficits *per se*, it does provide a potentially sensitive proxy for this concept. It is assumed that a forage deficit for calves would occur at a point on the curve of the relationship between calf survival and available forage at initiation of supplemental feeding. Modeling the response of winter calf elk survival to changes in feeding initiation criteria facilitates our ability to maximize the influence of feeding initiation criteria on winter distribution while minimizing the likelihood of a large mortality event.



Hypothesized relationship between winter survival of elk calves and per capita available forage at initiation of winter feeding on the National Elk Refuge.

BASIC COMMUNICATIONS STRATEGY

SECTION I: GENERAL INFORMATION

1. **Plan title:** Release of the National Elk Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA)

2. **DTS number: 44T**

3. **What is the action triggering this communications plan?** *(Please explain in no more than three sentences)*

The CCP and EA have been approved since September 2015, so this announcement is overdue. A separate engagement strategy for the Bison and Elk Management step-down plan is currently in development and will be available for leadership review soon.

4. **What is the proposed date to announce this action? Why has that date been selected?** *(Please note whether this date is flexible)*

We propose to release this CCP/EA as soon as possible and no later than September 2016.

SECTION II: GOALS AND MESSAGES

5. **What are our primary communications goals?**

Our primary communications goal is to inform our primary partners at the Wyoming Game and Fish Department, National Park Service, U.S. Forest Service, and the local public that the CCP/EA have been finalized and that certain activities under the CCP are underway. Our secondary communications goal is to draw a clear line between the CCP/EA and the Bison and Elk Management Plan, separating those items in the minds of our constituents and indicating to interested stakeholders that information about the latter plan is forthcoming this Fall.

6. **What are our key messages?** *(List no more than four!)*

- The purpose of Comprehensive Conservation Plans is to guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will

implement to protect species, manage habitats, and support compatible, public recreational and other uses.

- A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).
- Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.
- The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the refuge, including supplemental feeding. A separate announcement and a series of meetings on the Bison and Elk Management Plan are forthcoming this Fall.

SECTION III: IMPLEMENTATION

7. Who is leading this communications effort? *(Check one. Note if the response is neither of these, you should be using either a Partnership, Full or Targeted plan)*

◉ **Region** ○ **HQ**

8. Which programs and/or regions does this issue involve?

The National Elk Refuge (R6)

Refuges (R6)

External Affairs (R6)

9. Implementation timeline:

Date	Time	Tactic	Responsible
August 12	COB	Draft news release and comms plan, submit to NER staff for review	Ryan Moehring
August 19	COB	Review outreach package and return any edits to Ryan Moehring	NER Staff
ASAP?	COB	Refuges Planning re-submits package to *Federal Register*	Toni Griffin
Day before release	10:00 a.m. MDT	Contact Scott Talbot, Director WGFD	Steve Kallin
Day before release	10:00 a.m. MDT	Congressional notifications	Ryan Moehring
Day of release *(Day available in the Reading Room)*	10:00 a.m. MDT	Distribute press release	Ryan Moehring Lori Iverson will also forward the news release to the NER's news release list.
Day of release	10:00 a.m. MDT	Post press release on R6 website and FWS homepage. Also, post link to press release on social media	Rob Mansheim Lori Iverson will send out a link on the NER's Twitter account.
Day of release	10:00 a.m. MDT	Email Dear Interested Party Letter to interested stakeholders.	Toni Griffin

10. Which communications tools are needed to support these strategies and tactics? *(Be as specific as possible about the products identified and who will produce them)*

Tool	Responsible	Due Date
News Release	Ryan Moehring	8/12/16
Communications Plan	Ryan Moehring	8/12/16
Dear Interested Party Letter	Toni Griffin	8/26/16

11. Which agencies, organizations and/or individuals should be notified?

Stakeholder Name	Contact Info	Pro/Anti/ Neutral	Contact By
Grand Teton National Park	David Vela, Superintendent; david_vela@nps.gov.	xxx	Day before announcement
National Park Service, Intermountain Region	James Doyle, Chief – Communication and Legislation; 303-969-2321; james_doyle@nps.gov	neutral	Day before announcement
Bridger-Teton National Forest	Patricia O'Connor, Supervisor; poconnor@fs.fed.us	xxx	Day before announcement
Wyoming Game and Fish Department	Brad Hovinga; brad.hovinga@wyo.gov	xxx	Day before announcement

12. Who are the primary points of contact for this action?

Media coordinators *(For national-level plans, list at least one person from HQ Public Affairs and others from region/program if appropriate. For regional-level plans, only regional coordinators are required. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Congressional coordinators *(Optional. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Subject matter experts available for interview *(Must be approved by HQ Public Affairs for an HQ-led announcement or Regional Public Affairs for region-led announcement. Enter name, email and phone)*

- Steve Kallin, 307-201-5409; Steve_Kallin@fws.gov

Additional technical experts for reference *(Enter name, email and phone)*

- Eric Cole, 307-201-5432; Eric_Cole@fws.gov

SECTION IV: DOCUMENT INFO

13. Date Created **Created By**

8/12/2016	Ryan Moehring

14. Date last edited **Edited By**

3/7/2017	Lori Iverson

SECTION V: CONGRESSIONAL CONTACT LISTS

Delegation Contacts

Member Title	State	Member Name	STAFF_EMAIL
Senator	Wyoming	John Barrasso	brian_clifford@barrasso.senate.gov; kaitlynn_glover@ba kristi_wallin@barrasso.senate.gov
Senator	Wyoming	Michael Enzi	alison_mcguire@enzi.senate.gov karen_mccreery@enzi.senate.gov
Representative	Wyoming	Cynthia Lummis	landon.stropko@mail.house.gov tucker.fagan@mail.house.gov

Committee Contacts

N/A

From:	Ryan Moehring
To:	Lori Iverson
Cc:	Steve Kallin; Eric Cole; Mike Blenden; Toni Griffin
Subject:	RE: NER CCP/EA Communications Package
Date:	Monday, August 22, 2016 9:26:00 AM
Attachments:	NER CCP News Release_Draft_LI.docx NER CCP Comms Strategy_Draft_NER edits.docx

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CCP

Thanks, Lori. See updated CCP outreach materials attached. A couple of highlighted items still need attention. I'd also appreciate a review from others on this distribution, if possible, please.

Toni, please note that you are now listed as being responsible for the dear interested party letter. Is that OK? Do you have time to throw something together this week?

Step-down

Steve, Lori is good with the four items I listed below for the step-down plan; are you? Also, have you given any thought to the facilitator and engagement sessions I proposed? Will you have funding for this? Did you have any other thoughts/ideas? If you are still interested in the video idea Lori mentioned, please share your thoughts on that.

Mike, were you able to catch Will last week re: releasing the CCP/EA in light of our progress?

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Iverson, Lori [mailto:lori_iverson@fws.gov]
Sent: Thursday, August 18, 2016 10:16 AM
To: Ryan Moehring
Cc: Steve Kallin; Eric Cole; Mike Blenden; Toni Griffin
Subject: Re: NER CCP/EA Communications Package

Ryan,
I agree with the four components you have listed for the Step Down Plan. Steve has also expressed interest in a series of short videos. Bill O'Brian from HQ is very interested in coming out this winter to help produce a few. He gave me some samples of some he's done, and they would be perfect. He's not available any earlier to work on this.

Lori

Lori Iverson
Outreach & Visitor Services
U.S. Fish & Wildlife Service
National Elk Refuge
PO Box 510 / 675 East Broadway
Jackson, WY 83001
Phone: 307.201.5433
Cell: 307.690.4375
Fax: 307.733.9729
lori_iverson@fws.gov
National Elk Refuge photo gallery
National Elk Refuge web site
Twitter: @NatlElkRefuge

"It is not the critic who counts, not the man who points out how the strong man stumbled, or where the doer of deeds could have done better. The credit belongs to the man who is actually in the arena, whose face is marred by dust and sweat and blood, who strives valiantly, who errs and comes short again and again, who knows the great enthusiasms, the great devotions, and spends himself in a worthy cause ..."
~Theodore Roosevelt

On Fri, Aug 12, 2016 at 12:31 PM, Ryan Moehring <ryan_moehring@fws.gov> wrote:
All,

Thanks for your time on the phone yesterday. Per our discussion, I spent the morning putting together a communications strategy and news release for the NER CCP/EA. See attached and please provide me with feedback and edits **by COB next Friday 8/19**. Note: there are several highlighted sections in the comms plan that require NER staff attention. Note #2: I will be out of the office all next week and unable to discuss this, so if you want to chat and it can't wait until the week after next, this afternoon works best.

Also, I spent a bit of time thinking about our BEMP step-down engagement piece. That thought process, combined with a review of the materials Natalie provided and a reconciliation against what we are currently doing on the engagement front for the opening of Rocky Flats NWR, leads me to think that we need four primary items to fully meet our engagement obligations and best position ourselves for success:

1) A news release like the attached

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4) Once those meetings are complete, a series of facilitated workshops or listening sessions (2-4?) for the local community so we can explain our plan and provide them with opportunities to understand what is already decided and what decision space still exists where they can impact management decisions. If at all possible, these meetings would be co-hosted by us and our partners but facilitated by a third party.

Steve, I do know what your funding situation looks like, but my suggestion would be to hire an outside firm/contractor (local = better) to set up and facilitate these sessions so 1) they feel collaborative and not FWS top-down; and 2) you and your staff can fully participate instead of having to facilitate.

Of course these are just a few preliminary thoughts and we can further refine as needed, but based on recent discussions in the RO around “engagement”, I think this will get us close. One thing is certain: time is of the essence, so we should get a game plan together ASAP.

Finally, Mike, please let us know if you were able to catch Will today re: releasing the CCP/EA.

Thanks again, everyone, and please share your thoughts when you have a moment.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

Web |Facebook | Twitter | Flickr | YouTube

News Release

U.S. FISH AND WILDLIFE SERVICE
Mountain-Prairie Region
134 Union Boulevard
Lakewood, Colorado 80228

For Immediate Release
September XX, 2016

Management Plan Completed for National Elk Refuge

Contact: Ryan Moehring, (303) 236-0345, Ryan_Moehring@fws.gov

LAKEWOOD, Colo. – The U.S. Fish and Wildlife Service (Service) has released a final Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) that will guide management of the National Elk Refuge in Jackson Hole, Wyoming for the next 15 years. The management decisions included in the CCP are a result of thorough environmental review and input from the local community and other stakeholders.

A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation, photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.

The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the refuge, including supplemental feeding. Instead, the CCP addresses all other aspects of refuge management including migratory birds, threatened and endangered species, habitat, visitor use, and cultural resources.

The final CCP/EA is available online here: https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. Hard copies are available at the refuge administrative offices located at 675 E. Broadway in Jackson. For questions about the CCP/EA, please call 307-733-9212.

Established in 1912, the National Elk Refuge spans approximately 25,000 acres and provides wildlife with a variety of habitat types, including grassy meadows, marshes, forest, sagebrush, and rock outcrops. Although the refuge is best known for the large herd of wintering elk in the world, nearly 175 species of birds and at least 47 mammal species have been observed on the refuge. In addition to the large herd of elk, a free-roaming bison herd also winters at the refuge. Each year, roughly 500,000 people visit the National Elk Refuge to enjoy the views and charismatic wildlife.

To learn more about the refuge,
visit: https://www.fws.gov/refuge/National_Elk_Refuge/about.html.

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. We are both a leader and trusted partner in fish and wildlife conservation, known for our scientific excellence, stewardship of lands and natural resources, dedicated professionals, and commitment to public service.

For more information on our work and the people who make it happen, visit http://www.fws.gov/mountain-prairie/. Connect with our Facebook page at http://www.facebook.com/USFWSMountainPrairie, follow our tweets at http://twitter.com/USFWSMtnPrairie, watch our YouTube Channel at http://www.youtube.com/usfws and download photos from our Flickr page at http://www.flickr.com/photos/usfwsmtnprairie/.

– FWS –

From:	Ryan Moehring
To:	Toni Griffin
Cc:	Lori Iverson; Steve Kallin; Eric Cole; Mike Blenden
Subject:	RE: NER CCP/EA Communications Package
Date:	Monday, August 22, 2016 4:38:00 PM

Toni,

We should absolutely talk to Will before proceeding.

Mike, any update on that front?

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Griffin, Toni [mailto:toni_griffin@fws.gov]
Sent: Monday, August 22, 2016 4:34 PM
To: Ryan Moehring
Cc: Lori Iverson; Steve Kallin; Eric Cole; Mike Blenden
Subject: Re: NER CCP/EA Communications Package

Hi Ryan and All,

I made a couple minor edits to the NER CCP Comms Strategy, and took a stab at a Dear Reader/Interested Party letter. Not sure what exactly is meant by an Interested Party letter… We usually include a Dear Reader letter with the distribution of the final CCP. We also have a postcard that we planned to distribute to stakeholders via the mailing list. These items are attached for your review and comment.

I found out from HQ we don't need to obtain updated signatures on the FR notice to resubmit it clearance (good thing). But, we will need to provide a reason for the delay. Wondering if we should communicate to ARD/RD our intention to resubmit the notice to HQ before proceeding?

Best,
Toni

Toni Griffin
Refuge Planning
Division of Biological Resources
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
Lakewood, CO 80228

Office Phone: 303-236-4378

On Mon, Aug 22, 2016 at 9:26 AM, Ryan Moehring <ryan_moehring@fws.gov> wrote:

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National Elk Refuge

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Cell: 307.690.4375
Fax: 307.733.9729
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National Elk Refuge photo gallery
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Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

Web |Facebook | Twitter | Flickr | YouTube

From:	Griffin, Toni
To:	Ryan Moehring
Cc:	Mike Blenden; Steve Kallin; Lori Iverson; Eric Cole
Subject:	Re: NER CCP/EA Communications Package
Date:	Tuesday, August 23, 2016 3:29:49 PM
Attachments:	NER Public Engagement Timeline.docx

Hi Everyone,

Mike and I thought it might be helpful to develop a timeline of steps required to release the final CCP and the public engagement process for SMP to provide time/space between the CCP distribution and SMP public engagement. I took a stab at a timeline but am not familiar with the SMP steps so please edit this as needed. The main point I hope to communicate is we (Planning) needs to submit the FR notice to HQ for clearance asap to meet a September goal of releasing the CCP.

Thanks,

Toni Griffin
Refuge Planning
Division of Biological Resources
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
Lakewood, CO 80228
Office Phone: 303-236-4378

On Fri, Aug 12, 2016 at 2:15 PM, Ryan Moehring <ryan_moehring@fws.gov> wrote:

> Makes sense to me, Mike. I can start working on the BEMP comms plan/news release when I return the week after next (unless Steve's staff wants to start on it in my absence, which is fine; the format I sent earlier will be required to get through regional surname). I'll defer to them on the idea I shared earlier of facilitated meetings and listening sessions. Assuming Steve and his staff are OK w/ this approach, I think that if we had a draft comms plan and a news release and at least a rough outline for these meetings/sessions (and maybe a contractor on board to facilitate), that would be enough to demonstrate the tangible process Will needs in order to release the CCP – would you agree, Mike?
>
> Thanks,
>
> Ryan
>
> Ryan Moehring
>
> Public Affairs
>
> U.S. Fish and Wildlife Service

Mountain-Prairie Region

303-236-0345

From: Blenden, Mike [mailto:mike_blenden@fws.gov]
Sent: Friday, August 12, 2016 2:00 PM
To: Ryan Moehring
Cc: Steve Kallin; Lori Iverson; Eric Cole; Toni Griffin
Subject: Re: NER CCP/EA Communications Package

Thanks Ryan,

Yes, I spoke to Will. He likes our approach but needs to demonstrate tangible progress on engagement strategy for SMP to Noreen before final approval of CCP publication in FR. He understands need to provide space between publication of CCP and public engagement with SMP. Toni and I spoke this morning about development of a schedule showing the timing of both efforts. I think she was going to touch base with Ryan and do this. I told her my opinion to start now on the approval process for FR notice. That will take some time during which we can provide tangible progress on SMP engagement strategy. Make sense?

On Fri, Aug 12, 2016 at 12:31 PM, Ryan Moehring <ryan_moehring@fws.gov> wrote:

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Steve, I do know what your funding situation looks like, but my suggestion would be to hire an outside firm/contractor (local = better) to set up and facilitate these sessions so 1) they feel collaborative and not FWS top-down; and 2) you and your staff can fully participate instead of having to facilitate.

Of course these are just a few preliminary thoughts and we can further refine as needed, but based on recent discussions in the RO around “engagement”, I think this will get us close. One thing is certain: time is of the essence, so we should get a game plan together ASAP.

Finally, Mike, please let us know if you were able to catch Will today re: releasing the CCP/EA.

Thanks again, everyone, and please share your thoughts when you have a moment.

Thanks,

Ryan

Ryan Moehring

Public Affairs

U.S. Fish and Wildlife Service

Mountain-Prairie Region

303-236-0345

Web |Facebook | Twitter | Flickr | YouTube

--

Michael Blenden

Refuge Supervisor - Montana, Wyoming and Utah

134 Union Boulevard

Lakewood, CO 80228

303-236-4306

303-710-7934 cell

Too often we...enjoy the comfort of opinion without the discomfort of thought.

John F. Kennedy

National Elk Refuge Public Engagement Timeline

Task	**Target Date**
CCP Communications Strategy • Finalize Communications Strategy	September 1
CCP Federal Register Notice of Availability • Obtain HQ clearance (2-4 weeks) • Send to Office of Federal Register for publication (1 week)	September 26-30
CCP distributed to the public	September 26-30
Bison Elk SMP Engagement Strategy • Finalize Communications Strategy	September 30
Implement SMP Communications Strategy • Facilitated meetings with partners • Facilitated listening sessions for local community	November 1—December 31
SMP released to public	January 2017

National Elk Refuge

Jackson, Wyoming

Nestled below the majestic Teton Range, adjacent to the historic gateway town of Jackson, the National Elk Refuge provides crucial big game wintering habitat in the Greater Yellowstone Ecosystem. Across the refuge's grassland, wetland, woodland, and sagebrush shrubland communities, visitors view wintering elk and other wildlife populations that are balanced with their habitats. The public enjoys quality hunting and fishing as well as year-round interpretative opportunities. Effective outreach and strong public and private partnerships ensure understanding and protection of refuge resources for future generations.



The final National Elk Refuge Comprehensive Conservation Plan is now available.

The U.S. Fish and Wildlife Service recently completed the National Elk Refuge's comprehensive conservation plan, a long-term planning effort that will guide management of the refuge over the next 15 years.

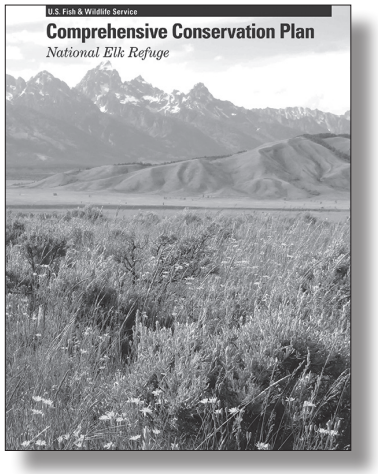
To learn more about the plan, please visit:

http://www.fws.gov/mountain-prairie/refuges/wy_ner.php

To receive a copy of the plan, please contact Toni Griffin, Acting Branch Chief, U.S. Fish and Wildlife Service, Region 6:

Email:
toni_griffin@fws.gov

Phone:
303 / 236 4378



BASIC COMMUNICATIONS STRATEGY

SECTION I: GENERAL INFORMATION

1. **Plan title:** Release of the National Elk Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA)

2. **DTS number: 44T**

3. **What is the action triggering this communications plan?** *(Please explain in no more than three sentences)*

The CCP and EA have been approved since September 2015, so this announcement is overdue. A separate engagement strategy for the Bison and Elk Management step-down plan is currently in development and will be available for leadership review soon.

4. **What is the proposed date to announce this action? Why has that date been selected?** *(Please note whether this date is flexible)*

We propose to release this CCP/EA as soon as possible and no later than September 2016.

SECTION II: GOALS AND MESSAGES

5. **What are our primary communications goals?**

Our primary communications goal is to inform our primary partners at the Wyoming Game and Fish Department, National Park Service, U.S. Forest Service, and the local public that the CCP/EA have been finalized and that certain activities under the CCP are underway. Our secondary communications goal is to draw a clear line between the CCP/EA and the Bison and Elk Management Plan, separating those items in the minds of our constituents and indicating to interested stakeholders that information about the latter plan is forthcoming this Fall.

6. **What are our key messages?** *(List no more than four!)*

- The purpose of Comprehensive Conservation Plans is to guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will

implement to protect species, manage habitats, and support compatible, public recreational and other uses.

- A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).
- Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.
- The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the refuge, including supplemental feeding. A separate announcement and a series of meetings on the Bison and Elk Management Plan are forthcoming this Fall.

SECTION III: IMPLEMENTATION

7. Who is leading this communications effort? *(Check one. Note if the response is neither of these, you should be using either a Partnership, Full or Targeted plan)*

◉ **Region** ○ **HQ**

8. Which programs and/or regions does this issue involve?

The National Elk Refuge (R6)

Refuges (R6)

External Affairs (R6)

9. Implementation timeline:

Date	Time	Tactic	Responsible
August 12	COB	Draft news release and comms plan, submit to NER staff for review	Ryan Moehring
August 19	COB	Review outreach package and return any edits to Ryan Moehring	NER Staff
ASAP	COB	Refuges Planning re-submits *Federal Register* package to HQ for clearance.	Toni Griffin
Day before release	10:00 a.m. MDT	Contact Scott Talbot, Director WGFD	Steve Kallin
Day before release	10:00 a.m. MDT	Congressional notifications	Ryan Moehring
Day of release *(Day available in the Reading Room)*	10:00 a.m. MDT	Distribute press release	Ryan Moehring Lori Iverson will also forward the news release to the NER's news release list.
Day of release	10:00 a.m. MDT	Post Final CCP on Mountain-Prairie Refuge Planning website. Distribute Final CCP (electronic and hard copy) to individuals on the CCP mailing list.	Danielle Stevens will work with Rob Mansheim to post files on RO website. Toni Griffin will distribute the Final CCP to the mailing list.
Day of release	10:00 a.m. MDT	Post press release on R6 website and FWS homepage. Also, post link to press release on social media	Rob Mansheim Lori Iverson will send out a link on the NER's Twitter account.

Day of release	10:00 a.m. MDT	Email Dear Interested Party Letter to interested stakeholders.	Toni Griffin

10. Which communications tools are needed to support these strategies and tactics? *(Be as specific as possible about the products identified and who will produce them)*

Tool	Responsible	Due Date
News Release	Ryan Moehring	8/12/16
Communications Plan	Ryan Moehring	8/12/16
Dear Interested Party Letter	Toni Griffin	8/26/16

11. Which agencies, organizations and/or individuals should be notified?

Stakeholder Name	Contact Info	Pro/Anti/ Neutral	Contact By
Grand Teton National Park	David Vela, Superintendent; david_vela@nps.gov.	neutral	Day before announcement
National Park Service, Intermountain Region	James Doyle, Chief – Communication and Legislation; 303-969-2321; james_doyle@nps.gov	neutral	Day before announcement
Bridger-Teton National Forest	Patricia O'Connor, Supervisor; poconnor@fs.fed.us	neutral	Day before announcement
Wyoming Game and Fish Department	Brad Hovinga; brad.hovinga@wyo.gov	neutral	Day before announcement

12. Who are the primary points of contact for this action?

Media coordinators *(For national-level plans, list at least one person from HQ Public Affairs and others*

from region/program if appropriate. For regional-level plans, only regional coordinators are required. Enter name, email and phone)

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Congressional coordinators *(Optional. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Subject matter experts available for interview *(Must be approved by HQ Public Affairs for an HQ-led announcement or Regional Public Affairs for region-led announcement. Enter name, email and phone)*

- Steve Kallin, 307-201-5409; Steve_Kallin@fws.gov

Additional technical experts for reference *(Enter name, email and phone)*

- Eric Cole, 307-201-5432; Eric_Cole@fws.gov

SECTION IV: DOCUMENT INFO

13. Date Created **Created By**

8/12/2016	Ryan Moehring

14. Date last edited **Edited By**

3/7/2017	Ryan Moehring

SECTION V: CONGRESSIONAL CONTACT LISTS

Delegation Contacts

Member Title	State	Member Name	STAFF_EMAIL
Senator	Wyoming	John Barrasso	brian_clifford@barrasso.senate.gov; kaitlynn_glover@ba kristi_wallin@barrasso.senate.gov

Senator	Wyoming	Michael Enzi	alison_mcguire@enzi.senate.gov karen_mccreery@enzi.senate.gov
Representative	Wyoming	Cynthia Lummis	landon.stropko@mail.house.gov tucker.fagan@mail.house.gov

Committee Contacts

N/A

From:	Ryan Moehring
To:	Toni Griffin
Cc:	Mike Blenden; Steve Kallin; Lori Iverson; Eric Cole
Subject:	RE: NER CCP/EA Communications Package
Date:	Tuesday, August 23, 2016 4:42:00 PM
Attachments:	NER CCP Dear Reader Letter.doc NER CCP News Release.docx NER CCP Postcard.pdf NER CCP Comms Strategy.docx

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Thanks, Toni. I think the CCP timeline makes sense. I think before we lock in a timeline for the step-down, however, we need to better understand what our engagement strategy is going to look like. Once Steve shares his thoughts on a facilitator, those proposed engagement sessions w/ WGFD and the public, etc., we'll have a better idea what exactly we are actually going to do and, by extension, how long that is going to take.

Edited versions of the NR, comms plan, Dear Reader letter, and postcard are attached. Happy to make any changes, but I think we are close. I'll work on a comms package for the BEMP once we have a better idea what we plan to do to support that rollout.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Griffin, Toni [mailto:toni_griffin@fws.gov]
Sent: Tuesday, August 23, 2016 3:30 PM
To: Ryan Moehring
Cc: Mike Blenden; Steve Kallin; Lori Iverson; Eric Cole
Subject: Re: NER CCP/EA Communications Package

Hi Everyone,

Mike and I thought it might be helpful to develop a timeline of steps required to release the final CCP and the public engagement process for SMP to provide time/space between the CCP distribution and SMP public engagement. I took a stab at a timeline but am not familiar with the SMP steps so please edit this as needed. The main point I hope to communicate is we (Planning) needs to submit the FR notice to HQ for clearance asap to meet a September goal of releasing the CCP.

Thanks,

Toni Griffin
Refuge Planning
Division of Biological Resources
Mountain-Prairie Region
U.S. Fish & Wildlife Service

134 Union Blvd
Lakewood, CO 80228
Office Phone: 303-236-4378

On Fri, Aug 12, 2016 at 2:15 PM, Ryan Moehring <ryan_moehring@fws.gov> wrote:
Makes sense to me, Mike. I can start working on the BEMP comms plan/news release when I return the week after next (unless Steve's staff wants to start on it in my absence, which is fine; the format I sent earlier will be required to get through regional surname). I'll defer to them on the idea I shared earlier of facilitated meetings and listening sessions. Assuming Steve and his staff are OK w/ this approach, I think that if we had a draft comms plan and a news release and at least a rough outline for these meetings/sessions (and maybe a contractor on board to facilitate), that would be enough to demonstrate the tangible process Will needs in order to release the CCP – would you agree, Mike?

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Blenden, Mike [mailto:mike_blenden@fws.gov]
Sent: Friday, August 12, 2016 2:00 PM
To: Ryan Moehring
Cc: Steve Kallin; Lori Iverson; Eric Cole; Toni Griffin
Subject: Re: NER CCP/EA Communications Package

Thanks Ryan,

Yes, I spoke to Will. He likes our approach but needs to demonstrate tangible progress on engagement strategy for SMP to Noreen before final approval of CCP publication in FR. He understands need to provide space between publication of CCP and public engagement with SMP. Toni and I spoke this morning about development of a schedule showing the timing of both efforts. I think she was going to touch base with Ryan and do this. I told her my opinion to start now on the approval process for FR notice. That will take some time during which we can provide tangible progress on SMP engagement strategy. Make sense?

On Fri, Aug 12, 2016 at 12:31 PM, Ryan Moehring <ryan_moehring@fws.gov> wrote:
All,

Thanks for your time on the phone yesterday. Per our discussion, I spent the morning putting together a communications strategy and news release for the NER CCP/EA. See attached and please provide me with feedback and edits **by COB next Friday 8/19**. Note: there are several highlighted sections in the comms plan that require NER staff attention. Note #2: I will be out of the office all next week and unable to discuss this, so if you want to chat and it can't wait until the week after next, this afternoon works best.

Also, I spent a bit of time thinking about our BEMP step-down engagement piece. That thought process, combined with a review of the materials Natalie provided and a reconciliation against what we are currently doing on the engagement front for the opening of Rocky Flats NWR, leads me to think that we need four primary items to fully meet our engagement obligations and best position ourselves for success:

1) A news release like the attached

2) A comms plan like the attached (to include items such as interested party letters)

3) A series (one or two may be sufficient) of facilitated meetings with partners (WGFD, NPS, USFS) to identify partner concerns and obstacles and chart a path forward together

4) Once those meetings are complete, a series of facilitated workshops or listening sessions (2-4?) for the local community so we can explain our plan and provide them with opportunities to understand what is already decided and what decision space still exists where they can impact management decisions. If at all possible, these meetings would be co-hosted by us and our partners but facilitated by a third party.

Steve, I do know what your funding situation looks like, but my suggestion would be to hire an outside firm/contractor (local = better) to set up and facilitate these sessions so 1) they feel collaborative and not FWS top-down; and 2) you and your staff can fully participate instead of having to facilitate.

Of course these are just a few preliminary thoughts and we can further refine as needed, but based on recent discussions in the RO around “engagement”, I think this will get us close. One thing is certain: time is of the essence, so we should get a game plan together ASAP.

Finally, Mike, please let us know if you were able to catch Will today re: releasing the CCP/EA.

Thanks again, everyone, and please share your thoughts when you have a moment.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

Web |Facebook | Twitter | Flickr | YouTube

--
Michael Blenden

Refuge Supervisor - Montana, Wyoming and Utah
134 Union Boulevard
Lakewood, CO 80228
303-236-4306
303-710-7934 cell

Too often we...enjoy the comfort of opinion without the discomfort of thought.
John F. Kennedy

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:
FWS/R6/NWRS/Planning
MAILSTOP 60130

MAILING ADDRESS:
P.O. Box 25486, DFC
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Boulevard
Lakewood, Colorado 80228-1807

Dear Reader:

We, the U.S. Fish and Wildlife Service, are pleased to provide you with a copy of the comprehensive conservation plan (CCP) for the National Elk Refuge. The CCP will guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will implement to protect species, manage habitats, and support compatible, public recreational and other uses. During the planning process, we worked closely with representatives from the National Park Service, the Wyoming Game and Fish Department, and the Teton County Planning Department. A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected Alternative D as the preferred management alternative.

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem. We will work closely with Wyoming Game and Fish Department and other Federal, State, and local partners to evaluate and manage habitats for the benefit of bison, elk, migratory birds, and other native species. An emphasis on adaptive management, including monitoring the effects of habitat management practices and use of research results to direct ongoing management, will be a priority.

We will use this plan, along with the Bison and Elk Management Plan (2007), as guidance for managing the refuge over the next 15 years. This comprehensive conservation plan will complement, not replace, the Bison and Elk Management Plan. A stepdown management plan is currently being drafted for the Bison and Elk Management Plan. This plan will outline, consistent with the Bison and Elk Management Plan, guidance to adaptively manage bison and elk herds to meet the goals and objectives outlined in the Bison and Elk Management Plan. Public comments will be solicited before the stepdown management plan is finalized.

The CCP document can be viewed online at https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. For more information about the CCP, please contact Steve Kallin, Project Leader at (307) 733-9212, or Steve_kallin@fws.gov.

Thank you for your continued interest in this planning process.

Sincerely,

Will Meeks
Assistant Regional Director
National Wildlife Refuge System

News Release

U.S. FISH AND WILDLIFE SERVICE
Mountain-Prairie Region
134 Union Boulevard
Lakewood, Colorado 80228

For Immediate Release
September XX, 2016

Management Plan Completed for National Elk Refuge

Contact: Ryan Moehring, (303) 236-0345, Ryan_Moehring@fws.gov

LAKEWOOD, Colo. – The U.S. Fish and Wildlife Service (Service) has released a final Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) that will guide management of the National Elk Refuge in Jackson Hole, Wyoming for the next 15 years. The management decisions included in the CCP are a result of thorough environmental review and input from the local community and other stakeholders.

A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation, photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.

The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the refuge, including supplemental feeding. Instead, the CCP addresses all other aspects of refuge management including migratory birds, threatened and endangered species, habitat, visitor use, and cultural resources.

The final CCP/EA is available online here: https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. Hard copies are available at the refuge administrative offices located at 675 E. Broadway in Jackson. For questions about the CCP/EA, please call 307-733-9212.

Established in 1912, the National Elk Refuge spans approximately 25,000 acres and provides wildlife with a variety of habitat types, including grassy meadows, marshes, forest, sagebrush, and rock outcrops. Although the refuge is best known for the large herd of wintering elk in the world, nearly 175 species of birds and at least 47 mammal species have been observed on the refuge. In addition to the large herd of elk, a free-roaming bison herd also winters at the refuge. Each year, roughly 500,000 people visit the National Elk Refuge to enjoy the views and charismatic wildlife.

To learn more about the refuge,
visit: https://www.fws.gov/refuge/National_Elk_Refuge/about.html.

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. We are both a leader and trusted partner in fish and wildlife conservation, known for our scientific excellence, stewardship of lands and natural resources, dedicated professionals, and commitment to public service.

For more information on our work and the people who make it happen, visit http://www.fws.gov/mountain-prairie/. Connect with our Facebook page at http://www.facebook.com/USFWSMountainPrairie, follow our tweets at http://twitter.com/USFWSMtnPrairie, watch our YouTube Channel at http://www.youtube.com/usfws and download photos from our Flickr page at http://www.flickr.com/photos/usfwsmtnprairie/.

– FWS –

From:	Steve Kallin
To:	Toni Griffin
Cc:	Cris Dippel; Lori Iverson; Eric Cole
Subject:	FW: Latest Step Down draft
Date:	Tuesday, August 30, 2016 2:56:12 PM
Attachments:	Draft NER Step Down Plan Post Peer Review Copy_01_SEP_2016.docx

Hi Toni:

Attached is the Draft BEMP Step Down Plan that needs to be "reformatted." Please correspond directly with Eric Cole if there are any questions. I will be out of the office until September 6.

Thank you again for the help!

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Cole, Eric [mailto:eric_cole@fws.gov]
Sent: Tuesday, August 30, 2016 2:41 PM
To: Steve Kallin
Subject: Latest Step Down draft

Steve,

The latest version of the step down plan is attached. I have noted formatting issues that need to be addressed, places where FAQ callouts might be inserted, and possible locations for the map using the comment feature. Some of the text and literature cited have been slightly modified from the previous version, but given the minor nature of these changes I did not use track changes to document them.

Eric Cole
Refuge Biologist
U.S. Fish & Wildlife Service, National Elk Refuge
Jackson, WY
307.201.5432

U.S. Fish and Wildlife Service National Park Service

September 2016 Draft

BISON AND ELK MANAGEMENT STEP DOWN PLAN

A Structured Framework for Reducing Reliance on Supplemental Winter Feeding

National Elk Refuge
Grand Teton National Park

DRAFT

September, 2016

September 2016 Draft

BISON AND ELK MANAGEMENT STEP DOWN PLAN

For the

National Elk Refuge,
Grand Teton National Park,
John D. Rockefeller, Jr. Memorial Parkway

Teton County, Wyoming

DRAFT

***Suggested Citation**:* U.S. Fish and Wildlife Service: 2015. Bison and Elk Management Feeding Reduction Step Down Plan, National Elk Refuge and Grand Teton National Park. U.S. Department of the Interior, Washington D.C. Available online at:

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Appendix I. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section

DRAFT

of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007)**. .....**
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DRAFT

EXECUTIVE SUMMARY

Overview

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands, focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The final plan directed the NER and GRTE (in conjunction with the Wyoming Game and Fish Department: WGFD) to maintain the state's elk herd objective of 11,000; establish a bison population objective of 500; restore habitat on the NER and in GRTE; continue hunting bison and elk on the NER; continue the elk reduction program, when necessary, in GRTE; allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available; and develop a dynamic, structured framework and Step Down Management Plan for decreasing the need for supplemental feeding on the NER. ***This Bison and Elk Management Step Down Plan (MSP) was developed to specifically addresses the criteria for a structured framework referenced in the Record of Decision.***

Background

Winter feeding of elk in Jackson was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. The loss of available winter range in Jackson Hole due to new ranching operations and a growing town resulted in significant numbers of elk dying during several severe winters in the late 1800s and early 1900s. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, established the National Elk Refuge. Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding.

Bison were extirpated outside Yellowstone National Park (YNP) by the mid-1880s but in 1948 were reintroduced to Jackson Hole when 20 bison from YNP were released near Moran, Wyoming. The herd remained small until discovering elk feedlines in 1980, when the population began sustained population growth. Bison and elk that winter on the NER are migratory and occupy summer ranges predominantly to the north.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER (Boyce 1989), high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases (Murie 1951, Franson and Smith 1988, Samuel et al. 1991), which is currently demonstrated by the high level of brucellosis in the elk and bison herds (Cross et al. 2010, Kamath et al. 2016). It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands (Smith et al. 2004), thereby reducing other wildlife associated with woody vegetation.

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. The potential risk of catastrophic disease outbreaks and the need to mitigate this threat is a vital component in achieving the BEMP Sustainable Populations Goal.

Comment [CE1]: This might be worth its own callout box similar to FAQs to draw attention to this critical point

Objectives

This MSP addresses several objectives under a broader BEMP goal of sustainable populations, which directed the agencies to: 1) develop a

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dynamic, structured framework for reducing NER supplemental feeding; 2) implement a phased reduction of animals on feed: a) Phase 1, to 5,000 elk and 500 bison, and b) Phase 2, elk and bison rely predominantly on native habitat; 3) maintain natural elk bull-to-cow ratios in park summer herd; and 4) enhance public outreach/education. The BEMP further stated that consideration criteria for implementing the 2nd phase of reduced feeding would include some or all of: 1) the level of forage production and availability on the National Elk Refuge, 2) desired herd sizes and age/sex ratios, 3) effective mitigation of bison and elk co-mingling with livestock on private lands , 4) winter distribution patterns of elk and bison, 5) prevalence of brucellosis, chronic wasting disease, and other wildlife diseases, and 6) public support. **In short, the overall objective of this plan is to provide a path for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives and public support.**

Strategies

Elk have been fed for some period during nearly every winter on the National Elk Refuge since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during a time of year when natural forage is typically most limited is powerful to both species, and their knowledge of its existence has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Attempting to modify this behavior on a large scale is unprecedented and will necessarily require investigation, constant evaluation, adaptive modifications to the approach when indicated, and repeated trials.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into the 3 broad categories of 1) timing and intensity of winter feeding, 2) timing and intensity of hunting, and 3) herd segment specific and overall harvest levels.

Measuring the success of MSP strategies will require knowledge of several bison and elk herd attributes. Because we are interested in reducing the intensity of elk and bison feeding throughout the entire winter season, which includes both the number of animals on feed and the duration of feeding, we will use measurements of elk-fed-days (EFD; the total number of elk fed per day per season derived from daily feedground estimates) and bison-fed-days (BFD; the total number of bison fed per day derived from daily feedground estimates) to evaluate feeding intensity. For example, if 5,000 elk were fed for 100 days during a given winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD. Average baseline feeding intensity during the post-BEMP to pre-MSP period from 2008-2016 was 487,838 EFD (range = 223,614-746,800), and 45,224 BFD (range = 26,035-82,124). Reductions in EFD and BFD compared to these baselines will represent progress in meeting feeding reduction objectives under the MSP. Reductions in EFD and BFD could be achieved through reducing the length of the feed season, reducing the number of elk and bison on feed, or some combination of both factors.

Initial success of MSP implementation will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP did not provide specific measurement criteria for the definition of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage" we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. These levels of reduction are consistent with elk and bison predominantly relying on free standing forage rather than supplemental feed.

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Similarly there are population-specific objectives derived from the BEMP and Phase 1 of the MSP for 5,000 elk wintering on NER and 500 bison wintering in the Jackson Hole area. Progress towards these objectives will be measured using annual classification counts and the average number of elk and bison counted during daily feedground estimates.

Chronic Wasting Disease. As of 2016, CWD has been detected within 40 miles of the Jackson Elk Herd (JEH) in moose, within 35 miles in deer, and within 175 miles in elk. Continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence will take place. Some aspects of CWD response planning could change based on implementation of WGFD's CWD management plan (WGFD 2016).

Winter Feeding. Currently, the initiation of supplemental winter feeding occurs when available forage drops to 300 lbs./acre along transects in areas with highly preferred grasses. This protocol will change to delay the initiation of feeding.

The strategy of delaying the start of supplemental feeding is to encourage elk and bison to use native winter range, especially those individuals that have not previously received a food reward on the Refuge. Over time, it's anticipated a cohort of animals will develop that are not conditioned to the Refuge supplemental feeding program, which will reduce herd concentrations and the risk of disease transmission.

To reduce supplemental feeding overall, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk and bison fed days, the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years of MSP implementation, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require focused mitigation measures.

As bison and elk behavioral responses are better understood, feeding delays will be extended to encourage a redistribution of elk and bison to native winter range. However other factors outside of the scope of this plan such as wolf numbers and distribution could reduce the effectiveness of this strategy.

Variables that influence feeding initiation date will be considered (Table 4, Fig. 10). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. And finally, the distribution of animals, particularly on private, livestock producing lands, would be considered prior to delaying feeding initiation date.

Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years.

In the early years of MSP implementation, the seasonal termination of feeding is expected to

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occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date as the MSP is implemented.

Harvest. Few options for manipulating elk hunting are currently available because the JEH is at or near the 11,000 WGFD objective. Proposed changes include allowing limited any elk permits, allowing a bow season near developments on the NER, delaying the elk season so it will better coincide with migration timing, and alternating areas that are closed and open to hunting over time to encourage animal movements or facilitate harvest.

Based on summer bull ratios in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded hunting opportunities are considered.

The proportion of the Jackson Elk Herd that winters on NER has increased in the past 2 decades. This trend is correlated with a decline in elk use of native winter range and an increase in the proportion of NER elk that occupy winter ranges immediately adjacent to the Refuge. If efforts to encourage increased use of native winter range are unsuccessful, agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. This will provide a level of harvest flexibility more commensurate with addressing changes in herd distribution.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution or discouraging bison from attempting to leave the NER via the south boundary into the town of Jackson.

The effectiveness of NER late-season harvest regimes is influenced by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could help reduce winter elk numbers on the Refuge. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st .

Private Lands Mitigation. Several strategies would be employed to mitigate likely changes in bison and elk distribution, including providing incentives for non-breeding cattle operations, increased fencing in limited areas to separate elk and bison from livestock feed lines, hazing elk and bison away from livestock feed lines, and purchasing private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal wildlife conflict technician positions supervised by WGFD.

Vegetation Restoration. Various approaches to restore the Kelly Hayfields in GRTE (4,500 acres) were initiated in 2008. Work will likely be complete in 2035. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and providing visitor opportunities to enjoy wildlife viewing within a natural setting. The restoration process involves removal of non-native vegetation, collecting and propagating native seeds and plants, as well as the seeding of native plants.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres are currently under restoration treatment and 3,265 acres remain non-native pasture. Maintenance of restored ecological conditions

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will require management efforts in perpetuity to keep non-native species from colonizing restored areas. The park will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Strategies Considered But Rejected

Strategies considered but rejected include fertility control in elk and bison, agency reduction of either elk or bison, and altering rations of supplemental feed. These strategies were rejected because they were not included in the BEMP preferred alternative and/or because there was not support for them by cooperating agencies.

Models and Monitoring

Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

A robust monitoring program will be necessary to track the effects of actions implemented under this plan. Critical monitoring components will include: 1) enhanced forage production and availability sampling; 2) measuring animal abundance and distribution including differences in some sex and age classes; 3) determining elk and bison fed days each feeding season; 4) estimating winter mortality; 5) brucellosis seroprevalence rates; and 6) CWD surveillance. In many cases, attribute baselines for the period preceding implementation of this plan have been developed for comparison after the plan is implemented.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Actions completed each year, the results of monitoring programs, and any proposed changes in management direction will be presented in an annual MSP update/report, completed by NER staff by the end of June.

Public Outreach/Education

De-emphasizing the supplemental feeding program will be a major paradigm shift especially for the residents of Jackson Hole and Teton County, but will also be of interest to others in Wyoming and across the nation familiar with the long history of feeding elk on the National Elk Refuge. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk and bison herd management methods. A detailed communication plan has been developed that identifies key messages and utilizes a variety of outreach methods, including print, video, and voice material, utilizing social media, and meetings with elected officials, state and local governments, agency and tribal partners, community organizations, stakeholders, and the general public.

Schedule

GPS collars were deployed on 30 adult cow elk in February 2016. Assuming adequate funding, , additional GPS collars will be deployed in winter 2017. Public outreach, private lands conflict mitigation and contacts, and enhanced forage monitoring will occur in fall 2016 through January 2017. Reductions in feed season length will begin in winter 2017.

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INTRODUCTION

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands. It included directives for forthcoming development of adaptive management practices to address several objectives in the plan, including a desired future condition of elk and bison relying predominantly on native forage. This MSP has been developed expressly for that purpose.

Bison and Elk Populations

While Jackson Hole is probably best known for the splendor and ruggedness of the Teton Range, the Jackson bison and elk herds rank among the top characterizing features of the valley. Both figure prominently in Jackson Hole's history and culture, although bison were absent from the valley for about 100 years between the mid-1800s and mid-1900s.

The JEH occupies approximately 8,000 km^2 in the upper Snake River watershed north of the town of Jackson (Fig. 1). Much of the herd is migratory, moving between distinct wintering and summer ranges. Primary wintering areas include the Buffalo Valley, lower elevations of the Gros Ventre River drainage, the NER, and areas adjacent to the NER on Bridger-Teton National Forest (BTNF) lands. Summering areas occur throughout the herd's range and for convenience are divided into five geographic regions that include GRTE, Yellowstone National Park (YNP), the Gros Ventre drainage, Teton Wilderness, and Southwest Boundary area, which includes private and public lands in the vicinity of GRTE's southwest boundary.

In the late 1800s, when elk populations all over North America were being extirpated, the residents of Jackson Hole protected elk from "tusk hunters" and large-scale commercial hunting operations. Elk are just as important to today's residents of the valley. Thousands of people each year have the opportunity to see elk at close range on the refuge while riding on horse-drawn sleighs. Thousands of pounds of shed elk antlers are sold at an annual antler auction each spring in the town square. Elk are important to backcountry users as well as to people that never leave the road. Jackson Hole is a popular destination for instate and out-of-state elk hunters. The draw of elk to visitors contributes significantly to the local economy.

Winter feeding of elk in Jackson Hole began in 1910 and was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. According to historical reports, before Euro-American settlement some Jackson elk wintered in the southern portion of Jackson Hole (present location of the NER town of Jackson) and may have used areas outside Jackson Hole, including the Green River and Wind River basins to the south and east, respectively, and the Snake River basin to the southwest in what is now eastern Idaho (Allred 1950; Anderson 1958; Blair 1987; Barnes 1912; Sheldon 1927). Radio-collar studies have documented small numbers of Jackson elk wintering in each of these areas in recent times as well (NER and GRTE, unpublished data). Over time, changes in land use and development in these areas, over hunting, and establishment of feedgrounds probably reduced the use of these areas by Jackson elk.

By the end of the 19th century the JEH was believed to be largely confined to Jackson Hole and the immediately surrounding area, where wintering conditions are often harsh. Significant numbers of elk died during several severe winters in the late 1800s and early 1900s> Primary reasons for these mortality events included the loss of available winter range in Jackson Hole from new ranching operations and a and

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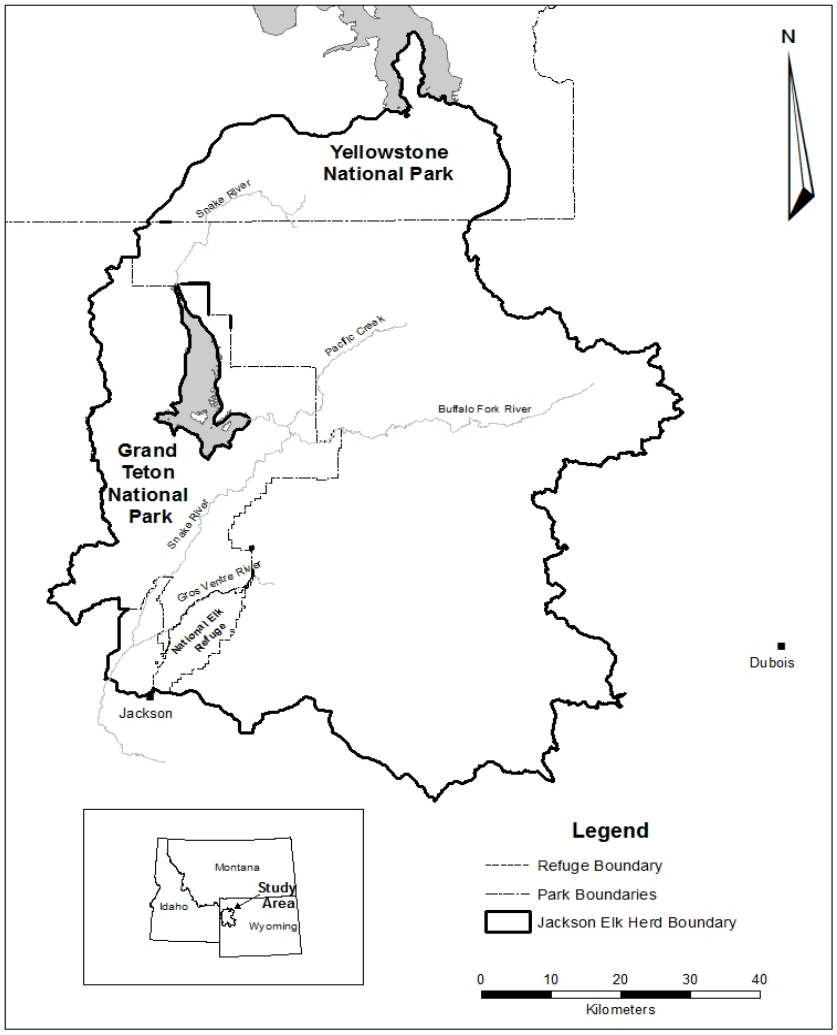


Figure 1. Jackson elk and bison herd ranges, including the National Elk Refuge, Grand Teton and Yellowstone National Parks, and Bridger-Teton National Forest. [include bison range, labels for continental divide and Bridger-Teton National Forest, and in Legend Jackson elk herd unit]. Also Gros Ventre drainage and state feedgrounds because they are referenced in text

expansion of Jackson. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, appropriated $45,000 for the purchase of lands and maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first winter census in the area was conducted in 1912 and showed about 20,000 elk residing in Jackson Hole and the

Hoback River drainage (the latter is not within the JEH's range).

Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding. In recent times the population has fluctuated near the herd objective of 11,000 that was adopted by the WGFD (Fig. 2).

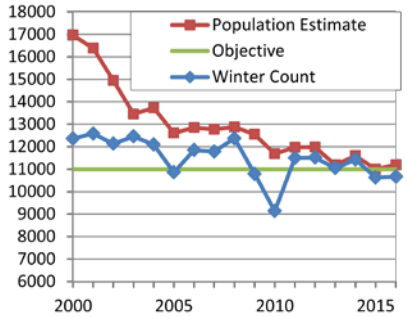


Figure 2. Winter Counts, population estimates, and herd objective for the Jackson elk herd, 2000-2016.

An iconic symbol of the American West, bison are also popular with visitors and residents. Because so few opportunities remain to see bison in the wild, viewing and photographing them in GRTE with the Teton Range in the background is a treasured opportunity for many of the valley's visitors. Similar to elk, there is also a high level of interest in bison hunting. Bison are of particular interest to nearby American Indian tribes and tribes in other parts of the United States because the animals are central to their culture and tradition.

Bison are native to Jackson Hole, as evidenced by the presence of prehistoric bison remains throughout the valley, but were extirpated outside Yellowstone National Park by the mid-1880s. In 1948, 20 bison from YNP were reintroduced to the 1,500-acre Jackson Hole Wildlife Park near Moran. The Jackson Hole Wildlife Park was a private, non-profit organization sponsored by the New York Zoological Society, the Jackson Hole Preserve, Inc., and the WGFD. A population of 15–30 bison was maintained in a large enclosure there until 1963, when brucellosis was discovered in the herd (likely transferred with the original 20 animals from YNP). At that time, all the adult animals were destroyed, but four vaccinated yearlings and five vaccinated calves were retained. In 1964 twelve certified brucellosis free bison from Theodore Roosevelt National Park were added to the herd. In 1968 the herd (down to 11 animals) escaped the confines of the wildlife park, and a year later the decision was made to allow them to range freely. The expansion of GRTE in 1950 had enveloped the Wildlife Park, and this allowed the bison to range freely and was consistent with National Park Service wildlife management policy. The herd remained small and wintered mostly in the Snake River bottoms in GRTE until 1975, when it followed the winter environmental gradient to the NER and began wintering there. The use of standing forage by bison on the NER was viewed as natural behavior thus acceptable to managers. In 1980, however, bison discovered and utilized supplemental feed provided to elk in winter, and they have continued to do so ever since.

The discovery of supplemental feed by bison has had several consequences, including a significant increase in the population's growth rate (Fig 3). Bison on the elk feedlines have at times disrupted feeding operations and displaced and injured elk. To minimize conflicts between bison and elk, managers have provided separate feedlines for bison since 1984. As the population has grown, separating elk and bison on feedlines has become increasingly difficult, and a variety of feeding strategies are employed to help reduce displacement of elk.

As the herd has grown it has maintained fairly stable movement patterns, wintering almost entirely on the NER and summering within GRTE and adjacent lands on the BTNF (Fig. 1).

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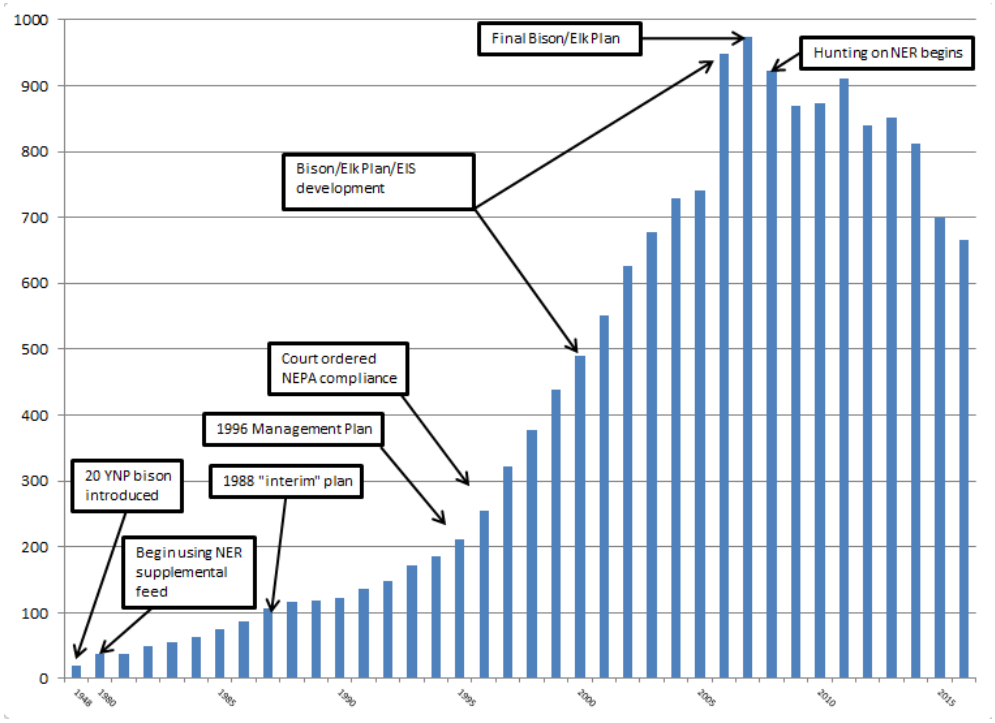


Figure 3. Population growth and planning history for the Jackson bison herd, 1948-2016.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands and thereby reducing availability of these habitats to other wildlife as well as unusually low winter mortality, which has affected predators and other species and has required intensive hunting programs.

Planning History

Jackson's bison and elk populations have been the subject of previous planning efforts. Elk management and research has been guided by the Jackson Hole Cooperative Elk Studies Group since it was established in 1958. The group consists of biologists and agency administrators from the NER, GRTE, YNP, BTNF, and WGFD, who meet at least annually to coordinate management of the population and its habitat. Coordination of bison management began soon after they started frequenting the NER in 1976 and using supplemental feed provided to elk in 1980 (Fig. 3). Release of an "Interim" plan that called for maintaining a herd of 90-110 bison while data were gathered for a long term plan occurred in 1988. It was followed by implementation of a sport hunt outside GRTE, administered by WGFD. This plan was halted after litigation in which the plan's violation of NEPA was successfully argued by plaintiffs.

In 1996, after considerable herd growth, a new long term management plan and environmental

assessment for the Jackson bison herd was released (Fig 3). This plan had strong support and called for maintaining a herd size of 350-400 bison, but it was shelved a year later when plaintiffs from the earlier litigation successfully argued that, because the plan failed to consider the effects of feeding elk on bison management, it also violated NEPA and was not sufficient. This led to development of the draft bison and elk management plan and environmental impact statement from 2000-2006 and release of the final plan in 2007 (Fig 3).

The 2007 Bison and Elk Management Plan (BEMP; USFWS 2007) considered six alternatives for bison and elk management focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The primary management scenarios presented in the alternatives included the status quo, terminating elk and bison hunting on the NER and the elk reduction program in GRTE, brucellosis vaccination options, restoring habitat, improving forage, and decreasing or phasing out supplemental winter feeding.

The final BEMP (USFWS 2007; www.fws.gov/bisonandelkplan) which set management direction for 15 years or until a subsequent plan is developed, proposed to maintain the state's elk herd objective of 11,000, establish a bison population objective of 500, restore habitat in the NER and GRTE, continue hunting bison and elk on the NER, continue the elk reduction program in GRTE in concert with the parks enabling legislation, allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available, and develop a dynamic framework of management actions which adaptively decrease the need for supplemental feeding on the NER. ***This Bison and Elk Management MSP was developed to address the latter and specifically addresses the criteria for a structured framework listed on page 5 of the Record of Decision*** **(Fig. 4).** It does not address other on-going bison and elk management actions already prescribed by the BEMP.

The BEMP scheduled the completion of the MSP for 2008. However, litigation challenging the BEMP in 2008 led to the decision to postpone its development until litigation was resolved. As of March 2015, two court rulings have upheld the 2007 BEMP and ROD. In a lawsuit against the BEMP and its author agencies (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2010), plaintiffs argued that the BEMP violated the National Wildlife Refuge System Improvement Act (National Wildlife Refuge System Improvement Act 1997) by disrupting the biological integrity of the Refuge, and that the plan and the accompanying EIS violated NEPA because they were insufficiently detailed to allow a reasonably complete discussion of mitigation. The crux of the plaintiff's argument was that the plan did not set a specific date for the cessation of supplemental feeding. In response, the agencies argued that the plan constituted a valid exercise of discretion and that it and the EIS were sufficiently detailed to satisfy the requirements of NEPA. In March 2010, the United States District Court for the District of Columbia sided in favor of the agencies in this case. In 2011, the plaintiffs appealed this ruling to the United States Court of Appeals for the District of Columbia Circuit. This Court affirmed the District Court ruling (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2011).

National Environmental Protection Act Compliance

The 2007 BEMP/EIS and ROD satisfied NEPA requirements for current bison and elk management through a detailed analysis of alternative management actions and their likely effect on the environment, and substantial involvement of the public in the process. This MSP does not duplicate or add to this process. It is designed to tier off of the BEMP as a dynamic implementation guide to one part of the preferred alternative outlined in the BEMP ROD. As such, references to NEPA covered in the BEMP

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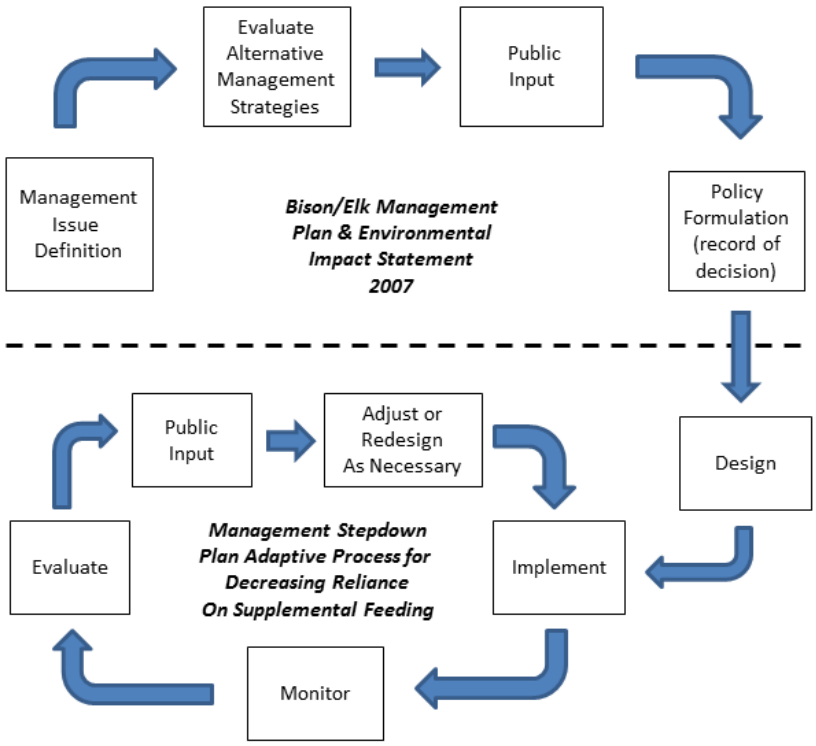


Figure 4. Management step down planning for supplemental feeding on the National Elk Refuge and its relationship to the 2007 Bison/Elk Management Plan and Environmental Assessment.

will be included where necessary in this document, and the discussion of any action that would require additional NEPA compliance will be explicitly stated as such in that context.

Management Step Down Planning

The use of adaptive management plans has gained popularity in natural resource management planning because, by definition, they allow modifications of strategy based on monitoring results and outcomes toward reaching specific goals or objectives. Four elements generally included in an adaptive management approach include: 1) well defined and mutually agreed upon objectives; 2) knowledge (including descriptive models) of the dynamics of the system being managed; 3) clearly articulated management actions and strategies; and 4) a monitoring program to evaluate responses of the system to management actions (Walters 1986).

This MSP utilizes adaptive management planning principles but is not intended to include all of the adaptive management planning elements outlined in the Department of Interior Adaptive Management Technical Guide (2007). This MSP is more accurately described as a "structured framework" of adaptive management actions that progressively transitions from supplemental winter feeding to greater reliance on free-standing forage (BEMP ROD p.5).

Table 1. 2007 Bison/Elk Management Plan Goals and Objectives (Step Down Plan objectives shaded)

Goal: Habitat Conservation

Objectives:

- Conserve important private lands.
- Increase forage production.
- Minimize non-native plants.
- Protect sagebrush grasslands.
- Restore willow, aspen, and cottonwood.
- Perpetuate natural mosaic of plant communities.

Goal: Sustainable Populations

Objectives (BEMP pages 135-136):

- Develop structured framework for reducing NER supplemental feeding.
- Phase reduction of animals on feed: 1) to 5,000 elk and 500 bison, and 2) elk and bison rely predominantly on native habitat.
- Maintain 35:100bull-to-cow ratios in park summer elk herd.
- Ensure a genetically viable bison herd with close to an even sex ratio.
- Enhance public outreach/education.

Goal: Elk and Bison Numbers

Objectives:

- Maintain state elk herd objective of 11,000.
- Maintain a genetically viable bison population of about 500 animals.

Goal: Disease Management

Objectives:

- Manage brucellosis transmission risk from elk and bison to livestock.
- Manage feeding to reduce brucellosis transmission among bison and elk.
- Educate hunters about wildlife disease human health hazards.

OBJECTIVES

The management direction and desired conditions stated in the BEMP called for the NER and GRTE staffs to work with others (agencies, partners, etc.) to "adaptively manage elk and bison in a manner that contributes to the State's herd objectives yet allows for the biotic integrity and environmental health of the resources to be sustained," so that the public can enjoy a variety of compatible wildlife-dependent recreational opportunities. Under the BEMP's 4 primary goals, 20 associated objectives were identified (Table 1). This MSP addresses four objectives under the goal of sustainable populations (Fig. 5).

The reduction of animals on feed at the NER was proposed to be spread over two phases. In Phase 1, the aim is to reduce the average number of elk on feed to 5,000 (while maintaining WGFD's 11,000 elk herd objective), and reduce the winter

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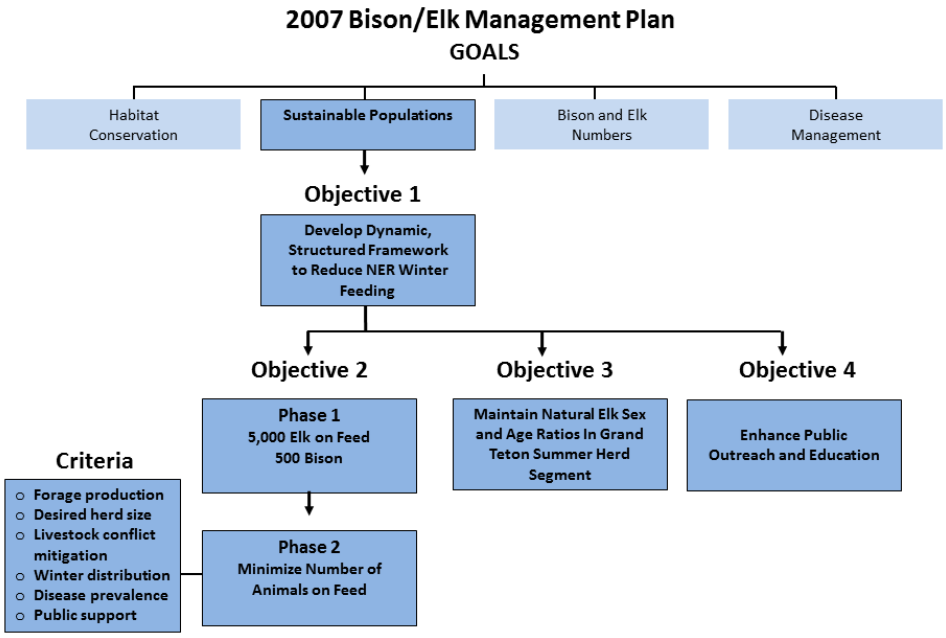


Figure 5. Relationship of MSP to the 2007 Bison/Elk Management plan goals, phasing of objectives, and consideration criteria for reducing the reliance of elk and bison on supplemental feed during Phase 2.

population of bison to the BEMP recommended, and WGFD adopted, objective of 500. In Phase 2, the overall objective is to reduce the reliance of bison and elk on supplemental feed (USFWS and USNPS 2007a). Desired conditions include animals relying predominantly on native habitat and cultivated forage on NER. Important consideration criteria for implementing Phase 2 will include: 1) the level of forage production and availability on the NER and adjacent winter ranges; 2) maintenance of desired herd sizes and age/sex ratios; 3) the ability to effectively mitigate bison and elk livestock conflicts; such as co-mingling on private lands during high risk disease transmission periods; 4) maintaining desirable winter distribution patterns of elk and bison; 5) the prevalence of brucellosis, chronic wasting disease, and other wildlife diseases; and 6) public support. In short, the overall objective of this plan is to outline a framework for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives.

This Plan focuses on management actions to initially achieve Phase 1 objectives. However, if successful, these actions will continue to be used to achieve the Phase 2 objective of reducing reliance on supplemental feeding while considering the six criteria listed above.

MANAGEMENT ACTIONS AND STRATEGIES

Background

The principal goal of reducing reliance on

supplemental feeding is to limit transmission of density dependent diseases in elk and bison while simultaneously minimizing winter mortality in elk. We will attempt to achieve this goal by experimentally reducing feed season length and closely monitoring elk and bison distribution and winter mortality.

Elk have been fed on the NER each year in all but 9 winters since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during winter months is powerful to both species, and their knowledge of NER feed grounds has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Because use of feed grounds is a learned behavior, decreasing feed season length will potentially reduce the likelihood of elk that winter on native range finding NER feed grounds. Over time this could result in a greater percentage of elk using native winter range relative to NER feed grounds. Because it is largely unprecedented, the concept of modifying this behavior on such a large scale is daunting and poses questions for which there are no immediate answers. In some cases, the likelihood a specific management strategy's success will only be able to be roughly estimated, and unanticipated results are likely. Closely monitoring forage availability, elk and bison distribution, and elk mortality will allow us to evaluate the effectiveness of management actions and adjust management actions as needed should unintended negative consequences arise.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into 3 broad categories: 1) timing and duration of winter feeding; 2) timing and intensity of hunting; and 3) herd segment specific and overall harvest levels.

Important Changes Since 2007

The BEMP was developed based on data collected and knowledge that existed up until its ROD. Since then, important changes have taken place, some of which are advantageous to this effort and some of which are not.

A primary change that will facilitate meeting objectives under this plan is the reduction of the bison population from nearly 1,200 animals in 2007 to about 675 during winter 2015-2016 (Fig. 3) through hunting programs administered by WGFD. Licensing changes enacted in 2014 included a reduction in the bison cow/calf license fee (from $416 to $263 for residents and $2522 to $1022 for non-residents) and eliminating the once-in-a-lifetime restriction on a successful bison hunter to only those that successfully harvested a bull. Continued progress toward the 500 animal herd objective will require sustained harvest success.

During the same period, the Jackson Elk Herd has declined from nearly 13,000 to its objective of 11,000, but because the proportion of the JEH that winters on NER has increased dramatically (Fig. 6), this will make achieving the Phase I objective of 5,000 elk on feed and any future elk population reductions more difficult. Preliminary analysis suggests that the increasing proportion of the JEH wintering on NER has been associated with 1) Declines in elk use of native winter range and movements of elk from State feed-grounds in the Gros Ventre drainage to NER.and 2) increasing numbers of elk that summer immediately adjacent to NER (Cole and Foley et al. 2015).

Refuge-wide herbaceous forage production averaged 14,387 (SD = 4,125) tons during 1998–2013. In recent years irrigation of approximately 3,600 acres has increased refuge-wide forage production by approximately 10% compared to what would have been produced with

Comment [CE4]: Alternative location for FAQ callout on why elk harvest cannot be increased to meet 5,000 elk objective

Comment [CE5]: Spelled feed-grounds or feed grounds or feed-grounds? Whatever we decide it should be consistent throughout the document.

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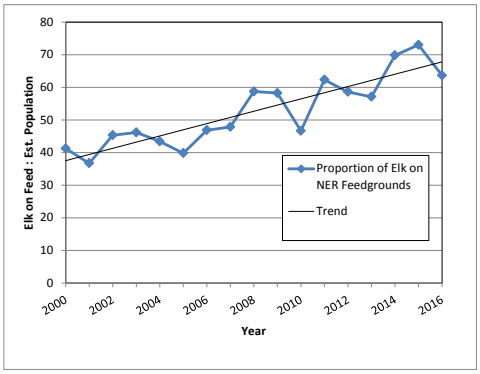


Figure 6. Increasing trend of National Elk Refuge elk on feed as a proportion of the Jackson Elk Herd estimated population size.

precipitation alone, and by 15% in the southern portion of NER which receives the greatest use by elk and bison.

Since 2007, the general awareness of climate change among the public has greatly increased. A strong, credible body of scientific evidence shows that climate change is occurring, is caused largely by human activities, and poses significant risks for a broad range of human and natural systems (National Academy of Science 2010). Ecological systems in the GYE are likely to be affected and associated changes may have implications for elk and bison management. Moderate term to long term effects of climate change in Jackson Hole will likely include increases in average temperature, a reduction in the duration and distribution of snow cover, an increase in the number of frost free days, increased wildfire frequency, and changes in plant community composition and structure including loss of forest and shrub cover and an increase in invasive plants (Riginos and Newcomb 2015). The net effect of these changes relative to the implementation of the MSP remains uncertain.

Current Management

Ongoing primary management actions on the NER include winter feeding, harvest, irrigation, and hazing. In GRTE, harvest of elk during the Elk Reduction Program takes place, when necessary, in collaboration with WGFD, and restoration of previously cultivated and irrigated sagebrush-grasslands is ongoing. Fundamental components of each of these will be briefly described below to provide a basis for comparison to MSP strategies that will follow.

Chronic Wasting Disease

Supplemental feeding has occurred in all but 9 winters on NER since 1912, and although this strategy minimizes winter elk mortality from starvation, contributes to Wyoming state elk herd objectives, eliminates commingling with livestock, and keep elk off adjacent roadways, elk occur at numbers and densities well in excess of carrying capacity (Smith et al. 2004, Lubow and Smith 2004). Considerable evidence suggests that Chronic Wasting Disease (CWD) transmission and prevalence are density dependent (Peters et al. 2000, Williams et al. 2002). Monello et al. (2014) found that elk densities of 15-110/km^2 (0.06 to 0.45/ac) in Rocky Mountain National Park were associated with 13% CWD prevalence, and they predicted elk population declines when CWD prevalence exceeded 13%. NER elk densities range from 77-16,850/km^2 (0.31-68/ac; NER unpublished data), which suggests that the introduction of CWD to NER elk would have significant negative population effects over time.

Winter Feeding

Initiation of feeding has the primary objectives of 1) minimizing elk winter mortality, focusing on calves since they are the most susceptible age class, and 2) minimizing comingling of elk with cattle on nearby adjacent private lands. Winter feeding begins when available forage reaches approximately 300 lbs/ac. Historic radio telemetry data and observations of elk movements indicate that when available forage declines below 300 lbs/ac., some elk leave NER for surrounding private lands. Therefore, the purpose of this feeding "trigger" is to keep elk on the NER and prevent them from searching for forage off the NER, which would increase the potential of comingling with cattle causing damage to private lands, and moving across

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Highway 89 where the risk of vehicles hitting elk is high. This trigger is not a warning that a significant nutritional deficit threshold has been reached. Available winter forage for elk and bison on the NER is largely determined by biomass of forage produced during the previous growing season, rate of forage consumption during fall and winter, and how snow conditions affect forage availability.

Index sites are used to sample forage biomass and determine when feeding should be initiated. These sites are selected annually to represent plant communities that are highly preferred by elk due to plant species composition and the persistence of green vegetation. Weekly sampling begins in late December to estimate available forage biomass at each index site. When average available forage across index sites is below 300 lbs/ac, biologists typically recommend that supplemental feeding be initiated.

During 1995–2013, the average initiation of winter feeding in NER occurred 28 January (range = 30 December–28 February), and feeding was terminated on 3 April (range = 20 March–20 April). Variation in feeding initiation and termination dates has been based on winter conditions and a desire to avoid elk-cattle comingling on nearby private lands. Coordination of winter feeding dates on the NER and WGFD-operated Gros Ventre drainage feedgrounds (Alkali, Patrol Cabin, and Fish Creek) occurs annually to help minimize movement of elk between these areas. This coordination will continue regardless of the management strategy employed. The relationship of recent elk numbers and objectives for NER and WGFD-operated feedgrounds and native range is shown in Table 2.

Bison discovered refuge feeding operations in 1980, and since that time they have been fed each year to help minimize disruption to elk feeding operations. Because bison displace elk from feedlines, NER staff attempt to feed most bison in the northernmost refuge feedground and provide a heavy feed ration, which helps keep them in this area. This strategy prevents bison from mingling with elk and also prevents bison from moving to areas where conflicts with humans are more likely.

Harvest

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Table 2. Annual distribution of wintering elk from the Jackson Elk Herd during February classification counts, 2011–2016, relative to the current objective.

	OBJECTIVE	2011	2012	2013	2014	2015	2016	mean
NER	5,000	7,746	7,360	6,285	8,296	8,390	7,290	7,561
Gros Ventre	3,500	2,775	3,265	2,982	2,326	1,162	1,667	2,362
Native Range[1]	2,500	982	894	1,784	801	913	1,711	1,180
Total	11,000	11,503	11,519	11,051	11,423	10,465	10,668	11,105

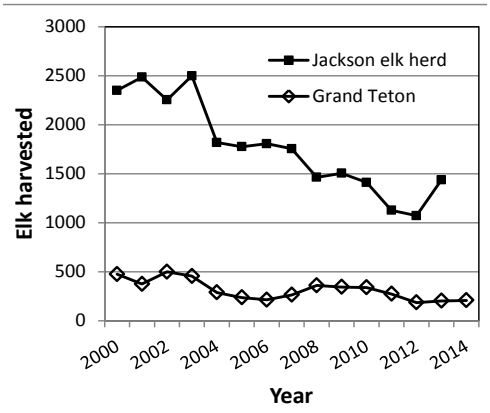


Figure 7. Estimated elk harvests for the Jackson Elk Herd and the amount of that harvest that occurs in Grand Teton National Park, 2000–2014.

Total hunter harvest of the JEH was gradually reduced over the last decade as the population neared objective (Fig. 7). Elk hunting on the NER (Hunt Area 77) typically begins in mid-October and ends in mid-December, with peak harvest in recent years occurring in late November to early December. From 2005 to 2015, 422 ± 102 (mean ± SD, range = 329-612) hunters harvested 196 ± 95 (range = 126-457) elk per year during the NER hunt.

The 1950 legislation that created GRTE provided for a controlled reduction of elk, when necessary, in specific portions of the park, primarily east of the Snake River. Elk reduction programs have taken place in the park each year since 1950 except two (1959 and 1960), when GRTE and WGFD officials agreed a reduction was not necessary (Figure 8). Season dates have varied over the years but recently have run from mid-October to early-December. The GRTE harvest accounts for about 25% of the JEH overall harvest, thus has been an important factor in regulating the population. Increased predation, likely a result of increases in grizzly bears and wolves over the last 20 years, has decreased the need for large harvests in GRTE.

Bison hunting begins 15 August and ends in early to mid-January. Most harvest occurs on the NER, with some additional harvest on private and BTNF lands. Since resuming the bison hunt in 2007, harvest has been 210 ± 45.5 (range 139-301) bison per year. This level of harvest has been sufficient to arrest the exponential growth of the population, reducing bison numbers from the peak in 2007 to about 700 animals in winter 2015 (Fig 3). Tribal bison harvest of up to 5 animals for ceremonial purposes was authorized in the BEMP. Translocation of wild bison to lands outside of Teton County is not currently permitted due to brucellosis concerns.

Bison hunting is not allowed in GRTE because of long standing NPS policy that prohibits most hunting in national parks. Bison quickly learned to take advantage of the safety of GRTE, which has made hunter harvest goals difficult to achieve. Many bison stay in GRTE during the hunting season, with only occasional short term movements to the NER, until severe winter conditions occur. In response, NER and WGFD managers have attempted to extend the hunt to late January while minimizing the conflict with the initiation of winter feeding. The unpredictable nature of winter conditions that time of year makes this challenging, and has (or could) result in the use of emergency season extensions or reductions.

Hazing

NER staff haze elk and bison to conserve winter forage, prevent year-round use of winter range, and in some cases to prevent elk and bison from moving to private lands or other areas where conflicts with humans are likely. Hazing using ATVs has proven most effective. The strategy is typically employed during 3 time periods: 1) in May to move elk and bison off NER that are lingering on NER winter range; 2) in July when some bison typically return to NER; and 3) in the period just prior to feeding initiation when elk and bison are most likely to leave NER for private lands. Hazing of elk and bison by WGFD staff also occurs on private lands adjacent to NER periodically throughout the year.

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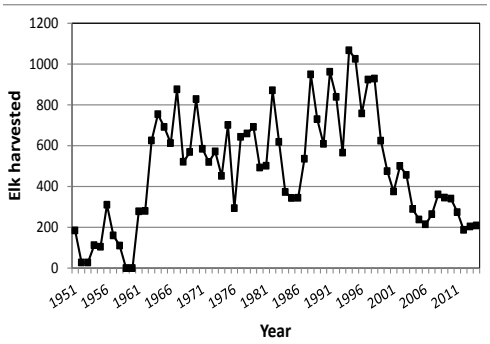


Figure 8. Elk harvest in Grand Teton National Park, 1950-2015.

Vegetation Restoration and Protection

The BEMP identified approximately 4,500 acres of previously irrigated and cultivated grasslands in GRTE in need of restoration to native sagebrush grasslands community. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. After 2 years of research and field studies, restoration efforts began in 2008. The restoration process involves several steps including: removal of non-native vegetation through repeated herbicide applications, collection and propagation of native grass, forb and shrub seeds and finally native seeding. Repeated herbicide treatments have been warranted prior to native seed planting as well as spot treatments of invasive weed species subsequent to native seeding. Substantial progress in this endeavor has been made since 2008, including 1,235 acres of previously cultivated lands under restoration treatment. Of the 1,235 acres undergoing treatment, 745 acres has been seeded with native grass, shrub, and select forb mixes, and 89 acres is considered fully restored. Two-hundred and seventy-five of these acres are currently fenced to reduce grazing pressure of early native vegetation establishment from bison and other ungulates. An additional 490 acres are targeted for native seeding in 2016 once removal of the invasive vegetation is successful. All treatments are monitored for native plant establishment and invasive plant infestations and treatments will be adjusted as necessary. Invasive plant treatments may have to continue indefinitely. GRTE will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Private Lands Mitigation

Fencing of hay stacks and livestock feedlines has been historically used to mitigate particularly difficult conflicts on private lands. Targeted fencing of golf course greens and sand traps fall through spring has also been successful in some situations for mitigating elk and bison presence and associated damage in these areas. It is important to note that the county has a "wildlife-friendly" fence policy and does not support extensive fencing that is impermeable to wildlife in residential areas.

Methods, Assumptions, and Constraints Common to All Strategies

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes, particularly population sizes. Measurements of the Jackson bison herd will be based on the annual mid-winter census and sex and age classification survey performed by NER, GRTE, and WGFD biologists. This survey occurs one day in February and includes ground counts of animals on feed at the NER and aerial counts of outlying bison across their winter ranges on the refuge, park, and Bridger-Teton National Forest.

Elk population estimates will also be based on mid-winter aerial and ground counts. However, the mid-winter counts are undertaken during a single survey period and do not necessarily represent either peak or cumulative abundance of elk on feed. Rather than basing progress toward the number of elk on feed for the entire season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in

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Table 3. Summary of potential Step Down Plan constraints.

Policy

- ESA[1] Lynx – limits on habitat impacts
- Greater Sage Grouse – core area protection
- 2007 BEMP/EIS (federal actions/lands)
  - No fertility control
  - No test and slaughter
  - Limited tribal ceremonial take
- Bison/elk hunt end date (Feb. 1st)
  - WGFD, brucellosis safety
- Carcass disposal (Feb. 15th)
  - WGFD, brucellosis safety
- Forest Service winter closure (Dec. 1st – April 30th)
- Easement limitation (NER boundary)

Winter Feeding

- Only during non-hunting periods

Harvest

- State regulations

Vegetation Restoration/Protection

- Bison/elk distribution
- Exotic plant species management

Private Lands

- Owner agreements

Social

- Hunter density (safety; hunt quality)
- Elk/bison winter mortality levels
- Public safety (ungulate/vehicle collisions)
- Disease
- Land-use conflicts (agricultural and residential)

Biological

- Disease (bison/elk/cattle commingling)
- Sage grouse habitat conflicts
- Fencing/wildlife conflicts
- Elk herd distribution
  - summer segment distribution goals

Funding

- Easement purchase
- Plan implementation

[1]Endangered Species Act

the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 elk were fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000.

We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both species on supplemental winter feeding.

Initial success of the MSP will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP does not provide specific measurement criteria to determine when the NER has successfully attained the objective of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage", we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. This level was chosen to define success because it indicates that elk and bison will predominately be foraging on free standing natural and cultivated plants on NER and adjacent winter ranges rather than on supplemental feed.

Several management constraints are common to the strategies discussed below (Table 3). Many law and policy constraints are applicable but we include here only those most pertinent. Endangered Species Act (16 USC 1531 et seq.) requirements for wolves, grizzly bears, lynx, and others apply. Lynx requirements for maintaining certain habitat types could limit methods used and areas considered for habitat improvements

in GRTE and the BTNF. Such improvements could increase elk and bison use of native winter range off the Refuge while simultaneously reducing use of feedlines. Similarly, compliance with the 2015 sage grouse amendment to the 1990 Bridger-Teton National Forest Land and Resource Management Plan and the Wyoming greater sage-grouse core area protection executive order (2011-5 and supplement 2013-3) could affect habitat manipulations. NEPA compliance conducted as part of the BEMP/EIS constrains what federal actions can be taken as a part of this plan. State regulations constrain late (winter) hunt and carcass disposal timing to protect against brucellosis contamination, since February-April represent the period bison and elk are most likely to transmit the disease. Restrictions on hunting timing also result from BTNF winter range closures, immediately east of the NER and elsewhere, December 1 to April 30. Additional details about these and other constraints will be included in discussions about specific strategies that follow.

Strategies

This section describes the management action this MSP proposes to implement. As such, it unveils the heart of management changes proposed to begin the process of transitioning to greater reliance of bison and elk on native forage during winter. Fundamentally, the strategies discussed in this plan represent an experiment designed to achieve Phase I objectives of 5,000 elk and 500 bison on NER and are a first step towards reducing reliance on supplemental feeding while meeting the sustainable population goals identified in the BEMP.

Initial strategies for achieving sustainable population goals identified in the BEMP (Table 1) are presented by the objectives below. The primary management actions available to the agencies to achieve Phase I objectives are modifications to winter feeding and hunting seasons. To a lesser extent, vegetation protection and restoration can be important, particularly for improving long-term ecological function and enhancing natural production of native forage. Private lands are also an integral component as changes in elk and bison distribution occur and new challenges develop. The likely consequences of implementing these strategies were evaluated in the BEMP. The most relevant of these are summarized in Appendix 1.

Objective: 1) *Implement a phased reduction of animals on NER feed to 5,000 elk and 500 bison, and, 2) influence elk and bison to rely predominantly on native habitat* (Table 1).

The first phase will be to reduce the number of elk on NER feed to approximately 5,000 and achieve a target population of about 500 bison. The second phase will be to adaptively manage bison and elk populations to achieve desired conditions, with animals relying predominately on available native habitat (NER, GRTE, and USFS lands) and cultivated forage (NER).

As previously mentioned, the concept of reducing winter feeding after more than 100 years of the practice, and the associated behavioral conditioning of elk and bison to its presence, represents a formidable challenge that must be approached cautiously and systematically. Efforts to scale back elk supplemental feeding operations in other parts of North America have been rare and fraught with controversy (Smith 2001). The strategies discussed below have been developed in this context, with appropriate feedback mechanisms through rigorous monitoring and frequent evaluation. Inability to meet this objective under the strategies presented here would trigger a thorough evaluation and consideration of more aggressive strategies when the BEMP is updated in 2022.

Comment [CE6]: Consider FAQ concerning why harvest cannot be increased to meet objectives and distribution changes are the only viable strategy

Chronic Wasting Disease

Since 1997, NER has cooperated with WGFD to conduct intensive surveillance for CWD in the JEH unit. GRTE has also collaborated with WGFD to collect samples from the ERP and from road-killed cervids. Although this effort indicates that CWD is not currently found in the JEH, continued surveillance at sample sizes sufficient to detect

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1% prevalence with 95% confidence annually will be critical to ensure a timely management response and limit the long-term population effects of the [USFWS and USNPS, 2007b]. Given that CWD has been detected within 40 miles of the JEH in moose, within 35 miles in deer, and within 175 miles in elk, this level of surveillance is warranted.

In 2016, the WGFD cooperated with federal agencies and other stakeholders to revise the 2006 Wyoming CWD Management Plan. The NER and USFWS Region 6 Wildlife Health Office staff participated in several meetings associated with this effort. The Wyoming CWD Plan lists several management responses for consideration if CWD be is detected on or adjacent to State or NER elk feedgrounds. Early detection of CWD in the JEH is essential to allow implementation of management responses.

The BEMP (2007) identifies the management response to the arrival of CWD as following the State of Wyoming CWD Plan in effect in 2007. The Wyoming CWD Plan was updated and significantly changed in 2016. In light of changes in the Wyoming State CWD Plan, and the results of CWD Studies completed since 2007, the NER management response to CWD will be reviewed and updated in a NER Disease Contingency Plan, as identified in the NER Comprehensive Conservation Plan (2016). The CWD section of the NER Disease Contingency Plan will remain consistent with the goals of the BEMP. The NER Disease Contingency Plan is scheduled to be completed in 2017.

Winter Feeding

Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the long run, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning animals to "expect" feed to be available later in the winter; this could build cohorts of animals that rely primarily on native winter range. To reduce supplemental feeding, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, which is the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding (Figure ?) and identify private land conflict areas that may require assistance with focused mitigation measures.

As bison and elk behavioral responses are better understood, and targeted mitigation on private lands is achieved as needed, feeding delays will be extended depending on several variables (Table 4, Fig. 9). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence on feeding initiation date, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Forage availability would also be affected by the numbers of elk and bison on the NER. And finally, the distribution of animals, particularly on private, livestock producing lands would be considered in determining feeding initiation date. A primary concern of manipulating feeding is elk winter mortality, particularly among calves. For example, research on unfed elk populations in Yellowstone National Park suggested average winter elk calf mortality of 28%, with the majority of cases caused by malnutrition (Singer et al. 1997). Similarly Smith and Anderson (1998) found unfed winter elk calf mortality of 29% compared to 11% for elk calves using feedgrounds. As food becomes limited in winter, calves are usually the first to experience nutritional deficit and winter

Comment [CE7]: The map that shows where elk and bison should not be could be placed in this section. This would be figure number? And subsequent figure numbers will need to be adjusted accordingly. Also the text does not currently reference the map?

Comment [CE8]: Consider FAQ on principal strategy of delaying feeding initiation here

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mortality because they are displaced by more dominant animals, they have limited fat reserves, and are more susceptible to cold temperatures than larger animals. Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years (Appendix 1).

In the early years of MSP implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date during the period of MSP implementation.

The MSP winter feeding strategy would include the establishment of additional key forage index sites and on-going measurements at those sites throughout the winter.

Harvest

Currently the JEH is at the Wyoming Game and Fish Commission established objective of 11,000 animals, which means there is less flexibility in manipulation of harvest regimes than there would be if the herd was above objective. Initially there would be little change in elk harvest programs on the NER, with the exception of allowing a limited number of any elk permits throughout the season, considering allowing bow hunting near developed areas (roads and buildings) and shifting the season about a week later (Table 4). Allowing a limited number of any elk permits would be consistent with providing sport hunting recreation on National Wildlife Refuges (NWRS Improvement Act; 1997) and the NER CCP [USFWS, 2015] and possibly encourage more hunters to participate in antlerless elk hunts. Monitoring programs and consideration of bull ratios in the GRTE summer segment (since most park bulls migrate to the NER) would help inform levels of proposed take. Bow hunting in areas currently closed to firearms will likely increase harvest by eliminating “no-hunt” areas which can become sanctuaries for large numbers of elk. Shifting the hunt one week later is consistent with later migrations and will improve harvest effectiveness (Fig. 9).

General elk harvest patterns in GRTE would continue to be based on need for harvest, summer segment population estimates, herd status relative to population objective, herd demographic parameters, herd-wide distribution of harvest, and mitigation for impacts on other resources and visitor activities.

Elk herd population objectives are reviewed every five years by the Wyoming Game and Fish Commission and adjusted as necessary. Agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. Lowering the population would help compensate for reduced use of traditional native winter range and increased growth of short-distance migrants which has led to significant increases of winter elk concentrations on the NER.

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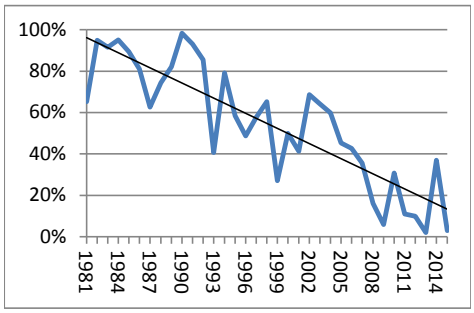


Figure 9. The percentage of elk that wintered on NER counted there on December 1, showing progressively later annual fall/winter arrival of elk to the NER during the past several decades.

The annual fall/winter arrival of elk to the NER during the past several decades has been occurring progressively later. This trend may necessitate extending the elk hunting season later into the year to achieve harvest objectives.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later end dates that are commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution. Special limited hunts designed to discourage bison from attempting to leave the NER via the south boundary into the town of Jackson will also be considered. If progress toward reaching the herd objective of 500 animals continues and the objective is reached, WGFD will adjust harvest quotas in the context of the objective, as necessary, to address population changes through time.

A cattle guard was installed on the Refuge Road near the east end of Broadway Avenue to help prevent bison and elk herds from entering the Town of Jackson. This will reduce the potential for dangerous human/wildlife interactions.

Currently, the effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives, but also that elk are sensitive to hunting pressure which can cause elk movements to areas that cause management issues for WGFD. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st in the future.

Annual herd-wide population estimates, elk summer herd segment estimates in GRTE and NER, temporal and spatial harvest patterns, and animal-fed-days would be monitored, and the resulting information would be used to inform ongoing evaluation of elk and bison management harvest programs (Figs. 9 and 10).

Hazing

No change in hazing practices is anticipated initially under this MSP framework.

Private Lands Mitigation

Delaying the onset of NER feeding is likely to result in changes in bison and elk distribution (Appendix 1). Some elk or bison may move to private lands in search of forage. Of greatest concern is the potential for elk or bison to commingle with cattle of cow/calf operations, where brucellosis transmission could have considerable consequences, such as requiring depopulation of the cattle herd.

Several strategies would be employed to mitigate potential problems (Table 4), including providing incentives for non-breeding cattle operations (because brucellosis transmission to slaughter-bound cattle is not economically important), increased fencing in some limited areas to separate elk/bison from livestock feed lines, haze elk/bison away from livestock feed lines and purchase private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal Wildlife Conflict Technician positions which are supervised by the

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WGFD. These Technicians are also critical to the success of an expanded monitoring program vital to the MSP (see Monitoring section below).

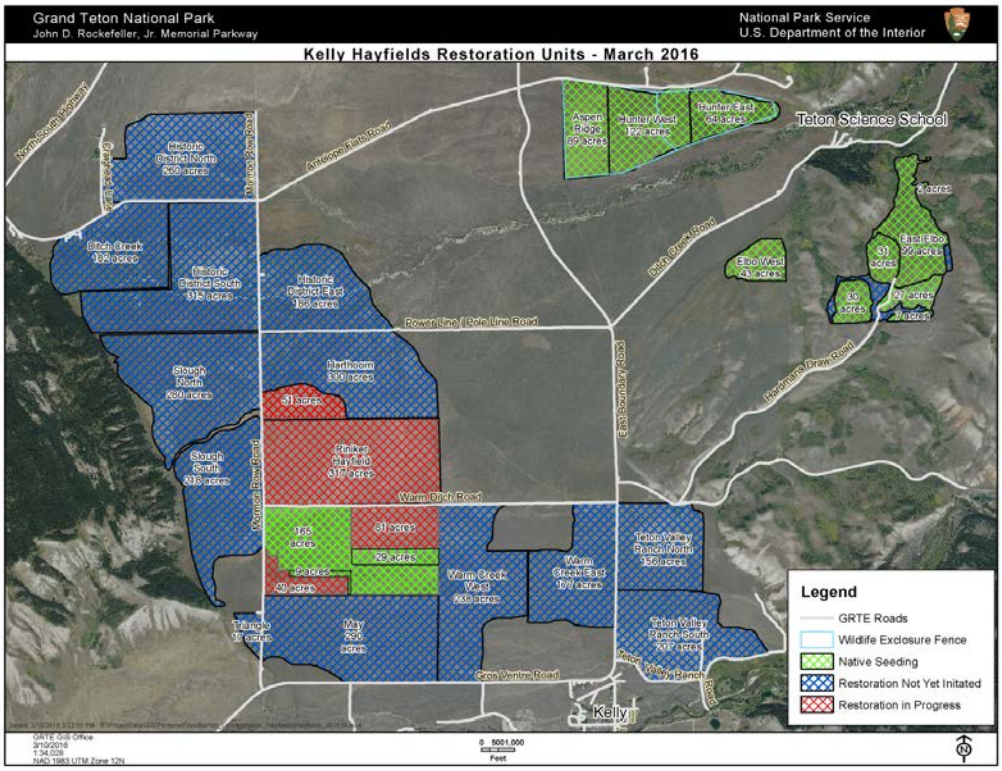


Figure 9. Units and status for the Kelly Hayfields ecological restoration effort in Grand Teton National Park, March 2016.

A database will be established to track non-agricultural conflicts on private lands to determine trends which will help evaluate the effectiveness of MSP mitigation efforts.

Preventing elk and especially bison from entering the Town of Jackson is essential in maximizing publicsafety and minimizing private property conflicts. Currently, bison are hazed northward when they drift south of Miller Butte. A cattle guard was installed on the Refuge Road just north of Broadway Avenue. This barrier is designed to prevent elk/bison from entering the Town of Jackson.

Vegetation Restoration/Protection

The varied approaches to restore the Kelly Hayfields in GRTE (4,500 acres) was initiated in 2008 following 2 years of research and field studies (Moeny 2008). The approach to ecological restoration includes serial treatments to 1) remove non-native species (e.g., herbicide application and prescribed burning); 2) seed native shrub, grass, and forb species; and 3) treat subsequent invasive plants by applying herbicides and, where appropriate, construct temporary fences to protect recently seeded pastures from colonization of non-native species and damage from large herbivores during early phases of restoration.

Of the 4,500 acres targeted for ecological

restoration in the Kelly Hayfields of GRTE, 1,235 acres within 7 pasture units are currently under restoration treatment and 3,265 acres remain non-native grass pasture (as of 2016; Figure 9). The non-native grass pastures are divided into 13 pasture treatment areas and are projected to be likely restored by 2035. As of 2016, approximately 745 acres are seeded with native vegetation, and 89 acres are considered fully restored. Maintenance of restored ecological conditions, however, will likely require management efforts in perpetuity to keep non-native species from colonizing restored areas. All 1,235 acres that are underway toward ecological restoration are being monitored for native plant establishment, invasive plant infestations, including cheatgrass spread. Park staff will continue to monitor and adaptively adjust treatments and restoration strategies according to our results.

Objective: *Maintain bull-to-cow ratios in park summer herd* (Table 1).

National Park Service management policy (NPS 2006) provides guidance for maintaining naturally regulated wildlife populations, free from the impacts of humans, to the greatest extent possible. The final BEMP identified a goal of maintaining park elk bull:cow ratios (a common way of expressing sex and age ratios in wild ungulate populations) near 35 adult bulls per 100 adult cows, based on estimates of what this ratio would be in a herd free from the effects of human harvest. The sex and age ratios of most North American elk populations are affected by sport hunting and herd managers generally maintain lower bull ratios.

Harvest

Based on summer bull ratios for elk in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded refuge hunting opportunities are considered.

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Table 4. Comparison of current and primary MSP components and parameters.			
Action	**Current Management**	**Management**	**Comment**
Winter Feeding:			
Feed	Pelleted alfalfa	Pelleted alfalfa	No change
Ration	Full ration average: 8-12 lbs/day/elk	No Change	No change, to minimize calf mortality. Note average daily ration over the entire feed season is lower than a full ration because feed rate is gradually increased at the beginning of the feed season and gradually reduced at the end to facilitate rumen acclimation
	20-22 lbs/day/bison	20 lbs/day/bison	
Start criteria:			
Available standing forage	300 lbs/acre, as measured at traditional key index sites	Generally later; index sites to be increased in number and distribution	Influencing factors: -time of season -forage availability -number of elk/bison on NER -elk/bison distribution
End criteria:			
Available forage	Based on a snow cover index and subjective estimate of when residual or new forage is adequate	Generally 1 week earlier than current management	Ongoing development of more objective criteria for future implementation ongoing
Monitoring:			
Animals on feed	Mid-winter census	Elk/bison fed days[1]	
Proportion of JEH on NER	Mid-winter census	Mid-winter census	
feed			
Calf mortality	2008-2015 Average: 3.3% (range 1.1-9.0%)	Potentially higher than current levels but less than native winter range	
Elk/bison distribution – collars	Almost no documented use of private lands during feeding operations	Unknown, but likely higher use of private lands than current management	
Elk Winter mortality (all age classes)	2008-2015 Average:	<=3%	
	1.2% (range 0.6-1.9%)		

Table 4. Comparison of current and primary MSP components and parameters.			
Action	**Current Management**	**Management**	**Comment**
Elk summer range segment Proportions for NER wintering elk	Approximately -40% GTNP North of Moose -35% South Snake River -10% Gros Ventre/Flat Creek -10% Teton Wilderness -5% Southern Yellowstone	Unknown, but will be monitored based on summer distribution of radio collared elk	Based on summer distribution of elk that were randomly radio collared on NER.
Harvest, National Elk Refuge elk:			
Frequency	Annual	Annual	
Begin Date	2nd week October	No Change	Modified as necessary
End Date	3nd week December	No Change	Modified as necessary
Structure	- 1 week initial drawing	- 1 week initial drawing	
	- 1 week left over 1st served	- 1 week left over 1st served	
	- partial week alternate	- partial week alternate	
	-daily 1st served alternates	- daily 1st served alternates	
Refuge permit types	- 1st week any elk	- Primarily antlerless only	
	- Antlerless only remainder of season	- limited any elk permits throughout season	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries		Consider expanding to allow bow hunting near developed areas	
Harvest, National Elk Refuge bison:			
Frequency	Annual	Annual	
Begin date	August 15th	August 15th	Modified as necessary
End date	2nd or 3rd week January	Consider later dates as appropriate	Modified as necessary
Hunting Season Structure	As per WGFD	As per WGFD	
Refuge permit types	Any bison or cow/calf per state license	Any bison or cow/calf per state license	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries	Limited to north of Nowlin Creek area	Consider escorted hunting in South Unit as needed	Guided hunts in South Unit when authorized
Harvest, Grand Teton NP elk:			
Frequency	As needed	As needed	
Begin Date	3rd week October	3rd week October	Modified as necessary
End Date	2nd week December	2nd week December	Modified as necessary
License types	Antlerless only	Antlerless only[2]	
Special regulations:	Cartridge limits	Cartridge limits	

Table 4. Comparison of current and primary MSP components and parameters.			
Action	**Current Management**	**Management**	**Comment**
	Bear spray required	Bear spray required	
	Hunter safety card required	Hunter safety card required	
Harvest, Bridger-Teton NF, Elk Hunt Area 80:			
Begin Date			
End Date		15-Dec	Would require change in winter closure dates
Harvest, Elk Hunt Area 78			
Structure			Changes at discretion of WGFD
License Types			
Private Lands Mitigation:			
Cattle commingling		Incentives for non-breeding operation	
Hay depredation		Increased fencing	
Landscape damage			
Easement acquisition			
Vegetation Restoration/ Protection: Elk Refuge			
Vegetation Restoration/ Protection: Grand Teton	Herbicide treatments, prescribed burning, native seed propagation and planting, and protection and maintenance of restored pastures	Same as Current Management for remaining non-native grasslands in Kelly Hayfields	
[1]Number elk and bison on feed per day, totaled by feeding season.			
[2]Any elk licenses could be offered if bull ratios in the park consistently exceed BEMP criteria.			

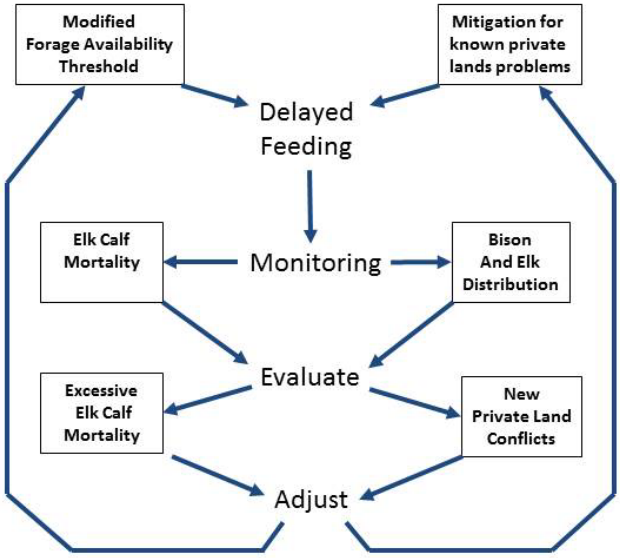


Figure 10. Framework for delayed feeding strategy under MSP.

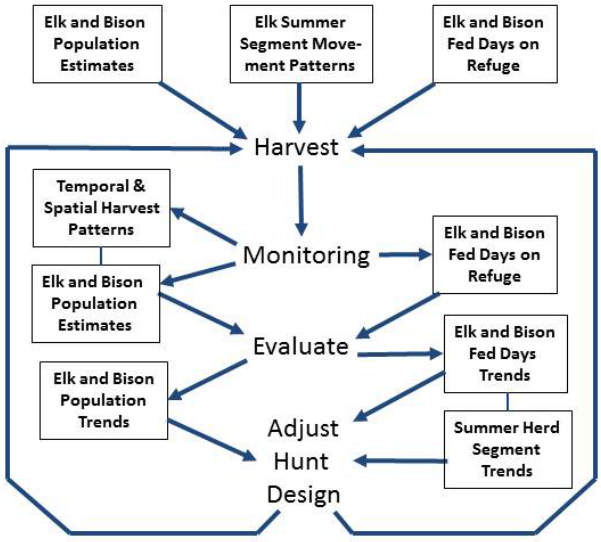


Figure 11. Framework for harvest strategy under MSP.

Strategies Considered But Rejected

The BEMP considered several additional strategies for elk and bison management that, for a variety of reasons, were not selected for implementation in the preferred alternative and Record of Decision. The agencies reconsidered a subset of these during the development of this MSP (Table 5). Since they were not part of the ROD, additional NEPA compliance would be necessary to incorporate any of them into this MSP, and thus they are not being considered at this time.

Table 5. Strategies considered but rejected.

Strategy Considered	Reason Rejected
Fertility control in elk	Judged not reasonable or feasible in BEMP, primarily due to major technical, social, and financial hurdles[1]. For MSP discussed primarily with regard to the difficult to harvest herd segment in Hunt Area 78 on private lands, where federal agencies have no jurisdiction.
Fertility control in bison	Impacts discussed at length in BEMP[2]. Not considered for MSP because current hunting programs appear effective at slowly moving the herd toward the 500 animal herd objective.
Agency reduction of bison or elk	Not considered necessary or desirable on federal lands because current hunting programs that utilize sport hunters are effective at meeting herd objectives.
Altering rations of supplemental feed	Rejected as a strategy because reducing daily feed ration below 8 lbs/elk would be enough feed to encourage elk to remain on NER but would result in unacceptably high elk calf mortality rates.
Private Lands Hunting Coordinator	The WGFD contacted private landowners and ranchers in the Spring Gulch area and discussed this concept to enhance elk harvest of short distance migrants. Generally, landowner interest was low.

MODELS OF SYSTEM DYNAMICS

Models provide a simplified representation of the biological system being managed. We will use modeling to quantify the effects of our management actions on 2 key responses of interest, elk distribution and winter elk calf mortality. There are a suite of possible factors that affect the proportion of elk on NER feedgrounds versus native winter range. Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

An increase in calf elk winter mortality is a potential result of reduced feed season length. Several factors influence winter calf elk survival on NER (Fig. 13). Models will be used to assess the effects of available forage on winter calf elk survival (Appendix 4). Over time this will allow us to assess the effects of our principal management strategy (reducing feed season length) relative to winter elk calf survival.

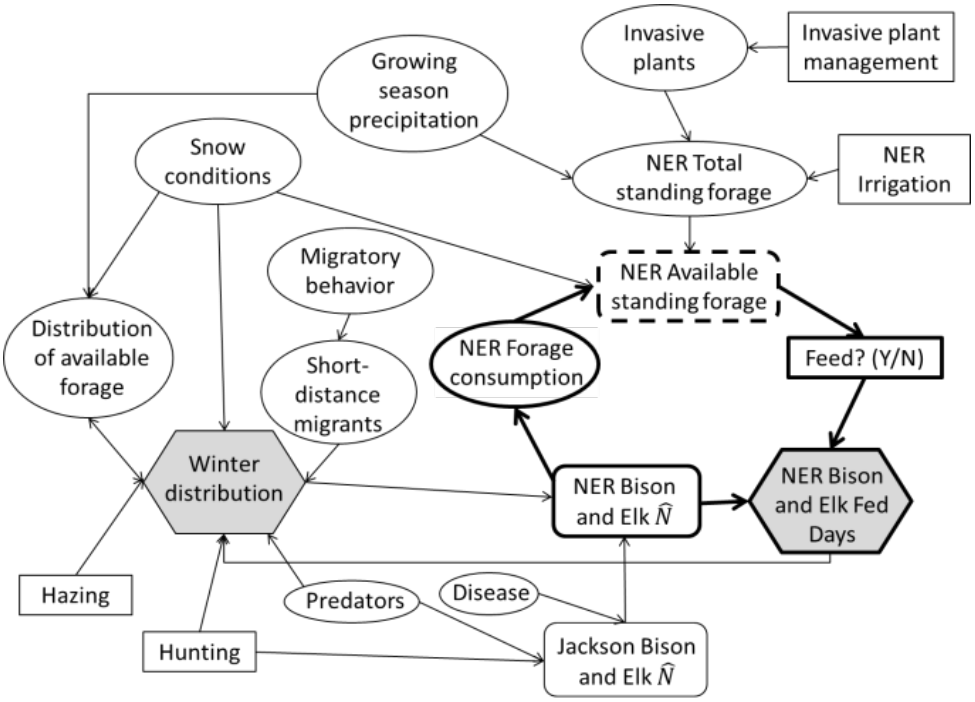


Figure 12. Diagram depicting the factors that potentially influence outcomes identified in the Bison and Elk Management Plan (BEMP; USFWS 2007a). Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

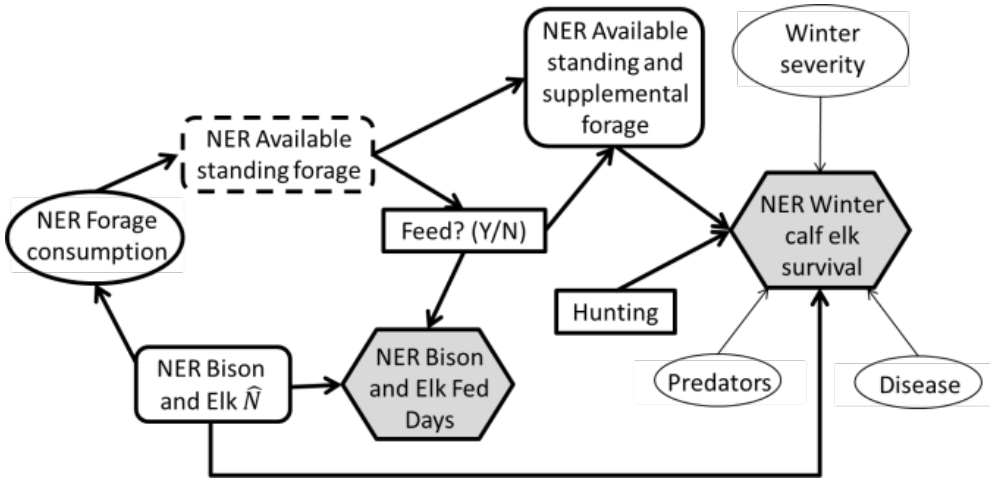


Figure 13. Diagram depicting the factors that potentially influence bison and elk fed days on the National Elk Refuge and winter calf elk survival. Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

MONITORING

Feeding Initiation Monitoring

NER uses weekly field estimates of the amount of forage available to elk to determine feeding initiation date. Currently measurements are taken at key index sites representing areas preferred by elk on NER (see supplemental materials at end of this section). These methods will be enhanced by 1) increasing the number of sampled sites to better represent the total amount of forage available to elk on the southern half of NER; 2) increasing the precision of estimates at each site by increasing the number of observers; and 3) extending the monitoring period later in the winter to assess the relationship between available forage and elk and bison distribution.

To better represent the total amount of forage available on the southern half of NER, a subsample of current key index sites will be retained to facilitate comparison with historic data, but additional random sample sites stratified by elk habitat preference will be added. Historic elk distribution mapping and elk GPS collar data (NER unpublished data) suggest that the areas most preferred by elk on southern NER are associated with moderate to high forage production and green vegetation. Because the distribution of forage production and greenness characteristics vary annually based on irrigation and precipitation patterns, we will annually map areas preferred and not preferred by elk and sample sites will be randomly selected within each of these mapped categories. At least 3 historic key index sites, 3 random sites in areas preferred by elk, and 3 sites in areas not preferred by elk will be sampled each week from late December through the initiation of supplemental feeding.

Currently the NER biologist is the only person trained in the techniques used to estimate available forage (see supplemental materials). At least 2 additional personnel will be trained in these techniques. This will provide a backup in the event of future personnel changes and will facilitate error estimates of the available forage measurements at each site.

Currently NER and WYGFD biologists monitor available forage conditions at least weekly from late December until average available forage at key index sites nears the threshold level of 300 lbs. per acre and feeding is initiated. The principal MSP strategy is to delay the initiation of supplemental feeding after average forage production reaches the 300 lbs/ac level at key index sites. Therefore the monitoring period will be extended to include this period of delayed feeding.

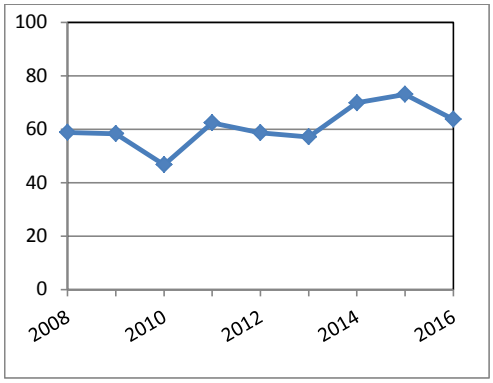


Figure 14. Proportion of the Jackson Elk Herd that was classified on NER feedgrounds in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

Proportion of Elk Wintering on NER

A principal MSP goal is to reduce the number of elk wintering on NER. Our strategy will be to effect redistribution of elk to native winter range from NER over time via shortening the duration of the feed season, and thus slowly conditioning elk to seek food elsewhere. As feeding periods are shortened, the probability of younger elk age classes discovering NER feedgrounds will be reduced, and, hypothetically, that proportion of the JEH that utilizes NER feedgrounds will decline over time. We will measure this effect by examining changes in the winter distribution of the JEH. WGFD annual trend/classification count data provide a multi-year baseline data set to measure changes in the winter distribution of the JEH and categorizes observations by location. In each year, we will calculate the proportion of total classified elk in the JEH that are classified on NER feedgrounds. We will compare the 3-year running average post MSP implementation to the pre-implementation baseline. The pretreatment baseline will be comprised of data from 2008 2016, a time period that represents BEMP implementation prior to MSP actions (Figure 13).

Elk Fed Days and Bison Fed Days

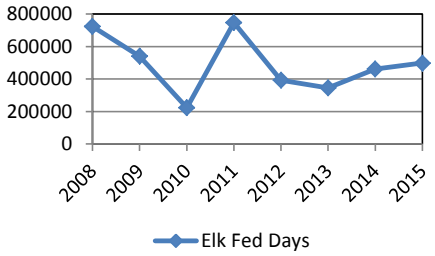
The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. We further assume the variables elk-fed-days (EFD) and bison-fed-days (BFD) are a proxy for these conditions. EFD and BFD will be calculated annually for each species based on the following formulas:

EFD= ∑ Total elk counted on feed during daily feedground counts for duration of feed season

BFD= ∑ Total bison counted on feed during daily feedground counts for duration of feed season

Because EFD and BFD are influenced by feed season length and the number of animals on feed, the MSP strategy of delaying the initiation of supplemental feeding will inherently reduce the number of EFD and BFD through a reduction in average feed season length. We believe that EFD will be further reduced by encouraging a greater proportion of the JEH to winter on native winter range, thereby reducing the number of elk occupying NER feedgrounds. We will evaluate changes in EFD and BFD by comparing the 3-year running average post MSP implementation compared to mean EFD and BFD from 2008–2015. The running average is an appropriate comparison because it will help

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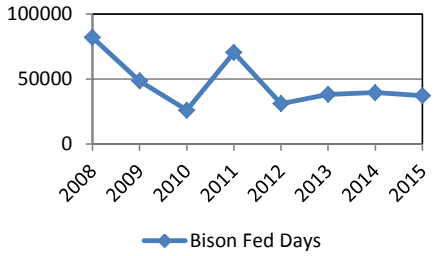


Figure 15. Elk Fed Days (EFD) and Bison Fed Days (BFD) in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the Management Step Down Plan (2008-2015). These values represent the pretreatment baseline which will be compared to the 3-year running average EFD and BFD post MSP implementation.

account for wide annual variation in EFD and BFD associated with winter severity (Figure 15)

Elk Winter Mortality Monitoring

NER has used consistent methods to monitor winter elk mortality since 1982. Each winter NER biologists and other refuge staff conduct a survey of all non-hunting related winter elk mortalities that occur on NER from November through April. Mortalities are tallied by age/sex class and percent mortality is calculated using the corresponding number of elk classified on NER feedgrounds as the denominator. We will continue to monitor elk winter mortality using the same methods post-MSP implementation, which will allow trend comparisons to the pre MSP baseline (Figure 15). Under the MSP framework, we believe the 3-year running averages for total and calf winter elk mortality will be within the range of variation exhibited by the pre MSP baseline. Historic monitoring suggests that calf and total mortality are sensitive to winter severity and disease outbreaks, and that winter mortality occasionally exceeds >3% total mortality and >10% calf mortality. Post-MSP mortality in excess of these levels may warrant shortening the feeding initiation delay in subsequent years.

Elk Collaring

One of the MSP's principal strategies is to shorten the length of the feed season to encourage elk use of native winter range, but we anticipate that this strategy will also result in an increase in elk conflicts on surrounding private land in the town of Jackson and the Spring Gulch areas, potentially including large groups of elk. To quantify this effect and provide real-time information to WGFD and NER managers to facilitate a response, we propose maintaining a sample of 50 GPS-collared elk that winter on NER throughout the MSP implementation period. Forty-five elk represents approximately 0.5% (1 in 200) of the NER winter elk population. This sample size will not be sufficient to detect all elk movements from NER to surrounding private lands, particularly movements by small groups of mature bull elk, but it will be sufficient to detect and quantify significant movements of cow/calf/yearling elk groups compared to pre-MSP baseline data.

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NER has elk GPS-collar data available from the 2008-2013, which represents the post-BEMP, pre-MSP baseline period. We hypothesize that elk movements from NER to surrounding private lands will increase during the MSP implementation period compared to the pre-treatment baseline. This will be tested by comparing the number of incidents that elk left NER for surrounding private lands (per elk/per year), and the proportion of elk GPS fixes on NER versus private lands during time periods of interest. The principal time period of interest is late December–March because this represents the period after the NER elk hunting season, and prior to, and during, NER feeding operations. This is the season when changes to the NER feeding program would be most likely to result in elk distribution changes.

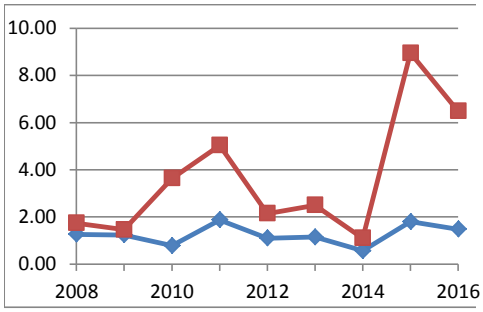


Figure 16. Total (blue) and calf (red) elk winter mortality (%) on NER in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

Thirty adult cow elk were captured on NER feedgrounds in February 2016 and Telonics Iridium GPS collars were deployed with a 90 minute fix interval. Collars will be deployed on up to 50 additional adult cow elk in February-March 2017. Given 83% annual survival for adult cow elk in the JEH (Cole and Foley et al. 2015) and 3-year collar life, approximately 10 additional elk will need to be collared each year in winter 2018 and 2019 to maintain the 50 elk desired sample size over the life of the MSP implementation period.

Ancillary data that will be collected and analyzed during the elk capture and collar data analysis process includes brucellosis seroprevalence, pregnancy rate, and elk summer range determination for comparison to the findings of Cole and Foley et al. (2015).

Disease

The primary purpose of limiting reliance on supplemental feeding is to reduce the prevalence of endemic elk and bison diseases and mitigate transmission risk associated with the introduction of novel diseases. We hypothesize that brucellosis seroprevalence will decline post MSP implementation. There are no recent brucellosis seroprevalence data for elk on the NER, but >50 elk will be captured during elk collaring operations in winter 2016, and each elk will be tested for brucellosis exposure. The 2016 Brucellosis seroprevalence rate will be the pre-treatment baseline to evaluate post MSP change. Chronic wasting disease (CWD) has been monitored in the JEH since 1997, and since 2008 it has been monitored with sufficient sample size to detect 1% prevalence with 95% confidence. No CWD positive cases have been detected in the JEH, which given the long term persistence of the disease, provides overwhelming evidence that CWD is not currently endemic to the JEH. However, most evidence suggests that the distribution of CWD is increasing and that its introduction to the JEH is inevitable. Early detection is critical to ensure a management response, and therefore ongoing monitoring at sample sizes sufficient to detect 1% CWD prevalence with 95% confidence is necessary. CWD is sampled by testing tissues collected primarily from hunter harvested elk, and past experience suggests that 2 full time technicians working from September-December are necessary to ensure minimum sample size. Typical costs associated with 2 technicians are $32,000 per year.

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Data Collected for Modeling

Table 6. Variables to be used in models to explain elk winter distribution in the Jackson Elk Herd and elk calf mortality on NER.

VARIABLE	SOURCE	Elk Winter Distribution Model	Elk Calf Mortality Model
Proportion Jackson Elk Herd on NER Feedgrounds	WGFD/NER Jackson Elk Herd February Classification Count	Yes	No
Proportion Jackson Elk Herd from South Snake River summer segment	Determined from elk GPS collar data for elk captured on NER	Yes	No
Number of wolf packs in the Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated total wolf numbers in Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated number of wolves using NER in winter	NER observations	Yes	Yes
Total NER herbaceous forage biomass	NER forage production survey data	Yes	Yes
Snow Water Equivalent	NOAA snowtell site data	Yes	Yes
NER Winter elk Mortality (calf)	NER winter elk mortality survey	No	Yes
Snow Depth	NOAA Snowtell sites and NER measurements	Yes	Yes
Available Forage	NER and GTNP monitoring in winter months	Yes	Yes
NER Elk and Bison Fed Days	NER feeding records and daily feedground estimates of elk and bison	Yes	Yes
NER Feeding Start Date	NER feeding records	Yes	Yes
Gros Ventre Feeding Start date	WGFD feeding records	Yes	No
Elk Hunting Pressure by Hunt Area	Estimated number of hunter days from WGFD completion reports	Yes	Yes

To facilitate modeling, we will collect data on the following associated variables (Table 6). The table lists variables and how they relate to our efforts to use modeling to explain changes in elk distribution and elk calf mortality relative to our principal action of reducing feed season length.

EVALUATION/FUTURE MANAGEMENT

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Consequently, we anticipate that the strategies outlined in this plan will be in place for a minimum of 5 years, after which an initial evaluation of the program will be made. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented at an annual management MSP update/report, completed by NER staff by the end of March for the previous year.

Consistent with objectives outlined in the BEMP, the long-term goal of this plan is reduce the reliance of bison and elk on intensive supplemental feeding, using adaptive management principles through a structured framework of management actions, to achieve a desired condition of animals relying predominately on native habitat on NER, GRTE, and USFS lands, and on NER cultivated forage. But because there is no precedent for what this plan proposes, there are few responses to proposed management actions that can be predicted to a degree of certainty commensurate with establishing definable thresholds or other objective criteria for success in the short term.

Factors that will be considered in evaluating the success of the program will include the trend of EFD and BFD, type and frequency of private lands conflicts, the proportion of the JEH wintering on the NER, presence or absence of CWD and other infectious diseases, elk and bison population size and distribution, elk calf winter mortality, and public support. These are complex, dynamic, and interwoven components that, together with the MSP, make up the framework for decreasing reliance on supplemental feeding. As such, the effects of changing biological, social, and political conditions on these components will be part of the evaluation process.

In the context of this larger framework, however, we believe evaluation of the trend in EFD and BFD will be most important after the first 5 years of MSP implementation. The direction and magnitude of the trend observed will provide a preliminary basis for evaluation and decisions about continued management actions. Initial success with reduced feeding will be associated with a declining trend in EFD and BFD, with greater magnitudes indicating higher degrees of success. However, determinations of overall program success will necessarily include evaluation of all system components. For example, gains in reduced feeding come could be accompanied by an increase in private land conflicts, which would affect overall success determinations. While the overriding strategy will be to decrease feeding as aggressively as possible while gauging effects on other system components, overall measures of program success through time will necessarily involve evaluating a matrix of effects. These evaluations will be included in annual MSP reports.

As proposed and new management strategies are implemented and evaluated under this plan, at some point in the future it may become apparent that meeting reduced feeding goals will not possible without reducing elk and/or bison population objectives. Population objectives for both herds are set by Wyoming Game and Fish Commission and are evaluated regularly by WGFD personnel, including public review through annual season setting meetings. The BEMP supported the State herd objectives of 500 bison and 11,000 elk, and thus due to NEPA requirements any further consideration of reduced herd sizes by the NER or GRTE are beyond the scope of this plan. However, Wyoming Game and Fish Commission changes to Jackson bison or elk herd objectives are not constrained by the BEMP.

Comment [CE9]: Consider FAQ callout "**Why is the MSP vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?"**

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Investigating the potential effects of climate change on elk and bison management will also be important in the long-term. During implementation of this plan, we will collect a variety of data that could be drawn upon for this purpose.

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PUBLIC OUTREACH AND EDUCATION

The practice of winter feeding is inexorably woven into the historic fabric of Jackson Hole. Elk are identified with the rich and unique legacy for which Jackson Hole is known around the world. De-emphasizing the supplemental feeding program will be a major paradigm shift for the residents of Jackson Hole, Teton County, and the State of Wyoming.

An effective Public Outreach and Education program is essential for effective MSP implementation. The practice of feeding elk evokes passionate responses from those that oppose and those that support this practice. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk/bison herd management methods.

A detailed communication plan to guide outreach and education efforts can be found in Appendix 3.

SCHEDULE

Table 7. Proposed implementation schedule for the MSP.

Action	Date
Public outreach and education	November 2016
Initiate private lands conflicts mitigation contacts/actions	January, 2017
Implement enhanced forage monitoring	January, 2017
Initiate changes in supplemental feeding protocol	January/February 2017
GPS Collar 30-40 elk (Iridium platform)	March 2017
Monitoring/Evaluation/Annual Report	June 2017

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BUDGET

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

	Year				
Agency / Activity	**1**	**2**	**3**	**4**	**5**
National Elk Refuge:					
Monitoring:					
Seasonal Biological Technician (0.5 FTE, GS-7)	$24,000	$25,000	$26,000	$27,000	$28,000
Bison/elk fed days					
Mid-winter census					
Elk summer herd segment distribution[1]					
Expanded standing forage estimates[1]					
Chronic Wasting Disease, 2 seasonal bio.-techs	$32,000	$32,000	$32,000	$32,000	$32,000
Winter bison/elk distribution					
Irrigation					
50 Elk radio telemetry collars; Iridium Platform	$115,000	$25,000	$25,000	$25,000	$25,000
Bison barrier maintenance at NER south entrance	$500	$500	$500	$500	$500
Step Down Management Plan annual reporting	$2,000	$2,000	$2,000	$2,000	$2,000
Private lands:					
Easements / Leases (Private Foundations)	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000
Conflict mitigation technicians (WGFD)	$91,000	$91,000	$91,000	$91,000	$91,000
Hazing (helicopter)	$6,000	$6,000	$6,000	$6,000	$6,000
Vegetation restoration/protection[1]					
Public Outreach and Education	$11,000	$1,000	$1,000	$1,000	$1,000
Subtotal					
Grand Teton National Park:					
Monitoring:					
Summer elk classification/distribution	$10,000	$11,000	$12,000	$13,000	$14,000
Collaborative elk monitoring (GRTE portion)	$5,000	$5,000	$5,000	$5,000	$5,000
Vegetation Restoration/Protection					
Monitoring	$16,000	$16,000	$18,000	$18,000	$12,000
Temporary bison fencing	$24,000				
Temporary fence maintenance	$6,000	$8,000	$8,000	$4,000	
Hayfields restoration	$84,000	$70,000	$70,000	$31,000	
Exotic plant mitigation	$50,000	$52,000	$46,000	$32,000	$16,000
Elk Reduction Program (subject to annual review)					
Hunter harvest evaluation	$1,500	$1,500	$1,500	$1,500	$1,500
Harvest age distribution	$2,000	$2,000	$2,000	$2,000	$2,000
CWD monitoring (0.15 FTE, GS-6)	$7,000	$7,000	$7,000	$7,000	$7,000
Law Enforcement and Visitor Protection (0.15 FTE for 20 LE and support staff; supplies, and permitting)[3]	Unknown				

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
Subtotal					
Wyoming Game and Fish Department:[2]					
Subtotal					
Grand Total					

[1]See detail in Appendix

[2] Dependent on size of elk reduction program; current annual expenditures are approx. $295,000 for 0.15 FTE for 20 LE and support staff; supplies, and permitting.

[3]Through Interagency Agreement

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APPENDIX ?? Frequently Asked Questions

Q1: Why is the MSP vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?

A1: This is the first time that the strategy of delaying feed season initiation has been employed to reduce reliance on supplemental feeding. There is uncertainty regarding the effects of this strategy on elk and bison distribution and elk winter mortality, and therefore it is important to maintain flexibility in plan implementation to avoid significant unintended negative consequences. Unintended negative consequences the MSP seeks to avoid include 1) elk or bison moving to areas where they damage property, risk human safety, or commingle with livestock, and 2) elk winter mortality levels significantly higher than baseline levels.

Q2: Why were reductions to the Jackson Elk Herd and Jackson Bison Herd population objectives not considered as a strategy to reduce reliance on supplemental feeding?

A2: The BEMP has clear population objectives of 5,000 elk wintering on NER and 500 wintering bison. Modifying those population objectives would require additional NEPA analysis. The BEMP also agreed to support State elk herd objectives. The WGFD completed a public process in 2016 to set the population objective for the overall Jackson Elk Herd, and that objective remains unchanged at 11,000 elk.

Q3: The BEMP has an objective of 5,000 elk wintering on NER. Why has that objective not been achieved through increased elk harvest?

A3: The overall Jackson Elk Herd population has declined and is currently close to the 11,000 elk objective, but the number of elk wintering on NER has been well above the 5,000 elk objective since implementation of the BEMP in 2007 (Mean =7,100 elk). When the analysis was conducted for the BEMP, elk winter distribution data suggested that 5,000 elk could winter on NER while still maintaining 11,000 elk in the Jackson Elk Herd overall. However, the proportion of the Jackson Elk Herd that winters on NER has increased significantly over time, and based on current elk distribution it is no longer possible to winter 5,000 elk on NER and maintain 11,000 elk in the overall Jackson Elk Herd. Although increasing elk harvest above current levels would likely allow us to achieve the 5,000 elk objective for NER, it would also reduce the overall Jackson Elk Herd population below the 11,000 objective. If increasing elk harvest in not plausible, the only other option to meet the 5,000 elk objective on NER is to change winter elk distribution, which is the principal strategy of the MSP.

Q4: Why is your principal strategy to delay the start of the feed season?

A4: By delaying the start of the supplemental feed season we decrease the probability that elk that use native winter range or state feed grounds will discover NER feed grounds. Because elk use of feed grounds is a learned behavior, over time this could increase the proportion of elk that winter on native winter range, reduce the number of elk that move from the Gros Ventre drainage to NER, and decrease the NER wintering elk population. The resulting shift in elk distribution would allow us to achieve the

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5,000 elk objective for NER. Because 5,000 elk and 500 bison is close to the estimated carrying capacity of NER habitat, less feeding will be necessary at these population levels.

Q5: Will delaying the start of the feed season result in elk starvation?

A5: Our goal is to delay elk feeding a sufficient amount of time to affect elk distribution without causing an increase in elk mortality.

APPENDIX 1. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007).

Comment [CE10]: If the Frequently Asked Questions section will go in the Appendix, then subsequent appendix numbers will have to be changed

Populations

- Jackson elk herd objective of 11,000 would be maintained.
- New Jackson bison herd objective of 500 established.

Winter Feeding

- Supplemental feeding could be delayed or could occur earlier compared to current practices.
- Changes [to feeding program could] include alterations in the timing of feeding and providing supplemental feed in fewer years.
- Ration or pellet composition might need to be changed.
- Supplemental feeding would be initiated according to established criteria, including pre-winter forage production, assessments of forage utilization (done jointly by WGFD and NER personnel), elk condition and movements, and potentially on the January 1 index of winter severity calculations for elk (Farnes, Heydon, and Hansen 1999).
- Mechanical means could be used to increase forage access for elk after snow crusting events.
- Changes in the refuge supplemental feeding program could begin to affect elk nutrition (negligible adverse effect on NER elk from lower nutrition).
- Displacement of elk by bison during competition for standing forage would decrease as the bison herd is reduced.
- Aggressive social interactions involving competition for food among elk and bison would increase overall as feeding periods are reduced.

Winter Distribution

- Elk densities on the NER would decline due to more reliance on standing forage and wider distribution.
- Elk use of lands surrounding the NER would increase, including:
    - USFS lands east of the NER
    - Gros Ventre feedgrounds possibly
    - Southern GRTE
    - State feedgrounds south of the NER
- Most of winter distribution shift would involve elk in the Yellowstone, Teton Wilderness, and Gros Ventre segments.
- As ungulate numbers decreased and supplemental feeding was reduced, competition and aggressive social interactions on the refuge would also be reduced.
- Elk and bison distribution would increase as the animals relied more on native winter range.
- Fewer animals would be present on the refuge.

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Mortality

- As supplemental feeding is reduced, natural factors such as climate and native forage availability would have a greater influence on numbers, movements, distribution, and mortality.
- More elk would be subject to natural factors affecting mortality, including loss of body condition, predation, and starvation.
- Increased mortality on and off the refuge would mainly affect older elk and calves, and some prime bulls entering the winter energetically stressed due to rut activities.
- Late winter calf ratios could decrease as a result of higher winter calf mortality
- Average winter mortality on the refuge would increase from 1%–2% annually to an estimated 1%–5%.
- Overall, a higher total winter mortality rate of approximately 5% could be expected.

Disease

- Reductions in supplemental feeding or elk numbers would reduce the potential for impacts due to tuberculosis, septicemic pasturelosis, and CWD.
- The health and sustainability of the Jackson elk herd would be increased gradually as supplemental feeding was reduced and there was greater reliance on standing forage and wider ungulate distribution.
- Health and sustainability of the Jackson elk herd would be enhanced in the long term.
- Wider distribution of elk would result in moderate reductions in both the prevalence and potential transmission of brucellosis, as well as potential for spread of diseases not yet in the population.

Private Lands

- The agencies would work closely with the WGFD and landowners, including livestock producers, to coordinate actions that would prevent conflicts due to elk dispersal and to defray costs of managing potential conflicts. Preventing access to food/hay rewards on private lands would be vital for effective management.
- Private land conservation easements within NER boundaries would promote wider distribution.

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APPENDIX 2. Monitoring Supplemental Materials: Feeding Initiation Methods

At each sample site, 10 subplots will be measured at every 5 steps along the random bearing determined for each site. At each subplot a 13.27" diameter metal sampling ring will be placed on the ground. The amount of forage available to elk within the sampling ring (dry weight in grams) will be visually estimated. The 13.27" diameter subplot allows easy conversion from grams to lbs. per acre (each gram is equivalent to 100 lbs. per acre). During annual forage production sampling, refuge biologist Eric Cole has made approximately 1,000 of these visual estimates per year for 17 years, and 33% of Cole's estimates have been verified by clipping and weighing. Therefore, Cole will be the principal estimator, but additional personnel will be trained in these techniques to provide redundancy in the event of personnel changes, and to increase the number of observers to facilitate estimation of error.

Estimating available forage within the sample ring at each subplot is relatively straightforward when snow cover is limited, but estimating how much of the forage is accessible to elk when snow is dense, deep and crusted can be subjective. To decrease the subjectivity of the estimation process, if the area under the sample ring is covered with snow, only forage that can be exposed with a gloved hand will be included in the estimate of available forage. Forage that is fouled with manure and/or flush with the ground due to trampling and/or encrusted in ice will not be included in the estimate of available forage. At each subplot the estimate of available forage (dry weight g) will be converted to an equivalent lbs./acre value (1 gram=100 lbs./acre). The arithmetic mean of available forage (lbs./acre) for the 10 subplots provides an estimate of available forage for each index site. There are 3 sample site categories: 1) Historic Key Index Sites that have been used since 2007, 2) New randomly selected sites within areas preferred by elk, and 3) New randomly selected sites in areas not preferred by elk. Historic key index sites were not randomly selected, but were instead selected to represent areas most preferred by elk on the south end of NER. These were the sites used to determine when supplemental feeding would be initiated from 2007 until the implementation of the MSP. To facilitate comparison with pre-MSP data, we will continue to use mean lbs. per acre across historic key index sites to determine the 300 lbs. per acre threshold. However, post MSP implementation we will delay feeding initiation by 2 weeks once the 300 lbs./acre level has been reached. We will concurrently sample at randomly selected sites stratified on an annual basis between areas highly preferred and not highly preferred by elk. This will enable us to quantify the relationship between mean forage availability at historic key index sites and random sites over time.

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APPENDIX 3. Communication Plan

Communication Goals

Prior to the MSP's Implementation

- Utilize a variety of outreach methods to inform the public on the goals and timing of the MSP implementation and possible effects on wintering herds.
- Utilize a variety of outreach methods to inform the public on public comment opportunities.
- Identify and coordinate key messages and outreach with USFWS regional and national offices, State and federal agency partners, non-profits, elected officials, and other identified audiences.

During the MSP's Implementation

- Continue to utilize a variety of outreach methods to describe current management actions as well as measurable and noticeable changes on the landscape, in animal behavior, or in animal health.
- Provide a comprehensive overview of the MSP by providing links and references to previous outreach and background information.

Communication Objectives

- Work with current media contacts to promote news of the MSP via print, radio, Web, and social media platforms.
- Utilize new media and social media tools to provide information on why the MSP was developed, what public comment opportunities exist, and how the plan is being implemented.
- Plan, coordinate, and execute public meetings to allow for public comment and questions on the plan.
- Develop and provide methods for the public to submit written comments on the MSP.
- Monitor print media on Refuge elk and bison management to see how the Step own Plan objectives and reactions are being portrayed to the public.

Current Outreach Resources

- National Elk Refuge web site
- National Elk Refuge news release list
- (approximately 300 contacts)
- National Elk Refuge Twitter site (1,039 followers)
- Bison and Elk Management Plan web site (http://www.fws.gov/bisonandelkplan/)
- Space for an 11" x 17" poster in the Visitor Center on Refuge management topics
- Display panels in the Visitor Center theater for temporary displays

Available Supporting Outreach Resources

- USFWS Mountain–Prairie External Affairs staff
- USFWS Mountain–Prairie web site, including the
- "Top Stories" feature
- USFWS Mountain–Prairie Twitter site USFWS Mountain-Prairie Region Facebook page
- USFWS National Wildlife Refuge System

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- Facebook page
- USFWS Facebook page

Previous Outreach Efforts

- NER routinely writes and disseminates news releases on Refuge management activities, including the Comprehensive Conservation Plan, supplemental feeding, herd health monitoring, and forage production.
- Post the above news stories as Content.
- Management System (CMS) articles.
- Post CMS news story promos so they prominently appear on the home page, linking readers to the articles.
- Send out Twitter messages linking viewers back to the news stories.
- Prepare, upload and provide links to Adobe PDF versions of news stories with additional photos where additional images are available and/or help understand or visualize the content.
- Utilized the Conservation link on the web Content
- Management System to post information about the Bison and Elk Management Plan and the draft Comprehensive Conservation Plan.
- Retained and provided a link to the original Bison and Elk Management web page (http://www.fws.gov/bisonandelkplan/) that was developed during the planning process. The web site includes links to the Final Plan/EIS, Record of Decision, Federal Register Notice of Availability for both the Record of Decision and Final Plan/EIS, associated news releases, public meeting highlights, and other related documents. Note: the National Elk Refuge does not manage the site.

Additional Outreach Opportunities

- Public meetings in Jackson and other identified locations.
- Service produced video; video could be posted to the National Elk Refuge's multimedia web page, or USFWS Mountain–Prairie home page "Top Video" feature.
- Live radio interview on KHOL (Jackson, WY radio)
- Wyoming Public Radio interview with Refuge management staff
- Interviews with local print media sources
- Updates at community leader meetings such as Rotary Club, Jackson Hole Chamber of Commerce board meetings, and interagency breakfast meetings (with Federal agencies and local elected officials).

Target Audiences

Internal

- Regional and National USFWS Leadership
- Refuge permanent staff
- Refuge seasonal staff
- Refuge volunteers

External

- Congressional representatives
- State of Wyoming leadership
- Federal agency partners, particularly Grand Teton National Park and the Bridger–Teton National

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Forest
- Wyoming Game & Fish Department
- Other NER partners, including county and town agencies and local nonprofit organizations
- Local elected officials
- Private landowners in proximity to the National
- Elk Refuge or neighboring Federal lands
- Tribes
- Local and state media
- Local public

Key Outreach Topics

- Overview of BEMP objectives
- Strategy to change elk/bison behavior
- Threat of disease
- Natural mortality rates
- Anticipated winter distribution changes for bison/elk
- Mitigate negative effects on private lands
- Change elk behavior and distribution while avoiding increased mortality.
- Explain the historic reasons a supplemental feeding program began and why it was continued.
- Explain the NER's limited large ungulate carrying capacity and the disproportionate impact of bison on available forage; 3 elk = 1 bison.

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APPENDIX 4. Models

Elk winter distribution model

The proportion of the JEH that winter on the NER will be linked to factors hypothesized to influence elk winter distribution using a generalized linear mixed effects model (GLMM). A GLMM can account for a proportional response variable (i.e., constrained to the interval 0–1) using a log link and binomially-distributed errors. A GLMM also includes fixed and random effects, with the latter capturing residual model variance otherwise not explained by fixed effects. Year will be including as a random effect, providing several benefits. First, we don't assume years are independent and comprise all of the factor levels of interest. Instead, the effect of year is treated as a random variable, with individual year effects realizations of that distribution. This allows inference to non-sampled factor levels, i.e. years, by estimating a latent population-level proportion of elk expected to winter on the NER regardless of fixed effect influences. Thus, the random year effect can be considered a latent variable describing elk behavior manifested as observed winter distribution. Second, because year effects are not treated as independent, estimated effects of year on the proportion of JEH elk wintering on the NER are dependent on all factor levels, leading to greater precision when estimating individual year effects (Kéry 2010).

The full GLMM incorporating fixed effects for each factor identified as influencing elk winter distribution is:

$$P_t = \beta_{0(t)} + \beta_1 * AFI_t + \beta_2 * SDM_t + \beta_3 * WP_t + \beta_4 * GSP_t + \beta_5 * SWE_t + \varepsilon_t$$

where the random intercept and residual model variance are

$B_{0(t)} \sim N(\mu_{\beta_0}, \sigma^2_{\beta_0})$, and

$\varepsilon_t \sim N(0, \sigma^2)$, respectively.

Fixed effects include 1) per capita available forage at initiation of winter feeding (*AFI*) , 2) proportion of the JEH that are short-distance migrants (*SDM*), 3) number of wolf packs present on JEH native winter range (*WP*), 4) growing season (May–August) precipitation for the Wyoming Snake Drainage climate division (*GSP*; a proxy for available forage on native winter range), and 5) snow water equivalent on 1 January at Thumb Divide (*SWE*; a proxy for early winter severity).

Elk calf winter survival and forage deficits

The Forage Accounting Model of Hobbs et al. (2003) has as an output weekly available forage biomass for the NER (sum of predictions for 30 × 30 m cells). These predictions account for snow conditions using a proxy of SWE and decrement total available biomass by 35% to account for unpalatable plants within the total estimate.

While calf survival is a function of multiple factors the primary management action influencing calf survival is supplemental winter feeding. Current winter feeding initiation criteria lead to calf survival generally higher than in unfed populations. Proposed feeding initiation criteria will result in later initiation of supplemental feed, which will be most influential to calf survival. There is currently little

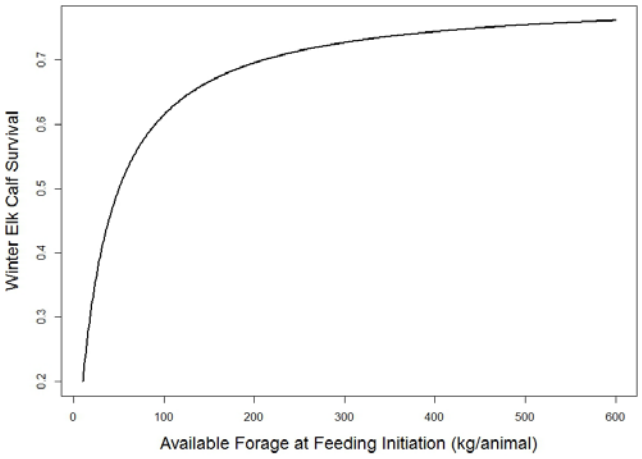
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understanding regarding the relationship between initiation of winter feeding and calf survival, except that current feeding initiation criteria result in high calf survival. We believe a threshold level of available forage at initiation of winter feeding exists such that winter calf survival reaches an asymptote. Below this threshold, calf survival is hypothesized to decline quickly with reductions in available forage at winter feeding initiation. Available forage at the initiation of winter feeding will be related to on elk calf winter survival using a saturating function (i.e., Holling type-II functional response; Fig. 6) by

$$S_t = \frac{aAFI_t}{b + AFI_t}.$$

The parameters *a* and *b* determine how calf survival is related to available forage. Maximum calf survival is *a*, and *b* represents the value of available forage to an individual when survival is 50% of *a* (Hilborn and Mangel 1997).

Although this approach doesn't capture forage deficits *per se*, it does provide a potentially sensitive proxy for this concept. It is assumed that a forage deficit for calves would occur at a point on the curve of the relationship between calf survival and available forage at initiation of supplemental feeding. Modeling the response of winter calf elk survival to changes in feeding initiation criteria facilitates our ability to maximize the influence of feeding initiation criteria on winter distribution while minimizing the likelihood of a large mortality event.



Hypothesized relationship between winter survival of elk calves and per capita available forage at initiation of winter feeding on the National Elk Refuge.

From: Griffin, Toni
To: Steve Kallin; Danielle Stevens
Cc: Cris Dippel; Lori Iverson; Eric Cole
Subject: Re: FW: Latest Step Down draft
Date: Wednesday, August 31, 2016 9:23:55 AM

Hi Everyone,

Danielle Stevens is our editor on staff and will be your contact for this effort. I'm forwarding the document to her, and have included you all so she has your names should she have any questions. Please feel free to communicate directly with Danielle as she works on the step down plan. I'll do my best to stay out of the way...

Hope all is well in beautiful Jackson,
Toni

Toni Griffin
Refuge Planning
Division of Biological Resources
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
Lakewood, CO 80228
Office Phone: 303-236-4378

On Tue, Aug 30, 2016 at 2:56 PM, Steve Kallin <steve_kallin@fws.gov> wrote:

> Hi Toni:
>
> Attached is the Draft BEMP Step Down Plan that needs to be "reformatted." Please correspond directly with Eric Cole if there are any questions. I will be out of the office until September 6.
>
> Thank you again for the help!
>
> **Steve Kallin**
>
> Project Leader
>
> National Elk Refuge
>
> PO Box 510
>
> 675 East Broadway
>
> Jackson, WY 83001
>
> Phone: (307) 201-5409

Fax: (307) 733-9729

steve_kallin@fws.gov

From: Cole, Eric [mailto:eric_cole@fws.gov]
Sent: Tuesday, August 30, 2016 2:41 PM
To: Steve Kallin
Subject: Latest Step Down draft

Steve,

The latest version of the step down plan is attached. I have noted formatting issues that need to be addressed, places where FAQ callouts might be inserted, and possible locations for the map using the comment feature. Some of the text and literature cited have been slightly modified from the previous version, but given the minor nature of these changes I did not use track changes to document them.

Eric Cole

Refuge Biologist

U.S. Fish & Wildlife Service, National Elk Refuge

Jackson, WY

307.201.5432

National Elk Refuge

Jackson, Wyoming

Nestled below the majestic Teton Range, adjacent to the historic gateway town of Jackson, the National Elk Refuge provides crucial big game wintering habitat in the Greater Yellowstone Ecosystem. Across the refuge's grassland, wetland, woodland, and sagebrush shrubland communities, visitors view wintering elk and other wildlife populations that are balanced with their habitats. The public enjoys quality hunting and fishing as well as year-round interpretative opportunities. Effective outreach and strong public and private partnerships ensure understanding and protection of refuge resources for future generations.



The final National Elk Refuge Comprehensive Conservation Plan is now available.

The U.S. Fish and Wildlife Service recently completed the National Elk Refuge's comprehensive conservation plan, a long-term planning effort that will guide management of the refuge over the next 15 years.

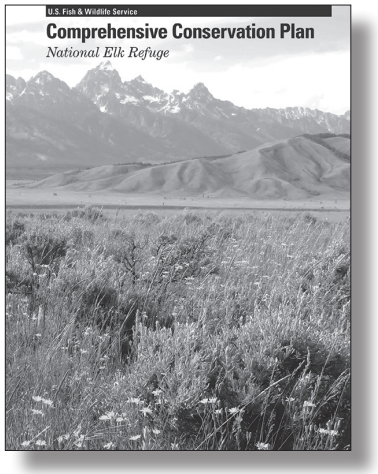
To learn more about the plan, please visit:

http://www.fws.gov/mountain-prairie/refuges/wy_ner.php

To receive a copy of the plan, please contact Toni Griffin, Acting Branch Chief, U.S. Fish and Wildlife Service, Region 6:

Email:
toni_griffin@fws.gov

Phone:
303 / 236 4378



BASIC COMMUNICATIONS STRATEGY

SECTION I: GENERAL INFORMATION

1. **Plan title:** Release of the National Elk Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA)

2. **DTS number: 44T**

3. **What is the action triggering this communications plan?** *(Please explain in no more than three sentences)*

The CCP and EA have been approved since September 2015, so this announcement is overdue. A separate engagement strategy for the Bison and Elk Management step-down plan is currently in development and will be available for leadership review soon.

4. **What is the proposed date to announce this action? Why has that date been selected?** *(Please note whether this date is flexible)*

We propose to release this CCP/EA as soon as possible and no later than September 2016.

SECTION II: GOALS AND MESSAGES

5. **What are our primary communications goals?**

Our primary communications goal is to inform our primary partners at the Wyoming Game and Fish Department, National Park Service, U.S. Forest Service, and the local public that the CCP/EA have been finalized and that certain activities under the CCP are underway. Our secondary communications goal is to draw a clear line between the CCP/EA and the Bison and Elk Management Plan, separating those items in the minds of our constituents and indicating to interested stakeholders that information about the latter plan is forthcoming this Fall.

6. **What are our key messages?** *(List no more than four!)*

- The purpose of Comprehensive Conservation Plans is to guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will

implement to protect species, manage habitats, and support compatible, public recreational and other uses.

- A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).
- Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.
- The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the refuge, including supplemental feeding. A separate announcement and a series of meetings on the Bison and Elk Management Plan are forthcoming this Fall.

SECTION III: IMPLEMENTATION

7. Who is leading this communications effort? *(Check one. Note if the response is neither of these, you should be using either a Partnership, Full or Targeted plan)*

◉ **Region** ○ **HQ**

8. Which programs and/or regions does this issue involve?

The National Elk Refuge (R6)

Refuges (R6)

External Affairs (R6)

9. Implementation timeline:

Date	Time	Tactic	Responsible
August 12	COB	Draft news release and comms plan, submit to NER staff for review	Ryan Moehring
August 19	COB	Review outreach package and return any edits to Ryan Moehring	NER Staff
ASAP	COB	Refuges Planning re-submits *Federal Register* package to HQ for clearance.	Toni Griffin
Day before release	10:00 a.m. MDT	Contact Scott Talbot, Director WGFD	Steve Kallin
Day before release	10:00 a.m. MDT	Congressional notifications	Ryan Moehring
Day of release *(Day available in the Reading Room)*	10:00 a.m. MDT	Distribute press release	Ryan Moehring Lori Iverson will also forward the news release to the NER's news release list.
Day of release	10:00 a.m. MDT	Post Final CCP on Mountain-Prairie Refuge Planning website. Distribute Final CCP (electronic and hard copy) to individuals on the CCP mailing list.	Danielle Stevens will work with Rob Mansheim to post files on RO website. Toni Griffin will distribute the Final CCP to the mailing list.
Day of release	10:00 a.m. MDT	Post press release on R6 website and FWS homepage. Also, post link to press release on social media	Rob Mansheim Lori Iverson will send out a link on the NER's Twitter account.

Day of release	10:00 a.m. MDT	Email Dear Interested Party Letter to interested stakeholders.	Toni Griffin

10. Which communications tools are needed to support these strategies and tactics? *(Be as specific as possible about the products identified and who will produce them)*

Tool	Responsible	Due Date
News Release	Ryan Moehring	8/12/16
Communications Plan	Ryan Moehring	8/12/16
Dear Interested Party Letter	Toni Griffin	8/26/16

11. Which agencies, organizations and/or individuals should be notified?

Stakeholder Name	Contact Info	Pro/Anti/ Neutral	Contact By
Grand Teton National Park	David Vela, Superintendent; david_vela@nps.gov.	neutral	Day before announcement
National Park Service, Intermountain Region	James Doyle, Chief – Communication and Legislation; 303-969-2321; james_doyle@nps.gov	neutral	Day before announcement
Bridger-Teton National Forest	Patricia O'Connor, Supervisor; poconnor@fs.fed.us	neutral	Day before announcement
Wyoming Game and Fish Department	Brad Hovinga; brad.hovinga@wyo.gov	neutral	Day before announcement

12. Who are the primary points of contact for this action?

Media coordinators *(For national-level plans, list at least one person from HQ Public Affairs and others*

from region/program if appropriate. For regional-level plans, only regional coordinators are required. Enter name, email and phone)

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Congressional coordinators *(Optional. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Subject matter experts available for interview *(Must be approved by HQ Public Affairs for an HQ-led announcement or Regional Public Affairs for region-led announcement. Enter name, email and phone)*

- Steve Kallin, 307-201-5409; Steve_Kallin@fws.gov

Additional technical experts for reference *(Enter name, email and phone)*

- Eric Cole, 307-201-5432; Eric_Cole@fws.gov

SECTION IV: DOCUMENT INFO

13. Date Created **Created By**

8/12/2016	Ryan Moehring

14. Date last edited **Edited By**

3/7/2017	Ryan Moehring

SECTION V: CONGRESSIONAL CONTACT LISTS

Delegation Contacts

Member Title	State	Member Name	STAFF_EMAIL
Senator	Wyoming	John Barrasso	brian_clifford@barrasso.senate.gov; kaitlynn_glover@ba kristi_wallin@barrasso.senate.gov

Senator	Wyoming	Michael Enzi	alison_mcguire@enzi.senate.gov karen_mccreery@enzi.senate.gov
Representative	Wyoming	Cynthia Lummis	landon.stropko@mail.house.gov tucker.fagan@mail.house.gov

Committee Contacts

N/A

From:	Ryan Moehring
To:	Steve Kallin; Lori Iverson
Subject:	FW: NER CCP/EA Communications Package
Date:	Tuesday, September 06, 2016 4:02:00 PM
Attachments:	NER CCP Dear Reader Letter.doc NER CCP News Release.docx NER CCP Postcard.pdf NER CCP Comms Strategy.docx

---

Resending.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Ryan Moehring [mailto:ryan_moehring@fws.gov]
Sent: Tuesday, August 23, 2016 4:42 PM
To: Toni Griffin
Cc: Mike Blenden; Steve Kallin; Lori Iverson; Eric Cole
Subject: RE: NER CCP/EA Communications Package

Thanks, Toni. I think the CCP timeline makes sense. I think before we lock in a timeline for the step-down, however, we need to better understand what our engagement strategy is going to look like. Once Steve shares his thoughts on a facilitator, those proposed engagement sessions w/ WGFD and the public, etc., we'll have a better idea what exactly we are actually going to do and, by extension, how long that is going to take.

Edited versions of the NR, comms plan, Dear Reader letter, and postcard are attached. Happy to make any changes, but I think we are close. I'll work on a comms package for the BEMP once we have a better idea what we plan to do to support that rollout.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Griffin, Toni [mailto:toni_griffin@fws.gov]
Sent: Tuesday, August 23, 2016 3:30 PM
To: Ryan Moehring
Cc: Mike Blenden; Steve Kallin; Lori Iverson; Eric Cole
Subject: Re: NER CCP/EA Communications Package

Hi Everyone,

Mike and I thought it might be helpful to develop a timeline of steps required to release the final CCP and the public engagement process for SMP to provide time/space between the CCP distribution and SMP public engagement. I took a stab at a timeline but am not familiar with the SMP steps so please edit this as needed. The main point I hope to communicate is we (Planning) needs to submit the FR notice to HQ for clearance asap to meet a September goal of releasing the CCP.

Thanks,

Toni Griffin
Refuge Planning
Division of Biological Resources
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
Lakewood, CO 80228
Office Phone: 303-236-4378

On Fri, Aug 12, 2016 at 2:15 PM, Ryan Moehring <ryan_moehring@fws.gov> wrote:

Makes sense to me, Mike. I can start working on the BEMP comms plan/news release when I return the week after next (unless Steve's staff wants to start on it in my absence, which is fine; the format I sent earlier will be required to get through regional surname). I'll defer to them on the idea I shared earlier of facilitated meetings and listening sessions. Assuming Steve and his staff are OK w/ this approach, I think that if we had a draft comms plan and a news release and at least a rough outline for these meetings/sessions (and maybe a contractor on board to facilitate), that would be enough to demonstrate the tangible process Will needs in order to release the CCP – would you agree, Mike?

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Blenden, Mike [mailto:mike_blenden@fws.gov]
Sent: Friday, August 12, 2016 2:00 PM
To: Ryan Moehring
Cc: Steve Kallin; Lori Iverson; Eric Cole; Toni Griffin
Subject: Re: NER CCP/EA Communications Package

Thanks Ryan,

Yes, I spoke to Will. He likes our approach but needs to demonstrate tangible progress on

engagement strategy for SMP to Noreen before final approval of CCP publication in FR. He understands need to provide space between publication of CCP and public engagement with SMP. Toni and I spoke this morning about development of a schedule showing the timing of both efforts. I think she was going to touch base with Ryan and do this. I told her my opinion to start now on the approval process for FR notice. That will take some time during which we can provide tangible progress on SMP engagement strategy. Make sense?

On Fri, Aug 12, 2016 at 12:31 PM, Ryan Moehring <ryan_moehring@fws.gov> wrote:
All,

Thanks for your time on the phone yesterday. Per our discussion, I spent the morning putting together a communications strategy and news release for the NER CCP/EA. See attached and please provide me with feedback and edits **by COB next Friday 8/19**. Note: there are several highlighted sections in the comms plan that require NER staff attention. Note #2: I will be out of the office all next week and unable to discuss this, so if you want to chat and it can't wait until the week after next, this afternoon works best.

Also, I spent a bit of time thinking about our BEMP step-down engagement piece. That thought process, combined with a review of the materials Natalie provided and a reconciliation against what we are currently doing on the engagement front for the opening of Rocky Flats NWR, leads me to think that we need four primary items to fully meet our engagement obligations and best position ourselves for success:

1) A news release like the attached

2) A comms plan like the attached (to include items such as interested party letters)

3) A series (one or two may be sufficient) of facilitated meetings with partners (WGFD, NPS, USFS) to identify partner concerns and obstacles and chart a path forward together

4) Once those meetings are complete, a series of facilitated workshops or listening sessions (2-4?) for the local community so we can explain our plan and provide them with opportunities to understand what is already decided and what decision space still exists where they can impact management decisions. If at all possible, these meetings would be co-hosted by us and our partners but facilitated by a third party.

Steve, I do know what your funding situation looks like, but my suggestion would be to hire an outside firm/contractor (local = better) to set up and facilitate these sessions so 1) they feel collaborative and not FWS top-down; and 2) you and your staff can fully participate instead of having to facilitate.

Of course these are just a few preliminary thoughts and we can further refine as needed, but based on recent discussions in the RO around "engagement", I think this will get us close. One thing is certain: time is of the essence, so we should get a game plan together ASAP.

Finally, Mike, please let us know if you were able to catch Will today re: releasing the CCP/EA.

Thanks again, everyone, and please share your thoughts when you have a moment.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

Web |Facebook | Twitter | Flickr | YouTube

--
Michael Blenden
Refuge Supervisor - Montana, Wyoming and Utah
134 Union Boulevard
Lakewood, CO 80228
303-236-4306
303-710-7934 cell

Too often we...enjoy the comfort of opinion without the discomfort of thought.
John F. Kennedy

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:
FWS/R6/NWRS/Planning
MAILSTOP 60130

MAILING ADDRESS:
P.O. Box 25486, DFC
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Boulevard
Lakewood, Colorado 80228-1807

Dear Reader:

We, the U.S. Fish and Wildlife Service, are pleased to provide you with a copy of the comprehensive conservation plan (CCP) for the National Elk Refuge. The CCP will guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will implement to protect species, manage habitats, and support compatible, public recreational and other uses. During the planning process, we worked closely with representatives from the National Park Service, the Wyoming Game and Fish Department, and the Teton County Planning Department. A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected Alternative D as the preferred management alternative.

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem. We will work closely with Wyoming Game and Fish Department and other Federal, State, and local partners to evaluate and manage habitats for the benefit of bison, elk, migratory birds, and other native species. An emphasis on adaptive management, including monitoring the effects of habitat management practices and use of research results to direct ongoing management, will be a priority.

We will use this plan, along with the Bison and Elk Management Plan (2007), as guidance for managing the refuge over the next 15 years. This comprehensive conservation plan will complement, not replace, the Bison and Elk Management Plan. A stepdown management plan is currently being drafted for the Bison and Elk Management Plan. This plan will outline, consistent with the Bison and Elk Management Plan, guidance to adaptively manage bison and elk herds to meet the goals and objectives outlined in the Bison and Elk Management Plan. Public comments will be solicited before the stepdown management plan is finalized.

The CCP document can be viewed online at https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. For more information about the CCP, please contact Steve Kallin, Project Leader at (307) 733-9212, or Steve_kallin@fws.gov.

Thank you for your continued interest in this planning process.

Sincerely,

Will Meeks
Assistant Regional Director
National Wildlife Refuge System

News Release

U.S. FISH AND WILDLIFE SERVICE
Mountain-Prairie Region
134 Union Boulevard
Lakewood, Colorado 80228

For Immediate Release
September XX, 2016

Management Plan Completed for National Elk Refuge

Contact: Ryan Moehring, (303) 236-0345, Ryan_Moehring@fws.gov

LAKEWOOD, Colo. – The U.S. Fish and Wildlife Service (Service) has released a final Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) that will guide management of the National Elk Refuge in Jackson Hole, Wyoming for the next 15 years. The management decisions included in the CCP are a result of thorough environmental review and input from the local community and other stakeholders.

A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation, photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.

The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the refuge, including supplemental feeding. Instead, the CCP addresses all other aspects of refuge management including migratory birds, threatened and endangered species, habitat, visitor use, and cultural resources.

The final CCP/EA is available online here: https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. Hard copies are available at the refuge administrative offices located at 675 E. Broadway in Jackson. For questions about the CCP/EA, please call 307-733-9212.

Established in 1912, the National Elk Refuge spans approximately 25,000 acres and provides wildlife with a variety of habitat types, including grassy meadows, marshes, forest, sagebrush, and rock outcrops. Although the refuge is best known for the large herd of wintering elk in the world, nearly 175 species of birds and at least 47 mammal species have been observed on the refuge. In addition to the large herd of elk, a free-roaming bison herd also winters at the refuge. Each year, roughly 500,000 people visit the National Elk Refuge to enjoy the views and charismatic wildlife.

To learn more about the refuge,
visit: https://www.fws.gov/refuge/National_Elk_Refuge/about.html.

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. We are both a leader and trusted partner in fish and wildlife conservation, known for our scientific excellence, stewardship of lands and natural resources, dedicated professionals, and commitment to public service.

For more information on our work and the people who make it happen, visit http://www.fws.gov/mountain-prairie/. Connect with our Facebook page at http://www.facebook.com/USFWSMountainPrairie, follow our tweets at http://twitter.com/USFWSMtnPrairie, watch our YouTube Channel at http://www.youtube.com/usfws and download photos from our Flickr page at http://www.flickr.com/photos/usfwsmtnprairie/.

– FWS –

From: Cole, Eric
To: Steve Kallin
Subject: draft elk and bison no-go map
Date: Tuesday, September 13, 2016 1:51:25 PM
Attachments: Draft elk and bison go no go map by eric cole.jpg

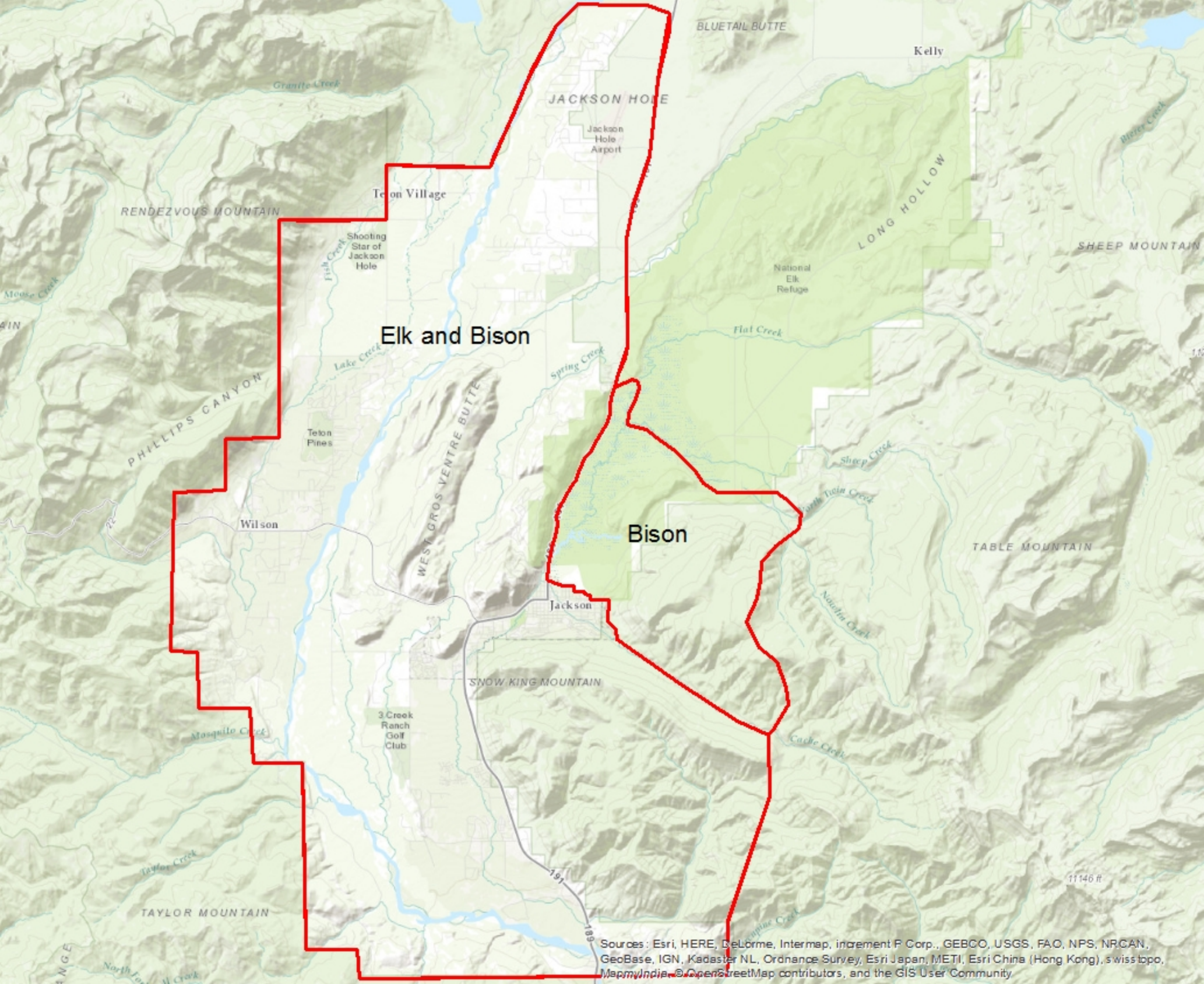
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Steve,

I have created a draft map that portrays the areas that we do not want elk or bison to go as a result of reduced feed season length associated with the MSP. (see attached .jpg). I also have the polygons as shape-files which can be incorporated into any future versions of the map if necessary.

A title for the figure might be: Implementation of MSP strategies could result in changes in elk and bison winter distribution. The polygons show general areas adjacent to NER where winter elk and bison movements from the refuge are not desired, and portion s of the refuge where bison movements are not desired due to potential conflicts with private property, livestock or vehicles.

Eric Cole
Refuge Biologist
U.S. Fish & Wildlife Service, National Elk Refuge
Jackson, WY
307.201.5432


Elk and Bison
Bison
BLUETAIL BUTTE
Kelly
JACKSON HOLE
Jackson Hole Airport
Granite Creek
Teton Village
RENDEZVOUS MOUNTAIN
Shooting Star of Jackson Hole
Fish Creek
Moose Creek
LONG HOLLOW
SHEEP MOUNTAIN
National Elk Refuge
Flat Creek
Lake Creek
Spring Creek
PHILLIPS CANYON
Teton Pines
WEST GROS VENTRE BUTTE
Sheep Creek
North Twin Creek
Wilson
TABLE MOUNTAIN
Jackson
Nowlin Creek
SNOW KING MOUNTAIN
3 Creek Ranch Golf Club
Mosquito Creek
Cache Creek
Taylor Creek
TAYLOR MOUNTAIN
11146 ft
191
189
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

From: Steve Kallin
To: David Gustine
Cc: Eric Cole
Subject: FW: Updated Draft BEMP Step Down Plan
Date: Tuesday, September 13, 2016 3:08:11 PM
Attachments: Draft NER Step Down Plan Post Peer Review Copy_01_SEP_2016.docx

---

Hi Dave:

Eric Cole will be contacting you directly to develop the map for the Step Down Plan we discussed. Thank you!

Also, thank you for your efforts to obtain funding for implementation of the Step Down Plan.

The Frequently Asked Questions are located in the attached plan immediately after the Literature Cited section.

Thanks again for your help!

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Monday, September 12, 2016 4:38 PM
To: Dale Deiter; Brad Hovinga; David Gustine
Subject: Updated Draft BEMP Step Down Plan

Per our last Step Down Planning meeting, we have updated the draft plan (see attached) which included the addition of FAQs. This version was sent out to everyone on the Planning Team for comments but none were received. We are still working on a map to show the general area where we do not want animals to disperse. I will send you a copy of the map once it is generated. Also, we are in the process of completing some document formatting changes for the final draft to be released for public comment.

I will be briefing our Regional Office this Friday concerning the status of this Step Down Plan. The next step in the completion and implementation schedule is to release this plan to the public for comment. That could happen as early as next week. If necessary, please discuss the status of this plan and its possible release for public comment with others in your agency as your procedures require. As a reminder, this is not a NEPA process.

Don't hesitate to call if you have any questions. Thanks again for all of your help,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

U.S. Fish and Wildlife Service National Park Service

September 2016 Draft

BISON AND ELK MANAGEMENT STEP DOWN PLAN

A Structured Framework for Reducing Reliance on Supplemental Winter Feeding

National Elk Refuge
Grand Teton National Park

DRAFT

September, 2016

September 2016 Draft

BISON AND ELK MANAGEMENT STEP DOWN PLAN

For the

National Elk Refuge,
Grand Teton National Park,
John D. Rockefeller, Jr. Memorial Parkway

Teton County, Wyoming

DRAFT

***Suggested Citation**:* U.S. Fish and Wildlife Service: 2015. Bison and Elk Management Feeding Reduction Step Down Plan, National Elk Refuge and Grand Teton National Park. U.S. Department of the Interior, Washington D.C. Available online at:

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Appendix I. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section

DRAFT

of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007)**. .....**
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DRAFT

EXECUTIVE SUMMARY

Overview

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands, focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The final plan directed the NER and GRTE (in conjunction with the Wyoming Game and Fish Department: WGFD) to maintain the state's elk herd objective of 11,000; establish a bison population objective of 500; restore habitat on the NER and in GRTE; continue hunting bison and elk on the NER; continue the elk reduction program, when necessary, in GRTE; allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available; and develop a dynamic, structured framework and Step Down Management Plan for decreasing the need for supplemental feeding on the NER. ***This Bison and Elk Management Step Down Plan (MSP) was developed to specifically addresses the criteria for a structured framework referenced in the Record of Decision.***

Background

Winter feeding of elk in Jackson was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. The loss of available winter range in Jackson Hole due to new ranching operations and a growing town resulted in significant numbers of elk dying during several severe winters in the late 1800s and early 1900s. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, established the National Elk Refuge. Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding.

Bison were extirpated outside Yellowstone National Park (YNP) by the mid-1880s but in 1948 were reintroduced to Jackson Hole when 20 bison from YNP were released near Moran, Wyoming. The herd remained small until discovering elk feedlines in 1980, when the population began sustained population growth. Bison and elk that winter on the NER are migratory and occupy summer ranges predominantly to the north.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER (Boyce 1989), high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases (Murie 1951, Franson and Smith 1988, Samuel et al. 1991), which is currently demonstrated by the high level of brucellosis in the elk and bison herds (Cross et al. 2010, Kamath et al. 2016). It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands (Smith et al. 2004), thereby reducing other wildlife associated with woody vegetation.

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. The potential risk of catastrophic disease outbreaks and the need to mitigate this threat is a vital component in achieving the BEMP Sustainable Populations Goal.

Comment [CE1]: This might be worth its own callout box similar to FAQs to draw attention to this critical point

Objectives

This MSP addresses several objectives under a broader BEMP goal of sustainable populations, which directed the agencies to: 1) develop a

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dynamic, structured framework for reducing NER supplemental feeding; 2) implement a phased reduction of animals on feed: a) Phase 1, to 5,000 elk and 500 bison, and b) Phase 2, elk and bison rely predominantly on native habitat; 3) maintain natural elk bull-to-cow ratios in park summer herd; and 4) enhance public outreach/education. The BEMP further stated that consideration criteria for implementing the 2nd phase of reduced feeding would include some or all of: 1) the level of forage production and availability on the National Elk Refuge, 2) desired herd sizes and age/sex ratios, 3) effective mitigation of bison and elk co-mingling with livestock on private lands , 4) winter distribution patterns of elk and bison, 5) prevalence of brucellosis, chronic wasting disease, and other wildlife diseases, and 6) public support. **In short, the overall objective of this plan is to provide a path for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives and public support.**

Strategies

Elk have been fed for some period during nearly every winter on the National Elk Refuge since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during a time of year when natural forage is typically most limited is powerful to both species, and their knowledge of its existence has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Attempting to modify this behavior on a large scale is unprecedented and will necessarily require investigation, constant evaluation, adaptive modifications to the approach when indicated, and repeated trials.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into the 3 broad categories of 1) timing and intensity of winter feeding, 2) timing and intensity of hunting, and 3) herd segment specific and overall harvest levels.

Measuring the success of MSP strategies will require knowledge of several bison and elk herd attributes. Because we are interested in reducing the intensity of elk and bison feeding throughout the entire winter season, which includes both the number of animals on feed and the duration of feeding, we will use measurements of elk-fed-days (EFD; the total number of elk fed per day per season derived from daily feedground estimates) and bison-fed-days (BFD; the total number of bison fed per day derived from daily feedground estimates) to evaluate feeding intensity. For example, if 5,000 elk were fed for 100 days during a given winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD. Average baseline feeding intensity during the post-BEMP to pre-MSP period from 2008-2016 was 487,838 EFD (range = 223,614-746,800), and 45,224 BFD (range = 26,035-82,124). Reductions in EFD and BFD compared to these baselines will represent progress in meeting feeding reduction objectives under the MSP. Reductions in EFD and BFD could be achieved through reducing the length of the feed season, reducing the number of elk and bison on feed, or some combination of both factors.

Initial success of MSP implementation will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP did not provide specific measurement criteria for the definition of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage" we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. These levels of reduction are consistent with elk and bison predominantly relying on free standing forage rather than supplemental feed.

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Similarly there are population-specific objectives derived from the BEMP and Phase 1 of the MSP for 5,000 elk wintering on NER and 500 bison wintering in the Jackson Hole area. Progress towards these objectives will be measured using annual classification counts and the average number of elk and bison counted during daily feedground estimates.

Chronic Wasting Disease. As of 2016, CWD has been detected within 40 miles of the Jackson Elk Herd (JEH) in moose, within 35 miles in deer, and within 175 miles in elk. Continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence will take place. Some aspects of CWD response planning could change based on implementation of WGFD's CWD management plan (WGFD 2016).

Winter Feeding. Currently, the initiation of supplemental winter feeding occurs when available forage drops to 300 lbs./acre along transects in areas with highly preferred grasses. This protocol will change to delay the initiation of feeding.

The strategy of delaying the start of supplemental feeding is to encourage elk and bison to use native winter range, especially those individuals that have not previously received a food reward on the Refuge. Over time, it's anticipated a cohort of animals will develop that are not conditioned to the Refuge supplemental feeding program, which will reduce herd concentrations and the risk of disease transmission.

To reduce supplemental feeding overall, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk and bison fed days, the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years of MSP implementation, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require focused mitigation measures.

As bison and elk behavioral responses are better understood, feeding delays will be extended to encourage a redistribution of elk and bison to native winter range. However other factors outside of the scope of this plan such as wolf numbers and distribution could reduce the effectiveness of this strategy.

Variables that influence feeding initiation date will be considered (Table 4, Fig. 10). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. And finally, the distribution of animals, particularly on private, livestock producing lands, would be considered prior to delaying feeding initiation date.

Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years.

In the early years of MSP implementation, the seasonal termination of feeding is expected to

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occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date as the MSP is implemented.

Harvest. Few options for manipulating elk hunting are currently available because the JEH is at or near the 11,000 WGFD objective. Proposed changes include allowing limited any elk permits, allowing a bow season near developments on the NER, delaying the elk season so it will better coincide with migration timing, and alternating areas that are closed and open to hunting over time to encourage animal movements or facilitate harvest.

Based on summer bull ratios in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded hunting opportunities are considered.

The proportion of the Jackson Elk Herd that winters on NER has increased in the past 2 decades. This trend is correlated with a decline in elk use of native winter range and an increase in the proportion of NER elk that occupy winter ranges immediately adjacent to the Refuge. If efforts to encourage increased use of native winter range are unsuccessful, agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. This will provide a level of harvest flexibility more commensurate with addressing changes in herd distribution.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution or discouraging bison from attempting to leave the NER via the south boundary into the town of Jackson.

The effectiveness of NER late-season harvest regimes is influenced by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could help reduce winter elk numbers on the Refuge. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st .

Private Lands Mitigation. Several strategies would be employed to mitigate likely changes in bison and elk distribution, including providing incentives for non-breeding cattle operations, increased fencing in limited areas to separate elk and bison from livestock feed lines, hazing elk and bison away from livestock feed lines, and purchasing private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal wildlife conflict technician positions supervised by WGFD.

Vegetation Restoration. Various approaches to restore the Kelly Hayfields in GRTE (4,500 acres) were initiated in 2008. Work will likely be complete in 2035. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and providing visitor opportunities to enjoy wildlife viewing within a natural setting. The restoration process involves removal of non-native vegetation, collecting and propagating native seeds and plants, as well as the seeding of native plants.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres are currently under restoration treatment and 3,265 acres remain non-native pasture. Maintenance of restored ecological conditions

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will require management efforts in perpetuity to keep non-native species from colonizing restored areas. The park will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Strategies Considered But Rejected

Strategies considered but rejected include fertility control in elk and bison, agency reduction of either elk or bison, and altering rations of supplemental feed. These strategies were rejected because they were not included in the BEMP preferred alternative and/or because there was not support for them by cooperating agencies.

Models and Monitoring

Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

A robust monitoring program will be necessary to track the effects of actions implemented under this plan. Critical monitoring components will include: 1) enhanced forage production and availability sampling; 2) measuring animal abundance and distribution including differences in some sex and age classes; 3) determining elk and bison fed days each feeding season; 4) estimating winter mortality; 5) brucellosis seroprevalence rates; and 6) CWD surveillance. In many cases, attribute baselines for the period preceding implementation of this plan have been developed for comparison after the plan is implemented.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Actions completed each year, the results of monitoring programs, and any proposed changes in management direction will be presented in an annual MSP update/report, completed by NER staff by the end of June.

Public Outreach/Education

De-emphasizing the supplemental feeding program will be a major paradigm shift especially for the residents of Jackson Hole and Teton County, but will also be of interest to others in Wyoming and across the nation familiar with the long history of feeding elk on the National Elk Refuge. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk and bison herd management methods. A detailed communication plan has been developed that identifies key messages and utilizes a variety of outreach methods, including print, video, and voice material, utilizing social media, and meetings with elected officials, state and local governments, agency and tribal partners, community organizations, stakeholders, and the general public.

Schedule

GPS collars were deployed on 30 adult cow elk in February 2016. Assuming adequate funding, , additional GPS collars will be deployed in winter 2017. Public outreach, private lands conflict mitigation and contacts, and enhanced forage monitoring will occur in fall 2016 through January 2017. Reductions in feed season length will begin in winter 2017.

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INTRODUCTION

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands. It included directives for forthcoming development of adaptive management practices to address several objectives in the plan, including a desired future condition of elk and bison relying predominantly on native forage. This MSP has been developed expressly for that purpose.

Bison and Elk Populations

While Jackson Hole is probably best known for the splendor and ruggedness of the Teton Range, the Jackson bison and elk herds rank among the top characterizing features of the valley. Both figure prominently in Jackson Hole's history and culture, although bison were absent from the valley for about 100 years between the mid-1800s and mid-1900s.

The JEH occupies approximately 8,000 km^2 in the upper Snake River watershed north of the town of Jackson (Fig. 1). Much of the herd is migratory, moving between distinct wintering and summer ranges. Primary wintering areas include the Buffalo Valley, lower elevations of the Gros Ventre River drainage, the NER, and areas adjacent to the NER on Bridger-Teton National Forest (BTNF) lands. Summering areas occur throughout the herd's range and for convenience are divided into five geographic regions that include GRTE, Yellowstone National Park (YNP), the Gros Ventre drainage, Teton Wilderness, and Southwest Boundary area, which includes private and public lands in the vicinity of GRTE's southwest boundary.

In the late 1800s, when elk populations all over North America were being extirpated, the residents of Jackson Hole protected elk from "tusk hunters" and large-scale commercial hunting operations. Elk are just as important to today's residents of the valley. Thousands of people each year have the opportunity to see elk at close range on the refuge while riding on horse-drawn sleighs. Thousands of pounds of shed elk antlers are sold at an annual antler auction each spring in the town square. Elk are important to backcountry users as well as to people that never leave the road. Jackson Hole is a popular destination for instate and out-of-state elk hunters. The draw of elk to visitors contributes significantly to the local economy.

Winter feeding of elk in Jackson Hole began in 1910 and was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. According to historical reports, before Euro-American settlement some Jackson elk wintered in the southern portion of Jackson Hole (present location of the NER town of Jackson) and may have used areas outside Jackson Hole, including the Green River and Wind River basins to the south and east, respectively, and the Snake River basin to the southwest in what is now eastern Idaho (Allred 1950; Anderson 1958; Blair 1987; Barnes 1912; Sheldon 1927). Radio-collar studies have documented small numbers of Jackson elk wintering in each of these areas in recent times as well (NER and GRTE, unpublished data). Over time, changes in land use and development in these areas, over hunting, and establishment of feedgrounds probably reduced the use of these areas by Jackson elk.

By the end of the 19th century the JEH was believed to be largely confined to Jackson Hole and the immediately surrounding area, where wintering conditions are often harsh. Significant numbers of elk died during several severe winters in the late 1800s and early 1900s> Primary reasons for these mortality events included the loss of available winter range in Jackson Hole from new ranching operations and a and

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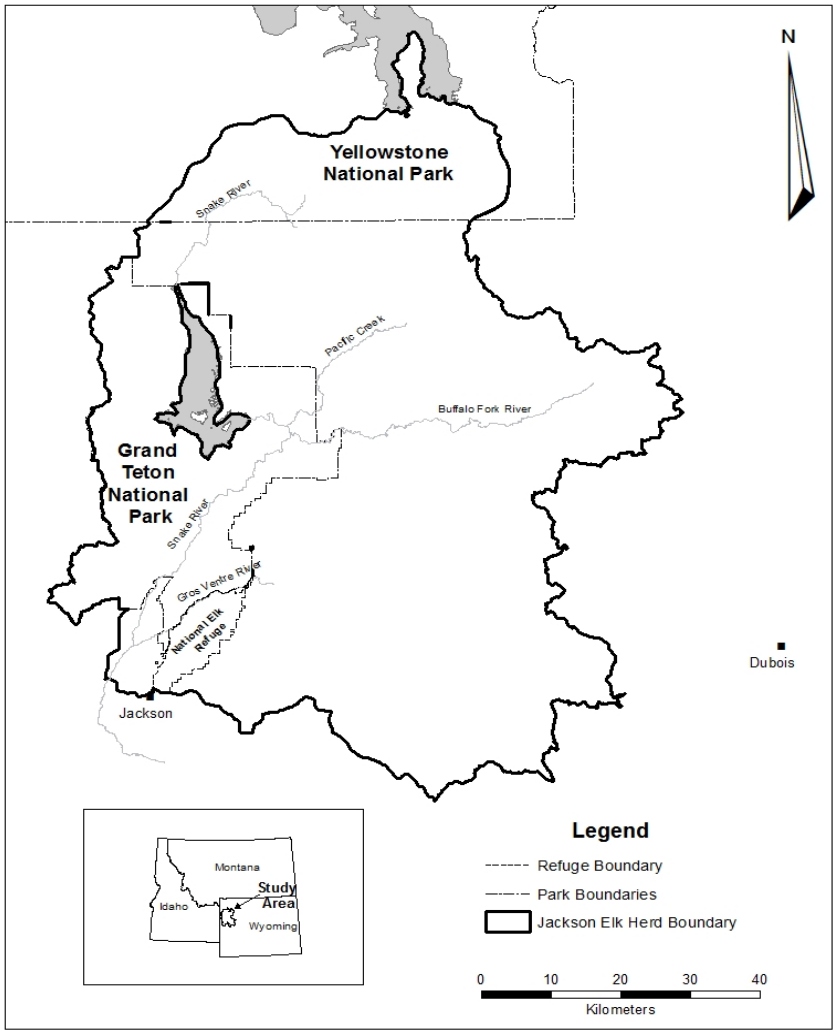


Figure 1. Jackson elk and bison herd ranges, including the National Elk Refuge, Grand Teton and Yellowstone National Parks, and Bridger-Teton National Forest. [include bison range, labels for continental divide and Bridger-Teton National Forest, and in Legend Jackson elk herd unit]. Also Gros Ventre drainage and state feedgrounds because they are referenced in text

expansion of Jackson. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, appropriated $45,000 for the purchase of lands and maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first winter census in the area was conducted in 1912 and showed about 20,000 elk residing in Jackson Hole and the

Hoback River drainage (the latter is not within the JEH's range).

Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding. In recent times the population has fluctuated near the herd objective of 11,000 that was adopted by the WGFD (Fig. 2).

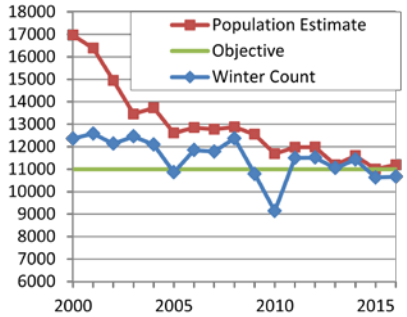


Figure 2. Winter Counts, population estimates, and herd objective for the Jackson elk herd, 2000-2016.

An iconic symbol of the American West, bison are also popular with visitors and residents. Because so few opportunities remain to see bison in the wild, viewing and photographing them in GRTE with the Teton Range in the background is a treasured opportunity for many of the valley's visitors. Similar to elk, there is also a high level of interest in bison hunting. Bison are of particular interest to nearby American Indian tribes and tribes in other parts of the United States because the animals are central to their culture and tradition.

Bison are native to Jackson Hole, as evidenced by the presence of prehistoric bison remains throughout the valley, but were extirpated outside Yellowstone National Park by the mid-1880s. In 1948, 20 bison from YNP were reintroduced to the 1,500-acre Jackson Hole Wildlife Park near Moran. The Jackson Hole Wildlife Park was a private, non-profit organization sponsored by the New York Zoological Society, the Jackson Hole Preserve, Inc., and the WGFD. A population of 15–30 bison was maintained in a large enclosure there until 1963, when brucellosis was discovered in the herd (likely transferred with the original 20 animals from YNP). At that time, all the adult animals were destroyed, but four vaccinated yearlings and five vaccinated calves were retained. In 1964 twelve certified brucellosis free bison from Theodore Roosevelt National Park were added to the herd. In 1968 the herd (down to 11 animals) escaped the confines of the wildlife park, and a year later the decision was made to allow them to range freely. The expansion of GRTE in 1950 had enveloped the Wildlife Park, and this allowed the bison to range freely and was consistent with National Park Service wildlife management policy. The herd remained small and wintered mostly in the Snake River bottoms in GRTE until 1975, when it followed the winter environmental gradient to the NER and began wintering there. The use of standing forage by bison on the NER was viewed as natural behavior thus acceptable to managers. In 1980, however, bison discovered and utilized supplemental feed provided to elk in winter, and they have continued to do so ever since.

The discovery of supplemental feed by bison has had several consequences, including a significant increase in the population's growth rate (Fig 3). Bison on the elk feedlines have at times disrupted feeding operations and displaced and injured elk. To minimize conflicts between bison and elk, managers have provided separate feedlines for bison since 1984. As the population has grown, separating elk and bison on feedlines has become increasingly difficult, and a variety of feeding strategies are employed to help reduce displacement of elk.

As the herd has grown it has maintained fairly stable movement patterns, wintering almost entirely on the NER and summering within GRTE and adjacent lands on the BTNF (Fig. 1).

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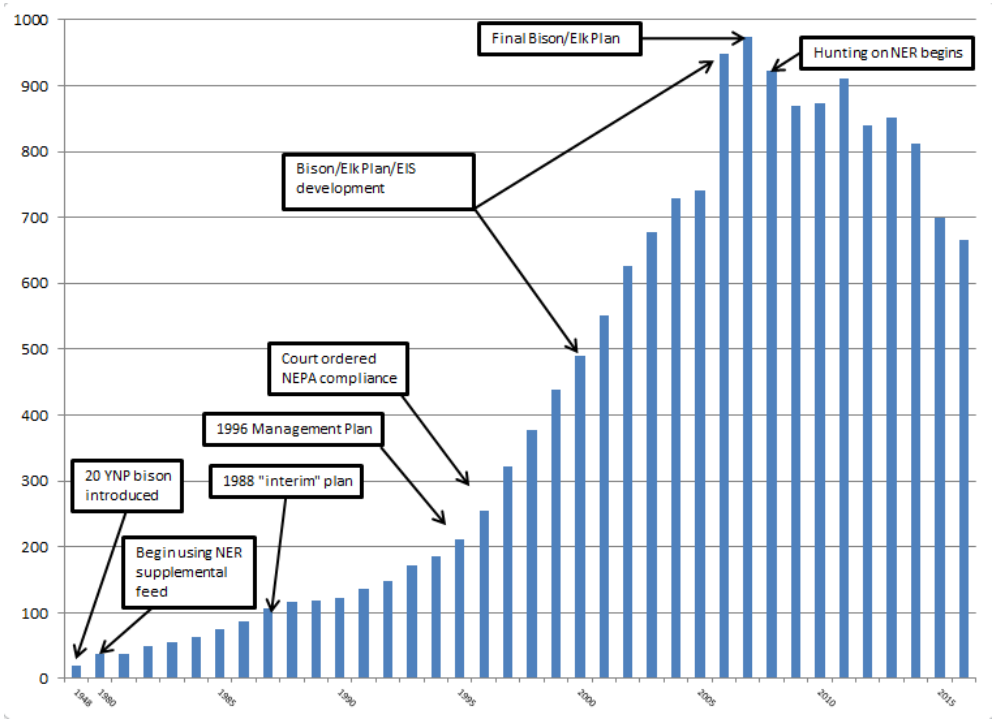


Figure 3. Population growth and planning history for the Jackson bison herd, 1948-2016.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands and thereby reducing availability of these habitats to other wildlife as well as unusually low winter mortality, which has affected predators and other species and has required intensive hunting programs.

Planning History

Jackson's bison and elk populations have been the subject of previous planning efforts. Elk management and research has been guided by the Jackson Hole Cooperative Elk Studies Group since it was established in 1958. The group consists of biologists and agency administrators from the NER, GRTE, YNP, BTNF, and WGFD, who meet at least annually to coordinate management of the population and its habitat. Coordination of bison management began soon after they started frequenting the NER in 1976 and using supplemental feed provided to elk in 1980 (Fig. 3). Release of an "Interim" plan that called for maintaining a herd of 90-110 bison while data were gathered for a long term plan occurred in 1988. It was followed by implementation of a sport hunt outside GRTE, administered by WGFD. This plan was halted after litigation in which the plan's violation of NEPA was successfully argued by plaintiffs.

In 1996, after considerable herd growth, a new long term management plan and environmental

assessment for the Jackson bison herd was released (Fig 3). This plan had strong support and called for maintaining a herd size of 350-400 bison, but it was shelved a year later when plaintiffs from the earlier litigation successfully argued that, because the plan failed to consider the effects of feeding elk on bison management, it also violated NEPA and was not sufficient. This led to development of the draft bison and elk management plan and environmental impact statement from 2000-2006 and release of the final plan in 2007 (Fig 3).

The 2007 Bison and Elk Management Plan (BEMP; USFWS 2007) considered six alternatives for bison and elk management focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The primary management scenarios presented in the alternatives included the status quo, terminating elk and bison hunting on the NER and the elk reduction program in GRTE, brucellosis vaccination options, restoring habitat, improving forage, and decreasing or phasing out supplemental winter feeding.

The final BEMP (USFWS 2007; www.fws.gov/bisonandelkplan) which set management direction for 15 years or until a subsequent plan is developed, proposed to maintain the state's elk herd objective of 11,000, establish a bison population objective of 500, restore habitat in the NER and GRTE, continue hunting bison and elk on the NER, continue the elk reduction program in GRTE in concert with the parks enabling legislation, allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available, and develop a dynamic framework of management actions which adaptively decrease the need for supplemental feeding on the NER. ***This Bison and Elk Management MSP was developed to address the latter and specifically addresses the criteria for a structured framework listed on page 5 of the Record of Decision*** **(Fig. 4).** It does not address other on-going bison and elk management actions already prescribed by the BEMP.

The BEMP scheduled the completion of the MSP for 2008. However, litigation challenging the BEMP in 2008 led to the decision to postpone its development until litigation was resolved. As of March 2015, two court rulings have upheld the 2007 BEMP and ROD. In a lawsuit against the BEMP and its author agencies (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2010), plaintiffs argued that the BEMP violated the National Wildlife Refuge System Improvement Act (National Wildlife Refuge System Improvement Act 1997) by disrupting the biological integrity of the Refuge, and that the plan and the accompanying EIS violated NEPA because they were insufficiently detailed to allow a reasonably complete discussion of mitigation. The crux of the plaintiff's argument was that the plan did not set a specific date for the cessation of supplemental feeding. In response, the agencies argued that the plan constituted a valid exercise of discretion and that it and the EIS were sufficiently detailed to satisfy the requirements of NEPA. In March 2010, the United States District Court for the District of Columbia sided in favor of the agencies in this case. In 2011, the plaintiffs appealed this ruling to the United States Court of Appeals for the District of Columbia Circuit. This Court affirmed the District Court ruling (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2011).

National Environmental Protection Act Compliance

The 2007 BEMP/EIS and ROD satisfied NEPA requirements for current bison and elk management through a detailed analysis of alternative management actions and their likely effect on the environment, and substantial involvement of the public in the process. This MSP does not duplicate or add to this process. It is designed to tier off of the BEMP as a dynamic implementation guide to one part of the preferred alternative outlined in the BEMP ROD. As such, references to NEPA covered in the BEMP

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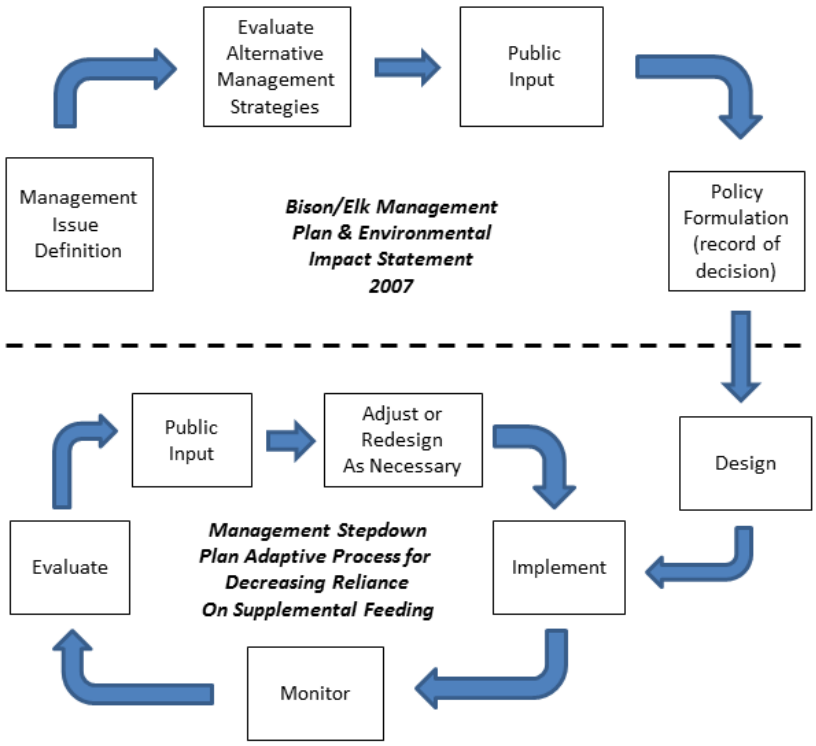


Figure 4. Management step down planning for supplemental feeding on the National Elk Refuge and its relationship to the 2007 Bison/Elk Management Plan and Environmental Assessment.

will be included where necessary in this document, and the discussion of any action that would require additional NEPA compliance will be explicitly stated as such in that context.

Management Step Down Planning

The use of adaptive management plans has gained popularity in natural resource management planning because, by definition, they allow modifications of strategy based on monitoring results and outcomes toward reaching specific goals or objectives. Four elements generally included in an adaptive management approach include: 1) well defined and mutually agreed upon objectives; 2) knowledge (including descriptive models) of the dynamics of the system being managed; 3) clearly articulated management actions and strategies; and 4) a monitoring program to evaluate responses of the system to management actions (Walters 1986).

This MSP utilizes adaptive management planning principles but is not intended to include all of the adaptive management planning elements outlined in the Department of Interior Adaptive Management Technical Guide (2007). This MSP is more accurately described as a "structured framework" of adaptive management actions that progressively transitions from supplemental winter feeding to greater reliance on free-standing forage (BEMP ROD p.5).

Table 1. 2007 Bison/Elk Management Plan Goals and Objectives (Step Down Plan objectives shaded)

Goal: Habitat Conservation

Objectives:

- Conserve important private lands.
- Increase forage production.
- Minimize non-native plants.
- Protect sagebrush grasslands.
- Restore willow, aspen, and cottonwood.
- Perpetuate natural mosaic of plant communities.

Goal: Sustainable Populations

Objectives (BEMP pages 135-136):

- Develop structured framework for reducing NER supplemental feeding.
- Phase reduction of animals on feed: 1) to 5,000 elk and 500 bison, and 2) elk and bison rely predominantly on native habitat.
- Maintain 35:100bull-to-cow ratios in park summer elk herd.
- Ensure a genetically viable bison herd with close to an even sex ratio.
- Enhance public outreach/education.

Goal: Elk and Bison Numbers

Objectives:

- Maintain state elk herd objective of 11,000.
- Maintain a genetically viable bison population of about 500 animals.

Goal: Disease Management

Objectives:

- Manage brucellosis transmission risk from elk and bison to livestock.
- Manage feeding to reduce brucellosis transmission among bison and elk.
- Educate hunters about wildlife disease human health hazards.

OBJECTIVES

The management direction and desired conditions stated in the BEMP called for the NER and GRTE staffs to work with others (agencies, partners, etc.) to "adaptively manage elk and bison in a manner that contributes to the State's herd objectives yet allows for the biotic integrity and environmental health of the resources to be sustained," so that the public can enjoy a variety of compatible wildlife-dependent recreational opportunities. Under the BEMP's 4 primary goals, 20 associated objectives were identified (Table 1). This MSP addresses four objectives under the goal of sustainable populations (Fig. 5).

The reduction of animals on feed at the NER was proposed to be spread over two phases. In Phase 1, the aim is to reduce the average number of elk on feed to 5,000 (while maintaining WGFD's 11,000 elk herd objective), and reduce the winter

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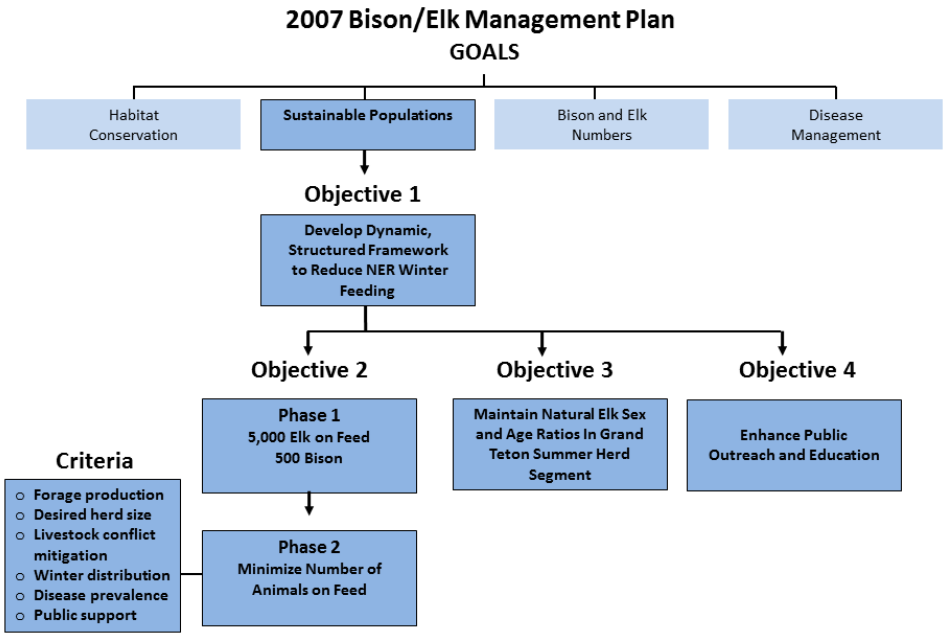


Figure 5. Relationship of MSP to the 2007 Bison/Elk Management plan goals, phasing of objectives, and consideration criteria for reducing the reliance of elk and bison on supplemental feed during Phase 2.

population of bison to the BEMP recommended, and WGFD adopted, objective of 500. In Phase 2, the overall objective is to reduce the reliance of bison and elk on supplemental feed (USFWS and USNPS 2007a). Desired conditions include animals relying predominantly on native habitat and cultivated forage on NER. Important consideration criteria for implementing Phase 2 will include: 1) the level of forage production and availability on the NER and adjacent winter ranges; 2) maintenance of desired herd sizes and age/sex ratios; 3) the ability to effectively mitigate bison and elk livestock conflicts; such as co-mingling on private lands during high risk disease transmission periods; 4) maintaining desirable winter distribution patterns of elk and bison; 5) the prevalence of brucellosis, chronic wasting disease, and other wildlife diseases; and 6) public support. In short, the overall objective of this plan is to outline a framework for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives.

This Plan focuses on management actions to initially achieve Phase 1 objectives. However, if successful, these actions will continue to be used to achieve the Phase 2 objective of reducing reliance on supplemental feeding while considering the six criteria listed above.

MANAGEMENT ACTIONS AND STRATEGIES

Background

The principal goal of reducing reliance on

supplemental feeding is to limit transmission of density dependent diseases in elk and bison while simultaneously minimizing winter mortality in elk. We will attempt to achieve this goal by experimentally reducing feed season length and closely monitoring elk and bison distribution and winter mortality.

Elk have been fed on the NER each year in all but 9 winters since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during winter months is powerful to both species, and their knowledge of NER feed grounds has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Because use of feed grounds is a learned behavior, decreasing feed season length will potentially reduce the likelihood of elk that winter on native range finding NER feed grounds. Over time this could result in a greater percentage of elk using native winter range relative to NER feed grounds. Because it is largely unprecedented, the concept of modifying this behavior on such a large scale is daunting and poses questions for which there are no immediate answers. In some cases, the likelihood a specific management strategy's success will only be able to be roughly estimated, and unanticipated results are likely. Closely monitoring forage availability, elk and bison distribution, and elk mortality will allow us to evaluate the effectiveness of management actions and adjust management actions as needed should unintended negative consequences arise.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into 3 broad categories: 1) timing and duration of winter feeding; 2) timing and intensity of hunting; and 3) herd segment specific and overall harvest levels.

Important Changes Since 2007

The BEMP was developed based on data collected and knowledge that existed up until its ROD. Since then, important changes have taken place, some of which are advantageous to this effort and some of which are not.

A primary change that will facilitate meeting objectives under this plan is the reduction of the bison population from nearly 1,200 animals in 2007 to about 675 during winter 2015-2016 (Fig. 3) through hunting programs administered by WGFD. Licensing changes enacted in 2014 included a reduction in the bison cow/calf license fee (from $416 to $263 for residents and $2522 to $1022 for non-residents) and eliminating the once-in-a-lifetime restriction on a successful bison hunter to only those that successfully harvested a bull. Continued progress toward the 500 animal herd objective will require sustained harvest success.

During the same period, the Jackson Elk Herd has declined from nearly 13,000 to its objective of 11,000, but because the proportion of the JEH that winters on NER has increased dramatically (Fig. 6), this will make achieving the Phase I objective of 5,000 elk on feed and any future elk population reductions more difficult. Preliminary analysis suggests that the increasing proportion of the JEH wintering on NER has been associated with 1) Declines in elk use of native winter range and movements of elk from State feed-grounds in the Gros Ventre drainage to NER.and 2) increasing numbers of elk that summer immediately adjacent to NER (Cole and Foley et al. 2015).

Refuge-wide herbaceous forage production averaged 14,387 (SD = 4,125) tons during 1998–2013. In recent years irrigation of approximately 3,600 acres has increased refuge-wide forage production by approximately 10% compared to what would have been produced with

Comment [CE4]: Alternative location for FAQ callout on why elk harvest cannot be increased to meet 5,000 elk objective

Comment [CE5]: Spelled feed-grounds or feed grounds or feed-grounds? Whatever we decide it should be consistent throughout the document.

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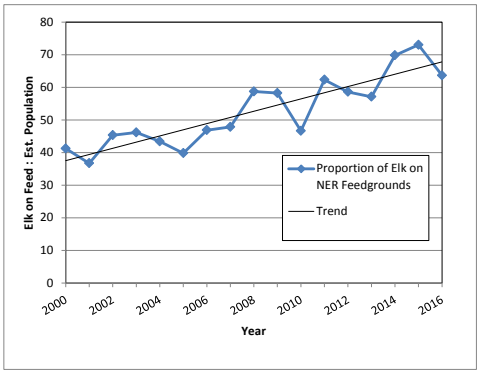


Figure 6. Increasing trend of National Elk Refuge elk on feed as a proportion of the Jackson Elk Herd estimated population size.

precipitation alone, and by 15% in the southern portion of NER which receives the greatest use by elk and bison.

Since 2007, the general awareness of climate change among the public has greatly increased. A strong, credible body of scientific evidence shows that climate change is occurring, is caused largely by human activities, and poses significant risks for a broad range of human and natural systems (National Academy of Science 2010). Ecological systems in the GYE are likely to be affected and associated changes may have implications for elk and bison management. Moderate term to long term effects of climate change in Jackson Hole will likely include increases in average temperature, a reduction in the duration and distribution of snow cover, an increase in the number of frost free days, increased wildfire frequency, and changes in plant community composition and structure including loss of forest and shrub cover and an increase in invasive plants (Riginos and Newcomb 2015). The net effect of these changes relative to the implementation of the MSP remains uncertain.

Current Management

Ongoing primary management actions on the NER include winter feeding, harvest, irrigation, and hazing. In GRTE, harvest of elk during the Elk Reduction Program takes place, when necessary, in collaboration with WGFD, and restoration of previously cultivated and irrigated sagebrush-grasslands is ongoing. Fundamental components of each of these will be briefly described below to provide a basis for comparison to MSP strategies that will follow.

Chronic Wasting Disease

Supplemental feeding has occurred in all but 9 winters on NER since 1912, and although this strategy minimizes winter elk mortality from starvation, contributes to Wyoming state elk herd objectives, eliminates commingling with livestock, and keep elk off adjacent roadways, elk occur at numbers and densities well in excess of carrying capacity (Smith et al. 2004, Lubow and Smith 2004). Considerable evidence suggests that Chronic Wasting Disease (CWD) transmission and prevalence are density dependent (Peters et al. 2000, Williams et al. 2002). Monello et al. (2014) found that elk densities of 15-110/km^2 (0.06 to 0.45/ac) in Rocky Mountain National Park were associated with 13% CWD prevalence, and they predicted elk population declines when CWD prevalence exceeded 13%. NER elk densities range from 77-16,850/km^2 (0.31-68/ac; NER unpublished data), which suggests that the introduction of CWD to NER elk would have significant negative population effects over time.

Winter Feeding

Initiation of feeding has the primary objectives of 1) minimizing elk winter mortality, focusing on calves since they are the most susceptible age class, and 2) minimizing comingling of elk with cattle on nearby adjacent private lands. Winter feeding begins when available forage reaches approximately 300 lbs/ac. Historic radio telemetry data and observations of elk movements indicate that when available forage declines below 300 lbs/ac., some elk leave NER for surrounding private lands. Therefore, the purpose of this feeding "trigger" is to keep elk on the NER and prevent them from searching for forage off the NER, which would increase the potential of comingling with cattle causing damage to private lands, and moving across

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Highway 89 where the risk of vehicles hitting elk is high. This trigger is not a warning that a significant nutritional deficit threshold has been reached. Available winter forage for elk and bison on the NER is largely determined by biomass of forage produced during the previous growing season, rate of forage consumption during fall and winter, and how snow conditions affect forage availability.

Index sites are used to sample forage biomass and determine when feeding should be initiated. These sites are selected annually to represent plant communities that are highly preferred by elk due to plant species composition and the persistence of green vegetation. Weekly sampling begins in late December to estimate available forage biomass at each index site. When average available forage across index sites is below 300 lbs/ac, biologists typically recommend that supplemental feeding be initiated.

During 1995–2013, the average initiation of winter feeding in NER occurred 28 January (range = 30 December–28 February), and feeding was terminated on 3 April (range = 20 March–20 April). Variation in feeding initiation and termination dates has been based on winter conditions and a desire to avoid elk-cattle comingling on nearby private lands. Coordination of winter feeding dates on the NER and WGFD-operated Gros Ventre drainage feedgrounds (Alkali, Patrol Cabin, and Fish Creek) occurs annually to help minimize movement of elk between these areas. This coordination will continue regardless of the management strategy employed. The relationship of recent elk numbers and objectives for NER and WGFD-operated feedgrounds and native range is shown in Table 2.

Bison discovered refuge feeding operations in 1980, and since that time they have been fed each year to help minimize disruption to elk feeding operations. Because bison displace elk from feedlines, NER staff attempt to feed most bison in the northernmost refuge feedground and provide a heavy feed ration, which helps keep them in this area. This strategy prevents bison from mingling with elk and also prevents bison from moving to areas where conflicts with humans are more likely.

Harvest

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Table 2. Annual distribution of wintering elk from the Jackson Elk Herd during February classification counts, 2011–2016, relative to the current objective.

	OBJECTIVE	2011	2012	2013	2014	2015	2016	mean
NER	5,000	7,746	7,360	6,285	8,296	8,390	7,290	7,561
Gros Ventre	3,500	2,775	3,265	2,982	2,326	1,162	1,667	2,362
Native Range[1]	2,500	982	894	1,784	801	913	1,711	1,180
Total	11,000	11,503	11,519	11,051	11,423	10,465	10,668	11,105

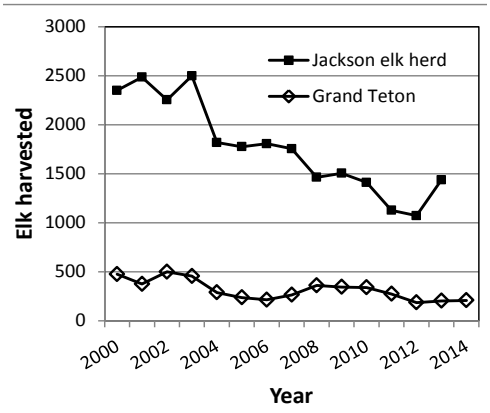


Figure 7. Estimated elk harvests for the Jackson Elk Herd and the amount of that harvest that occurs in Grand Teton National Park, 2000–2014.

Total hunter harvest of the JEH was gradually reduced over the last decade as the population neared objective (Fig. 7). Elk hunting on the NER (Hunt Area 77) typically begins in mid-October and ends in mid-December, with peak harvest in recent years occurring in late November to early December. From 2005 to 2015, 422 ± 102 (mean ± SD, range = 329-612) hunters harvested 196 ± 95 (range = 126-457) elk per year during the NER hunt.

The 1950 legislation that created GRTE provided for a controlled reduction of elk, when necessary, in specific portions of the park, primarily east of the Snake River. Elk reduction programs have taken place in the park each year since 1950 except two (1959 and 1960), when GRTE and WGFD officials agreed a reduction was not necessary (Figure 8). Season dates have varied over the years but recently have run from mid-October to early-December. The GRTE harvest accounts for about 25% of the JEH overall harvest, thus has been an important factor in regulating the population. Increased predation, likely a result of increases in grizzly bears and wolves over the last 20 years, has decreased the need for large harvests in GRTE.

Bison hunting begins 15 August and ends in early to mid-January. Most harvest occurs on the NER, with some additional harvest on private and BTNF lands. Since resuming the bison hunt in 2007, harvest has been 210 ± 45.5 (range 139-301) bison per year. This level of harvest has been sufficient to arrest the exponential growth of the population, reducing bison numbers from the peak in 2007 to about 700 animals in winter 2015 (Fig 3). Tribal bison harvest of up to 5 animals for ceremonial purposes was authorized in the BEMP. Translocation of wild bison to lands outside of Teton County is not currently permitted due to brucellosis concerns.

Bison hunting is not allowed in GRTE because of long standing NPS policy that prohibits most hunting in national parks. Bison quickly learned to take advantage of the safety of GRTE, which has made hunter harvest goals difficult to achieve. Many bison stay in GRTE during the hunting season, with only occasional short term movements to the NER, until severe winter conditions occur. In response, NER and WGFD managers have attempted to extend the hunt to late January while minimizing the conflict with the initiation of winter feeding. The unpredictable nature of winter conditions that time of year makes this challenging, and has (or could) result in the use of emergency season extensions or reductions.

Hazing

NER staff haze elk and bison to conserve winter forage, prevent year-round use of winter range, and in some cases to prevent elk and bison from moving to private lands or other areas where conflicts with humans are likely. Hazing using ATVs has proven most effective. The strategy is typically employed during 3 time periods: 1) in May to move elk and bison off NER that are lingering on NER winter range; 2) in July when some bison typically return to NER; and 3) in the period just prior to feeding initiation when elk and bison are most likely to leave NER for private lands. Hazing of elk and bison by WGFD staff also occurs on private lands adjacent to NER periodically throughout the year.

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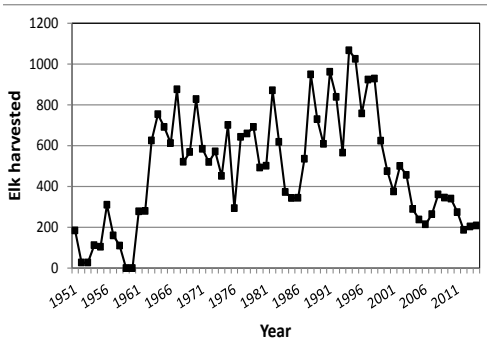


Figure 8. Elk harvest in Grand Teton National Park, 1950-2015.

Vegetation Restoration and Protection

The BEMP identified approximately 4,500 acres of previously irrigated and cultivated grasslands in GRTE in need of restoration to native sagebrush grasslands community. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. After 2 years of research and field studies, restoration efforts began in 2008. The restoration process involves several steps including: removal of non-native vegetation through repeated herbicide applications, collection and propagation of native grass, forb and shrub seeds and finally native seeding. Repeated herbicide treatments have been warranted prior to native seed planting as well as spot treatments of invasive weed species subsequent to native seeding. Substantial progress in this endeavor has been made since 2008, including 1,235 acres of previously cultivated lands under restoration treatment. Of the 1,235 acres undergoing treatment, 745 acres has been seeded with native grass, shrub, and select forb mixes, and 89 acres is considered fully restored. Two-hundred and seventy-five of these acres are currently fenced to reduce grazing pressure of early native vegetation establishment from bison and other ungulates. An additional 490 acres are targeted for native seeding in 2016 once removal of the invasive vegetation is successful. All treatments are monitored for native plant establishment and invasive plant infestations and treatments will be adjusted as necessary. Invasive plant treatments may have to continue indefinitely. GRTE will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Private Lands Mitigation

Fencing of hay stacks and livestock feedlines has been historically used to mitigate particularly difficult conflicts on private lands. Targeted fencing of golf course greens and sand traps fall through spring has also been successful in some situations for mitigating elk and bison presence and associated damage in these areas. It is important to note that the county has a "wildlife-friendly" fence policy and does not support extensive fencing that is impermeable to wildlife in residential areas.

Methods, Assumptions, and Constraints Common to All Strategies

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes, particularly population sizes. Measurements of the Jackson bison herd will be based on the annual mid-winter census and sex and age classification survey performed by NER, GRTE, and WGFD biologists. This survey occurs one day in February and includes ground counts of animals on feed at the NER and aerial counts of outlying bison across their winter ranges on the refuge, park, and Bridger-Teton National Forest.

Elk population estimates will also be based on mid-winter aerial and ground counts. However, the mid-winter counts are undertaken during a single survey period and do not necessarily represent either peak or cumulative abundance of elk on feed. Rather than basing progress toward the number of elk on feed for the entire season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in

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Table 3. Summary of potential Step Down Plan constraints.

Policy

- ESA[1] Lynx – limits on habitat impacts
- Greater Sage Grouse – core area protection
- 2007 BEMP/EIS (federal actions/lands)
  - No fertility control
  - No test and slaughter
  - Limited tribal ceremonial take
- Bison/elk hunt end date (Feb. 1st)
  - WGFD, brucellosis safety
- Carcass disposal (Feb. 15th)
  - WGFD, brucellosis safety
- Forest Service winter closure (Dec. 1st – April 30th)
- Easement limitation (NER boundary)

Winter Feeding

- Only during non-hunting periods

Harvest

- State regulations

Vegetation Restoration/Protection

- Bison/elk distribution
- Exotic plant species management

Private Lands

- Owner agreements

Social

- Hunter density (safety; hunt quality)
- Elk/bison winter mortality levels
- Public safety (ungulate/vehicle collisions)
- Disease
- Land-use conflicts (agricultural and residential)

Biological

- Disease (bison/elk/cattle commingling)
- Sage grouse habitat conflicts
- Fencing/wildlife conflicts
- Elk herd distribution
  - summer segment distribution goals

Funding

- Easement purchase
- Plan implementation

[1]Endangered Species Act

the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 elk were fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000.

We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both species on supplemental winter feeding.

Initial success of the MSP will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP does not provide specific measurement criteria to determine when the NER has successfully attained the objective of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage", we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. This level was chosen to define success because it indicates that elk and bison will predominately be foraging on free standing natural and cultivated plants on NER and adjacent winter ranges rather than on supplemental feed.

Several management constraints are common to the strategies discussed below (Table 3). Many law and policy constraints are applicable but we include here only those most pertinent. Endangered Species Act (16 USC 1531 et seq.) requirements for wolves, grizzly bears, lynx, and others apply. Lynx requirements for maintaining certain habitat types could limit methods used and areas considered for habitat improvements

in GRTE and the BTNF. Such improvements could increase elk and bison use of native winter range off the Refuge while simultaneously reducing use of feedlines. Similarly, compliance with the 2015 sage grouse amendment to the 1990 Bridger-Teton National Forest Land and Resource Management Plan and the Wyoming greater sage-grouse core area protection executive order (2011-5 and supplement 2013-3) could affect habitat manipulations. NEPA compliance conducted as part of the BEMP/EIS constrains what federal actions can be taken as a part of this plan. State regulations constrain late (winter) hunt and carcass disposal timing to protect against brucellosis contamination, since February-April represent the period bison and elk are most likely to transmit the disease. Restrictions on hunting timing also result from BTNF winter range closures, immediately east of the NER and elsewhere, December 1 to April 30. Additional details about these and other constraints will be included in discussions about specific strategies that follow.

Strategies

This section describes the management action this MSP proposes to implement. As such, it unveils the heart of management changes proposed to begin the process of transitioning to greater reliance of bison and elk on native forage during winter. Fundamentally, the strategies discussed in this plan represent an experiment designed to achieve Phase I objectives of 5,000 elk and 500 bison on NER and are a first step towards reducing reliance on supplemental feeding while meeting the sustainable population goals identified in the BEMP.

Initial strategies for achieving sustainable population goals identified in the BEMP (Table 1) are presented by the objectives below. The primary management actions available to the agencies to achieve Phase I objectives are modifications to winter feeding and hunting seasons. To a lesser extent, vegetation protection and restoration can be important, particularly for improving long-term ecological function and enhancing natural production of native forage. Private lands are also an integral component as changes in elk and bison distribution occur and new challenges develop. The likely consequences of implementing these strategies were evaluated in the BEMP. The most relevant of these are summarized in Appendix 1.

Objective: 1) *Implement a phased reduction of animals on NER feed to 5,000 elk and 500 bison, and, 2) influence elk and bison to rely predominantly on native habitat* (Table 1).

The first phase will be to reduce the number of elk on NER feed to approximately 5,000 and achieve a target population of about 500 bison. The second phase will be to adaptively manage bison and elk populations to achieve desired conditions, with animals relying predominately on available native habitat (NER, GRTE, and USFS lands) and cultivated forage (NER).

As previously mentioned, the concept of reducing winter feeding after more than 100 years of the practice, and the associated behavioral conditioning of elk and bison to its presence, represents a formidable challenge that must be approached cautiously and systematically. Efforts to scale back elk supplemental feeding operations in other parts of North America have been rare and fraught with controversy (Smith 2001). The strategies discussed below have been developed in this context, with appropriate feedback mechanisms through rigorous monitoring and frequent evaluation. Inability to meet this objective under the strategies presented here would trigger a thorough evaluation and consideration of more aggressive strategies when the BEMP is updated in 2022.

Comment [CE6]: Consider FAQ concerning why harvest cannot be increased to meet objectives and distribution changes are the only viable strategy

Chronic Wasting Disease

Since 1997, NER has cooperated with WGFD to conduct intensive surveillance for CWD in the JEH unit. GRTE has also collaborated with WGFD to collect samples from the ERP and from road-killed cervids. Although this effort indicates that CWD is not currently found in the JEH, continued surveillance at sample sizes sufficient to detect

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1% prevalence with 95% confidence annually will be critical to ensure a timely management response and limit the long-term population effects of the [USFWS and USNPS, 2007b]. Given that CWD has been detected within 40 miles of the JEH in moose, within 35 miles in deer, and within 175 miles in elk, this level of surveillance is warranted.

In 2016, the WGFD cooperated with federal agencies and other stakeholders to revise the 2006 Wyoming CWD Management Plan. The NER and USFWS Region 6 Wildlife Health Office staff participated in several meetings associated with this effort. The Wyoming CWD Plan lists several management responses for consideration if CWD be is detected on or adjacent to State or NER elk feedgrounds. Early detection of CWD in the JEH is essential to allow implementation of management responses.

The BEMP (2007) identifies the management response to the arrival of CWD as following the State of Wyoming CWD Plan in effect in 2007. The Wyoming CWD Plan was updated and significantly changed in 2016. In light of changes in the Wyoming State CWD Plan, and the results of CWD Studies completed since 2007, the NER management response to CWD will be reviewed and updated in a NER Disease Contingency Plan, as identified in the NER Comprehensive Conservation Plan (2016). The CWD section of the NER Disease Contingency Plan will remain consistent with the goals of the BEMP. The NER Disease Contingency Plan is scheduled to be completed in 2017.

Winter Feeding

Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the long run, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning animals to "expect" feed to be available later in the winter; this could build cohorts of animals that rely primarily on native winter range. To reduce supplemental feeding, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, which is the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding (Figure ?) and identify private land conflict areas that may require assistance with focused mitigation measures.

As bison and elk behavioral responses are better understood, and targeted mitigation on private lands is achieved as needed, feeding delays will be extended depending on several variables (Table 4, Fig. 9). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence on feeding initiation date, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Forage availability would also be affected by the numbers of elk and bison on the NER. And finally, the distribution of animals, particularly on private, livestock producing lands would be considered in determining feeding initiation date. A primary concern of manipulating feeding is elk winter mortality, particularly among calves. For example, research on unfed elk populations in Yellowstone National Park suggested average winter elk calf mortality of 28%, with the majority of cases caused by malnutrition (Singer et al. 1997). Similarly Smith and Anderson (1998) found unfed winter elk calf mortality of 29% compared to 11% for elk calves using feedgrounds. As food becomes limited in winter, calves are usually the first to experience nutritional deficit and winter

Comment [CE7]: The map that shows where elk and bison should not be could be placed in this section. This would be figure number? And subsequent figure numbers will need to be adjusted accordingly. Also the text does not currently reference the map?

Comment [CE8]: Consider FAQ on principal strategy of delaying feeding initiation here

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mortality because they are displaced by more dominant animals, they have limited fat reserves, and are more susceptible to cold temperatures than larger animals. Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years (Appendix 1).

In the early years of MSP implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date during the period of MSP implementation.

The MSP winter feeding strategy would include the establishment of additional key forage index sites and on-going measurements at those sites throughout the winter.

Harvest

Currently the JEH is at the Wyoming Game and Fish Commission established objective of 11,000 animals, which means there is less flexibility in manipulation of harvest regimes than there would be if the herd was above objective. Initially there would be little change in elk harvest programs on the NER, with the exception of allowing a limited number of any elk permits throughout the season, considering allowing bow hunting near developed areas (roads and buildings) and shifting the season about a week later (Table 4). Allowing a limited number of any elk permits would be consistent with providing sport hunting recreation on National Wildlife Refuges (NWRS Improvement Act; 1997) and the NER CCP [USFWS, 2015] and possibly encourage more hunters to participate in antlerless elk hunts. Monitoring programs and consideration of bull ratios in the GRTE summer segment (since most park bulls migrate to the NER) would help inform levels of proposed take. Bow hunting in areas currently closed to firearms will likely increase harvest by eliminating “no-hunt” areas which can become sanctuaries for large numbers of elk. Shifting the hunt one week later is consistent with later migrations and will improve harvest effectiveness (Fig. 9).

General elk harvest patterns in GRTE would continue to be based on need for harvest, summer segment population estimates, herd status relative to population objective, herd demographic parameters, herd-wide distribution of harvest, and mitigation for impacts on other resources and visitor activities.

Elk herd population objectives are reviewed every five years by the Wyoming Game and Fish Commission and adjusted as necessary. Agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. Lowering the population would help compensate for reduced use of traditional native winter range and increased growth of short-distance migrants which has led to significant increases of winter elk concentrations on the NER.

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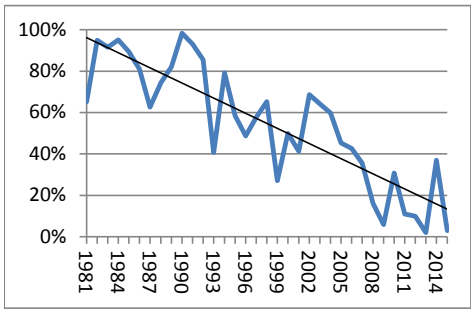


Figure 9. The percentage of elk that wintered on NER counted there on December 1, showing progressively later annual fall/winter arrival of elk to the NER during the past several decades.

The annual fall/winter arrival of elk to the NER during the past several decades has been occurring progressively later. This trend may necessitate extending the elk hunting season later into the year to achieve harvest objectives.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later end dates that are commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution. Special limited hunts designed to discourage bison from attempting to leave the NER via the south boundary into the town of Jackson will also be considered. If progress toward reaching the herd objective of 500 animals continues and the objective is reached, WGFD will adjust harvest quotas in the context of the objective, as necessary, to address population changes through time.

A cattle guard was installed on the Refuge Road near the east end of Broadway Avenue to help prevent bison and elk herds from entering the Town of Jackson. This will reduce the potential for dangerous human/wildlife interactions.

Currently, the effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives, but also that elk are sensitive to hunting pressure which can cause elk movements to areas that cause management issues for WGFD. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st in the future.

Annual herd-wide population estimates, elk summer herd segment estimates in GRTE and NER, temporal and spatial harvest patterns, and animal-fed-days would be monitored, and the resulting information would be used to inform ongoing evaluation of elk and bison management harvest programs (Figs. 9 and 10).

Hazing

No change in hazing practices is anticipated initially under this MSP framework.

Private Lands Mitigation

Delaying the onset of NER feeding is likely to result in changes in bison and elk distribution (Appendix 1). Some elk or bison may move to private lands in search of forage. Of greatest concern is the potential for elk or bison to commingle with cattle of cow/calf operations, where brucellosis transmission could have considerable consequences, such as requiring depopulation of the cattle herd.

Several strategies would be employed to mitigate potential problems (Table 4), including providing incentives for non-breeding cattle operations (because brucellosis transmission to slaughter-bound cattle is not economically important), increased fencing in some limited areas to separate elk/bison from livestock feed lines, haze elk/bison away from livestock feed lines and purchase private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal Wildlife Conflict Technician positions which are supervised by the

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WGFD. These Technicians are also critical to the success of an expanded monitoring program vital to the MSP (see Monitoring section below).

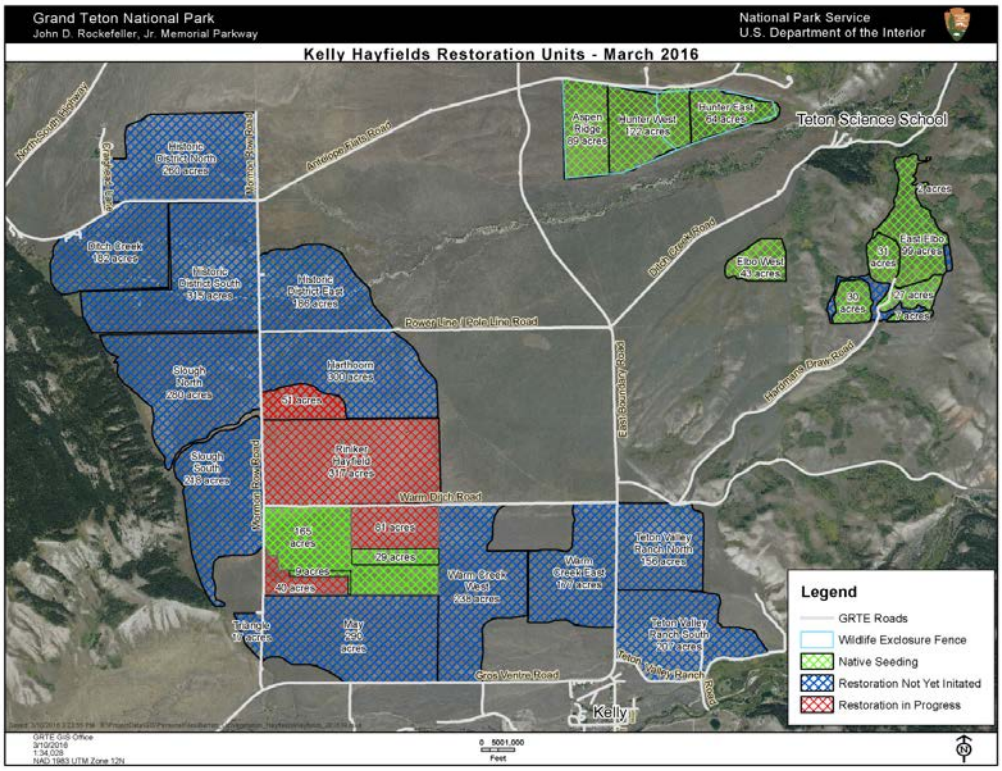


Figure 9. Units and status for the Kelly Hayfields ecological restoration effort in Grand Teton National Park, March 2016.

A database will be established to track non-agricultural conflicts on private lands to determine trends which will help evaluate the effectiveness of MSP mitigation efforts.

Preventing elk and especially bison from entering the Town of Jackson is essential in maximizing publicsafety and minimizing private property conflicts. Currently, bison are hazed northward when they drift south of Miller Butte. A cattle guard was installed on the Refuge Road just north of Broadway Avenue. This barrier is designed to prevent elk/bison from entering the Town of Jackson.

Vegetation Restoration/Protection

The varied approaches to restore the Kelly Hayfields in GRTE (4,500 acres) was initiated in 2008 following 2 years of research and field studies (Moeny 2008). The approach to ecological restoration includes serial treatments to 1) remove non-native species (e.g., herbicide application and prescribed burning); 2) seed native shrub, grass, and forb species; and 3) treat subsequent invasive plants by applying herbicides and, where appropriate, construct temporary fences to protect recently seeded pastures from colonization of non-native species and damage from large herbivores during early phases of restoration.

Of the 4,500 acres targeted for ecological

restoration in the Kelly Hayfields of GRTE, 1,235 acres within 7 pasture units are currently under restoration treatment and 3,265 acres remain non-native grass pasture (as of 2016; Figure 9). The non-native grass pastures are divided into 13 pasture treatment areas and are projected to be likely restored by 2035. As of 2016, approximately 745 acres are seeded with native vegetation, and 89 acres are considered fully restored. Maintenance of restored ecological conditions, however, will likely require management efforts in perpetuity to keep non-native species from colonizing restored areas. All 1,235 acres that are underway toward ecological restoration are being monitored for native plant establishment, invasive plant infestations, including cheatgrass spread. Park staff will continue to monitor and adaptively adjust treatments and restoration strategies according to our results.

Objective: *Maintain bull-to-cow ratios in park summer herd* (Table 1).

National Park Service management policy (NPS 2006) provides guidance for maintaining naturally regulated wildlife populations, free from the impacts of humans, to the greatest extent possible. The final BEMP identified a goal of maintaining park elk bull:cow ratios (a common way of expressing sex and age ratios in wild ungulate populations) near 35 adult bulls per 100 adult cows, based on estimates of what this ratio would be in a herd free from the effects of human harvest. The sex and age ratios of most North American elk populations are affected by sport hunting and herd managers generally maintain lower bull ratios.

Harvest

Based on summer bull ratios for elk in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded refuge hunting opportunities are considered.

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Table 4. Comparison of current and primary MSP components and parameters.			
Action	**Current Management**	**Management**	**Comment**
Winter Feeding:			
Feed	Pelleted alfalfa	Pelleted alfalfa	No change
Ration	Full ration average: 8-12 lbs/day/elk	No Change	No change, to minimize calf mortality. Note average daily ration over the entire feed season is lower than a full ration because feed rate is gradually increased at the beginning of the feed season and gradually reduced at the end to facilitate rumen acclimation
	20-22 lbs/day/bison	20 lbs/day/bison	
Start criteria:			
Available standing forage	300 lbs/acre, as measured at traditional key index sites	Generally later; index sites to be increased in number and distribution	Influencing factors: -time of season -forage availability -number of elk/bison on NER -elk/bison distribution
End criteria:			
Available forage	Based on a snow cover index and subjective estimate of when residual or new forage is adequate	Generally 1 week earlier than current management	Ongoing development of more objective criteria for future implementation ongoing
Monitoring:			
Animals on feed	Mid-winter census	Elk/bison fed days[1]	
Proportion of JEH on NER	Mid-winter census	Mid-winter census	
feed			
Calf mortality	2008-2015 Average: 3.3% (range 1.1-9.0%)	Potentially higher than current levels but less than native winter range	
Elk/bison distribution – collars	Almost no documented use of private lands during feeding operations	Unknown, but likely higher use of private lands than current management	
Elk Winter mortality (all age classes)	2008-2015 Average:	<=3%	
	1.2% (range 0.6-1.9%)		

Table 4. Comparison of current and primary MSP components and parameters.			
Action	**Current Management**	**Management**	**Comment**
Elk summer range segment Proportions for NER wintering elk	Approximately -40% GTNP North of Moose -35% South Snake River -10% Gros Ventre/Flat Creek -10% Teton Wilderness -5% Southern Yellowstone	Unknown, but will be monitored based on summer distribution of radio collared elk	Based on summer distribution of elk that were randomly radio collared on NER.
Harvest, National Elk Refuge elk:			
Frequency	Annual	Annual	
Begin Date	2nd week October	No Change	Modified as necessary
End Date	3nd week December	No Change	Modified as necessary
Structure	- 1 week initial drawing	- 1 week initial drawing	
	- 1 week left over 1st served	- 1 week left over 1st served	
	- partial week alternate	- partial week alternate	
	-daily 1st served alternates	- daily 1st served alternates	
Refuge permit types	- 1st week any elk	- Primarily antlerless only	
	- Antlerless only remainder of season	- limited any elk permits throughout season	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries		Consider expanding to allow bow hunting near developed areas	
Harvest, National Elk Refuge bison:			
Frequency	Annual	Annual	
Begin date	August 15th	August 15th	Modified as necessary
End date	2nd or 3rd week January	Consider later dates as appropriate	Modified as necessary
Hunting Season Structure	As per WGFD	As per WGFD	
Refuge permit types	Any bison or cow/calf per state license	Any bison or cow/calf per state license	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries	Limited to north of Nowlin Creek area	Consider escorted hunting in South Unit as needed	Guided hunts in South Unit when authorized
Harvest, Grand Teton NP elk:			
Frequency	As needed	As needed	
Begin Date	3rd week October	3rd week October	Modified as necessary
End Date	2nd week December	2nd week December	Modified as necessary
License types	Antlerless only	Antlerless only[2]	
Special regulations:	Cartridge limits	Cartridge limits	

Table 4. Comparison of current and primary MSP components and parameters.			
Action	**Current Management**	**Management**	**Comment**
	Bear spray required	Bear spray required	
	Hunter safety card required	Hunter safety card required	
Harvest, Bridger-Teton NF, Elk Hunt Area 80:			
Begin Date			
End Date		15-Dec	Would require change in winter closure dates
Harvest, Elk Hunt Area 78			
Structure			Changes at discretion of WGFD
License Types			
Private Lands Mitigation:			
Cattle commingling		Incentives for non-breeding operation	
Hay depredation		Increased fencing	
Landscape damage			
Easement acquisition			
Vegetation Restoration/ Protection: Elk Refuge			
Vegetation Restoration/ Protection: Grand Teton	Herbicide treatments, prescribed burning, native seed propagation and planting, and protection and maintenance of restored pastures	Same as Current Management for remaining non-native grasslands in Kelly Hayfields	
[1]Number elk and bison on feed per day, totaled by feeding season.			
[2]Any elk licenses could be offered if bull ratios in the park consistently exceed BEMP criteria.			

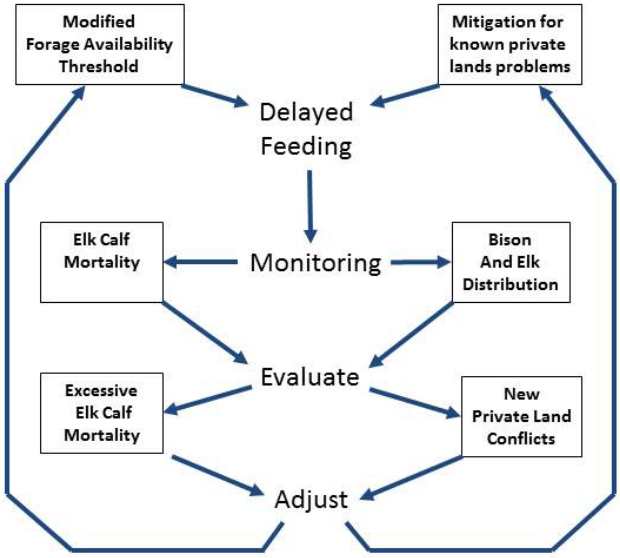


Figure 10. Framework for delayed feeding strategy under MSP.

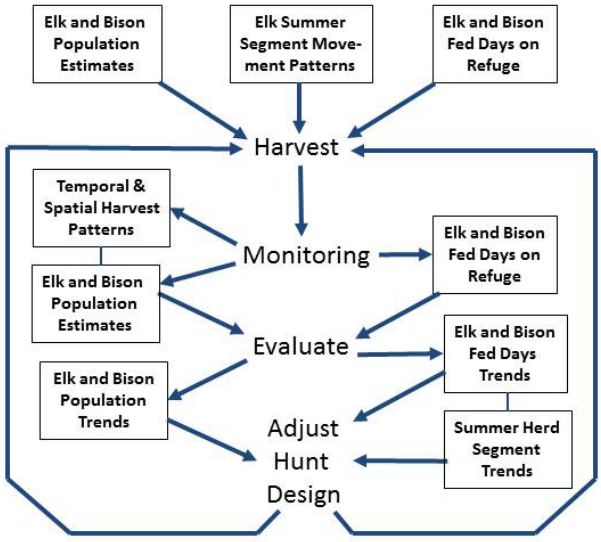


Figure 11. Framework for harvest strategy under MSP.

Strategies Considered But Rejected

The BEMP considered several additional strategies for elk and bison management that, for a variety of reasons, were not selected for implementation in the preferred alternative and Record of Decision. The agencies reconsidered a subset of these during the development of this MSP (Table 5). Since they were not part of the ROD, additional NEPA compliance would be necessary to incorporate any of them into this MSP, and thus they are not being considered at this time.

Table 5. Strategies considered but rejected.

Strategy Considered	Reason Rejected
Fertility control in elk	Judged not reasonable or feasible in BEMP, primarily due to major technical, social, and financial hurdles[1]. For MSP discussed primarily with regard to the difficult to harvest herd segment in Hunt Area 78 on private lands, where federal agencies have no jurisdiction.
Fertility control in bison	Impacts discussed at length in BEMP[2]. Not considered for MSP because current hunting programs appear effective at slowly moving the herd toward the 500 animal herd objective.
Agency reduction of bison or elk	Not considered necessary or desirable on federal lands because current hunting programs that utilize sport hunters are effective at meeting herd objectives.
Altering rations of supplemental feed	Rejected as a strategy because reducing daily feed ration below 8 lbs/elk would be enough feed to encourage elk to remain on NER but would result in unacceptably high elk calf mortality rates.
Private Lands Hunting Coordinator	The WGFD contacted private landowners and ranchers in the Spring Gulch area and discussed this concept to enhance elk harvest of short distance migrants. Generally, landowner interest was low.

MODELS OF SYSTEM DYNAMICS

Models provide a simplified representation of the biological system being managed. We will use modeling to quantify the effects of our management actions on 2 key responses of interest, elk distribution and winter elk calf mortality. There are a suite of possible factors that affect the proportion of elk on NER feedgrounds versus native winter range. Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

An increase in calf elk winter mortality is a potential result of reduced feed season length. Several factors influence winter calf elk survival on NER (Fig. 13). Models will be used to assess the effects of available forage on winter calf elk survival (Appendix 4). Over time this will allow us to assess the effects of our principal management strategy (reducing feed season length) relative to winter elk calf survival.

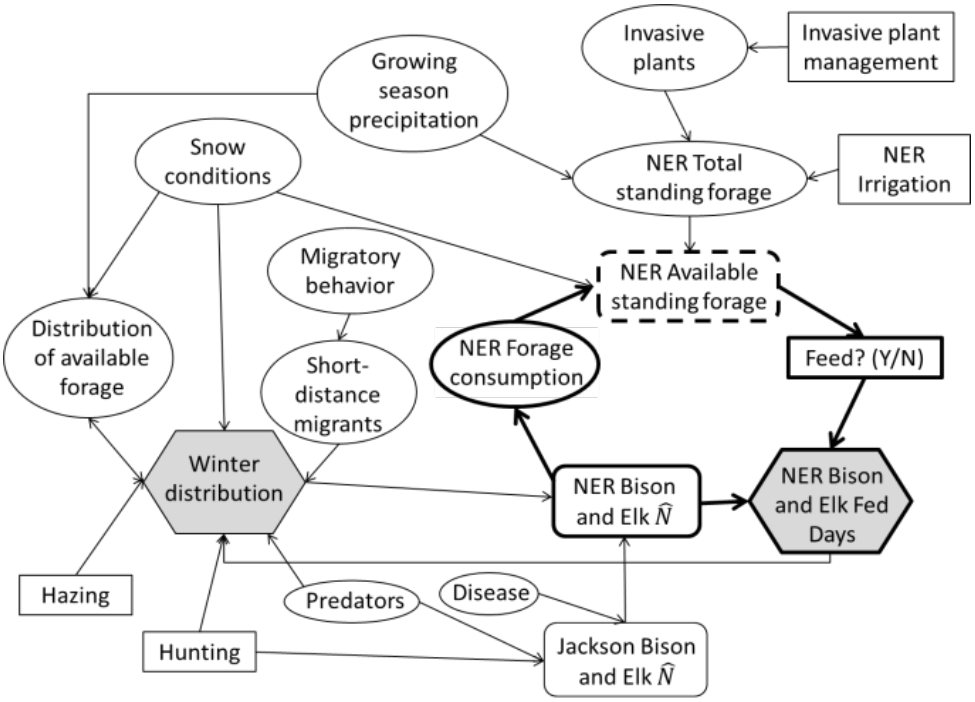


Figure 12. Diagram depicting the factors that potentially influence outcomes identified in the Bison and Elk Management Plan (BEMP; USFWS 2007a). Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

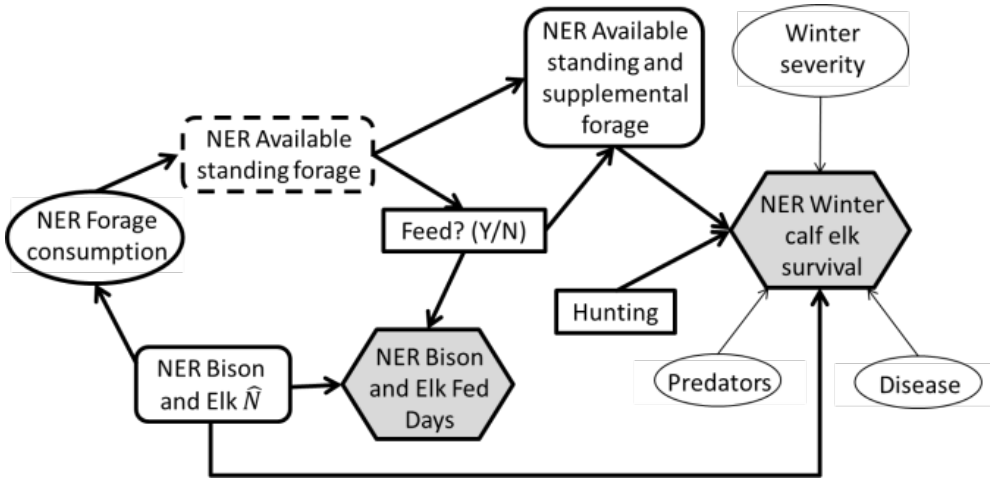


Figure 13. Diagram depicting the factors that potentially influence bison and elk fed days on the National Elk Refuge and winter calf elk survival. Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

MONITORING

Feeding Initiation Monitoring

NER uses weekly field estimates of the amount of forage available to elk to determine feeding initiation date. Currently measurements are taken at key index sites representing areas preferred by elk on NER (see supplemental materials at end of this section). These methods will be enhanced by 1) increasing the number of sampled sites to better represent the total amount of forage available to elk on the southern half of NER; 2) increasing the precision of estimates at each site by increasing the number of observers; and 3) extending the monitoring period later in the winter to assess the relationship between available forage and elk and bison distribution.

To better represent the total amount of forage available on the southern half of NER, a subsample of current key index sites will be retained to facilitate comparison with historic data, but additional random sample sites stratified by elk habitat preference will be added. Historic elk distribution mapping and elk GPS collar data (NER unpublished data) suggest that the areas most preferred by elk on southern NER are associated with moderate to high forage production and green vegetation. Because the distribution of forage production and greenness characteristics vary annually based on irrigation and precipitation patterns, we will annually map areas preferred and not preferred by elk and sample sites will be randomly selected within each of these mapped categories. At least 3 historic key index sites, 3 random sites in areas preferred by elk, and 3 sites in areas not preferred by elk will be sampled each week from late December through the initiation of supplemental feeding.

Currently the NER biologist is the only person trained in the techniques used to estimate available forage (see supplemental materials). At least 2 additional personnel will be trained in these techniques. This will provide a backup in the event of future personnel changes and will facilitate error estimates of the available forage measurements at each site.

Currently NER and WYGFD biologists monitor available forage conditions at least weekly from late December until average available forage at key index sites nears the threshold level of 300 lbs. per acre and feeding is initiated. The principal MSP strategy is to delay the initiation of supplemental feeding after average forage production reaches the 300 lbs/ac level at key index sites. Therefore the monitoring period will be extended to include this period of delayed feeding.

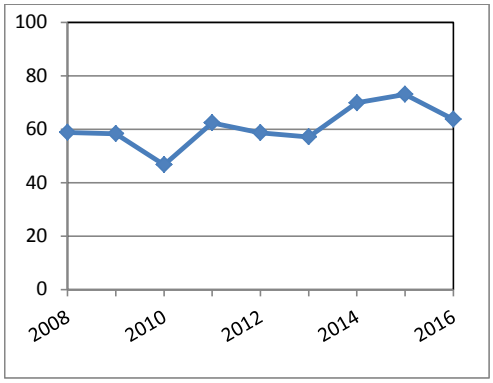


Figure 14. Proportion of the Jackson Elk Herd that was classified on NER feedgrounds in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

Proportion of Elk Wintering on NER

A principal MSP goal is to reduce the number of elk wintering on NER. Our strategy will be to effect redistribution of elk to native winter range from NER over time via shortening the duration of the feed season, and thus slowly conditioning elk to seek food elsewhere. As feeding periods are shortened, the probability of younger elk age classes discovering NER feedgrounds will be reduced, and, hypothetically, that proportion of the JEH that utilizes NER feedgrounds will decline over time. We will measure this effect by examining changes in the winter distribution of the JEH. WGFD annual trend/classification count data provide a multi-year baseline data set to measure changes in the winter distribution of the JEH and categorizes observations by location. In each year, we will calculate the proportion of total classified elk in the JEH that are classified on NER feedgrounds. We will compare the 3-year running average post MSP implementation to the pre-implementation baseline. The pretreatment baseline will be comprised of data from 2008 2016, a time period that represents BEMP implementation prior to MSP actions (Figure 13).

Elk Fed Days and Bison Fed Days

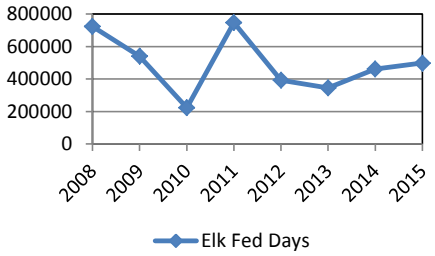
The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. We further assume the variables elk-fed-days (EFD) and bison-fed-days (BFD) are a proxy for these conditions. EFD and BFD will be calculated annually for each species based on the following formulas:

EFD= ∑ Total elk counted on feed during daily feedground counts for duration of feed season

BFD= ∑ Total bison counted on feed during daily feedground counts for duration of feed season

Because EFD and BFD are influenced by feed season length and the number of animals on feed, the MSP strategy of delaying the initiation of supplemental feeding will inherently reduce the number of EFD and BFD through a reduction in average feed season length. We believe that EFD will be further reduced by encouraging a greater proportion of the JEH to winter on native winter range, thereby reducing the number of elk occupying NER feedgrounds. We will evaluate changes in EFD and BFD by comparing the 3-year running average post MSP implementation compared to mean EFD and BFD from 2008–2015. The running average is an appropriate comparison because it will help

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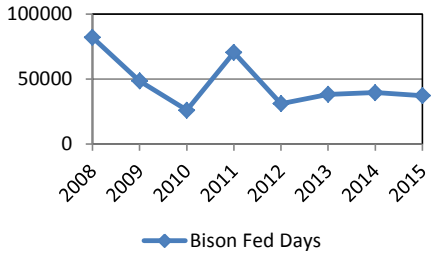


Figure 15. Elk Fed Days (EFD) and Bison Fed Days (BFD) in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the Management Step Down Plan (2008-2015). These values represent the pretreatment baseline which will be compared to the 3-year running average EFD and BFD post MSP implementation.

account for wide annual variation in EFD and BFD associated with winter severity (Figure 15)

Elk Winter Mortality Monitoring

NER has used consistent methods to monitor winter elk mortality since 1982. Each winter NER biologists and other refuge staff conduct a survey of all non-hunting related winter elk mortalities that occur on NER from November through April. Mortalities are tallied by age/sex class and percent mortality is calculated using the corresponding number of elk classified on NER feedgrounds as the denominator. We will continue to monitor elk winter mortality using the same methods post-MSP implementation, which will allow trend comparisons to the pre MSP baseline (Figure 15). Under the MSP framework, we believe the 3-year running averages for total and calf winter elk mortality will be within the range of variation exhibited by the pre MSP baseline. Historic monitoring suggests that calf and total mortality are sensitive to winter severity and disease outbreaks, and that winter mortality occasionally exceeds >3% total mortality and >10% calf mortality. Post-MSP mortality in excess of these levels may warrant shortening the feeding initiation delay in subsequent years.

Elk Collaring

One of the MSP's principal strategies is to shorten the length of the feed season to encourage elk use of native winter range, but we anticipate that this strategy will also result in an increase in elk conflicts on surrounding private land in the town of Jackson and the Spring Gulch areas, potentially including large groups of elk. To quantify this effect and provide real-time information to WGFD and NER managers to facilitate a response, we propose maintaining a sample of 50 GPS-collared elk that winter on NER throughout the MSP implementation period. Forty-five elk represents approximately 0.5% (1 in 200) of the NER winter elk population. This sample size will not be sufficient to detect all elk movements from NER to surrounding private lands, particularly movements by small groups of mature bull elk, but it will be sufficient to detect and quantify significant movements of cow/calf/yearling elk groups compared to pre-MSP baseline data.

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NER has elk GPS-collar data available from the 2008-2013, which represents the post-BEMP, pre-MSP baseline period. We hypothesize that elk movements from NER to surrounding private lands will increase during the MSP implementation period compared to the pre-treatment baseline. This will be tested by comparing the number of incidents that elk left NER for surrounding private lands (per elk/per year), and the proportion of elk GPS fixes on NER versus private lands during time periods of interest. The principal time period of interest is late December–March because this represents the period after the NER elk hunting season, and prior to, and during, NER feeding operations. This is the season when changes to the NER feeding program would be most likely to result in elk distribution changes.

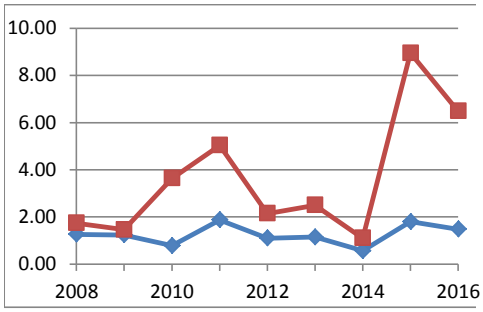


Figure 16. Total (blue) and calf (red) elk winter mortality (%) on NER in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

Thirty adult cow elk were captured on NER feedgrounds in February 2016 and Telonics Iridium GPS collars were deployed with a 90 minute fix interval. Collars will be deployed on up to 50 additional adult cow elk in February-March 2017. Given 83% annual survival for adult cow elk in the JEH (Cole and Foley et al. 2015) and 3-year collar life, approximately 10 additional elk will need to be collared each year in winter 2018 and 2019 to maintain the 50 elk desired sample size over the life of the MSP implementation period.

Ancillary data that will be collected and analyzed during the elk capture and collar data analysis process includes brucellosis seroprevalence, pregnancy rate, and elk summer range determination for comparison to the findings of Cole and Foley et al. (2015).

Disease

The primary purpose of limiting reliance on supplemental feeding is to reduce the prevalence of endemic elk and bison diseases and mitigate transmission risk associated with the introduction of novel diseases. We hypothesize that brucellosis seroprevalence will decline post MSP implementation. There are no recent brucellosis seroprevalence data for elk on the NER, but >50 elk will be captured during elk collaring operations in winter 2016, and each elk will be tested for brucellosis exposure. The 2016 Brucellosis seroprevalence rate will be the pre-treatment baseline to evaluate post MSP change. Chronic wasting disease (CWD) has been monitored in the JEH since 1997, and since 2008 it has been monitored with sufficient sample size to detect 1% prevalence with 95% confidence. No CWD positive cases have been detected in the JEH, which given the long term persistence of the disease, provides overwhelming evidence that CWD is not currently endemic to the JEH. However, most evidence suggests that the distribution of CWD is increasing and that its introduction to the JEH is inevitable. Early detection is critical to ensure a management response, and therefore ongoing monitoring at sample sizes sufficient to detect 1% CWD prevalence with 95% confidence is necessary. CWD is sampled by testing tissues collected primarily from hunter harvested elk, and past experience suggests that 2 full time technicians working from September-December are necessary to ensure minimum sample size. Typical costs associated with 2 technicians are $32,000 per year.

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Data Collected for Modeling

Table 6. Variables to be used in models to explain elk winter distribution in the Jackson Elk Herd and elk calf mortality on NER.

VARIABLE	SOURCE	Elk Winter Distribution Model	Elk Calf Mortality Model
Proportion Jackson Elk Herd on NER Feedgrounds	WGFD/NER Jackson Elk Herd February Classification Count	Yes	No
Proportion Jackson Elk Herd from South Snake River summer segment	Determined from elk GPS collar data for elk captured on NER	Yes	No
Number of wolf packs in the Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated total wolf numbers in Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated number of wolves using NER in winter	NER observations	Yes	Yes
Total NER herbaceous forage biomass	NER forage production survey data	Yes	Yes
Snow Water Equivalent	NOAA snowtell site data	Yes	Yes
NER Winter elk Mortality (calf)	NER winter elk mortality survey	No	Yes
Snow Depth	NOAA Snowtell sites and NER measurements	Yes	Yes
Available Forage	NER and GTNP monitoring in winter months	Yes	Yes
NER Elk and Bison Fed Days	NER feeding records and daily feedground estimates of elk and bison	Yes	Yes
NER Feeding Start Date	NER feeding records	Yes	Yes
Gros Ventre Feeding Start date	WGFD feeding records	Yes	No
Elk Hunting Pressure by Hunt Area	Estimated number of hunter days from WGFD completion reports	Yes	Yes

To facilitate modeling, we will collect data on the following associated variables (Table 6). The table lists variables and how they relate to our efforts to use modeling to explain changes in elk distribution and elk calf mortality relative to our principal action of reducing feed season length.

EVALUATION/FUTURE MANAGEMENT

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Consequently, we anticipate that the strategies outlined in this plan will be in place for a minimum of 5 years, after which an initial evaluation of the program will be made. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented at an annual management MSP update/report, completed by NER staff by the end of March for the previous year.

Consistent with objectives outlined in the BEMP, the long-term goal of this plan is reduce the reliance of bison and elk on intensive supplemental feeding, using adaptive management principles through a structured framework of management actions, to achieve a desired condition of animals relying predominately on native habitat on NER, GRTE, and USFS lands, and on NER cultivated forage. But because there is no precedent for what this plan proposes, there are few responses to proposed management actions that can be predicted to a degree of certainty commensurate with establishing definable thresholds or other objective criteria for success in the short term.

Factors that will be considered in evaluating the success of the program will include the trend of EFD and BFD, type and frequency of private lands conflicts, the proportion of the JEH wintering on the NER, presence or absence of CWD and other infectious diseases, elk and bison population size and distribution, elk calf winter mortality, and public support. These are complex, dynamic, and interwoven components that, together with the MSP, make up the framework for decreasing reliance on supplemental feeding. As such, the effects of changing biological, social, and political conditions on these components will be part of the evaluation process.

In the context of this larger framework, however, we believe evaluation of the trend in EFD and BFD will be most important after the first 5 years of MSP implementation. The direction and magnitude of the trend observed will provide a preliminary basis for evaluation and decisions about continued management actions. Initial success with reduced feeding will be associated with a declining trend in EFD and BFD, with greater magnitudes indicating higher degrees of success. However, determinations of overall program success will necessarily include evaluation of all system components. For example, gains in reduced feeding come could be accompanied by an increase in private land conflicts, which would affect overall success determinations. While the overriding strategy will be to decrease feeding as aggressively as possible while gauging effects on other system components, overall measures of program success through time will necessarily involve evaluating a matrix of effects. These evaluations will be included in annual MSP reports.

As proposed and new management strategies are implemented and evaluated under this plan, at some point in the future it may become apparent that meeting reduced feeding goals will not possible without reducing elk and/or bison population objectives. Population objectives for both herds are set by Wyoming Game and Fish Commission and are evaluated regularly by WGFD personnel, including public review through annual season setting meetings. The BEMP supported the State herd objectives of 500 bison and 11,000 elk, and thus due to NEPA requirements any further consideration of reduced herd sizes by the NER or GRTE are beyond the scope of this plan. However, Wyoming Game and Fish Commission changes to Jackson bison or elk herd objectives are not constrained by the BEMP.

Comment [CE9]: Consider FAQ callout "**Why is the MSP vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?"**

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Investigating the potential effects of climate change on elk and bison management will also be important in the long-term. During implementation of this plan, we will collect a variety of data that could be drawn upon for this purpose.

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PUBLIC OUTREACH AND EDUCATION

The practice of winter feeding is inexorably woven into the historic fabric of Jackson Hole. Elk are identified with the rich and unique legacy for which Jackson Hole is known around the world. De-emphasizing the supplemental feeding program will be a major paradigm shift for the residents of Jackson Hole, Teton County, and the State of Wyoming.

An effective Public Outreach and Education program is essential for effective MSP implementation. The practice of feeding elk evokes passionate responses from those that oppose and those that support this practice. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk/bison herd management methods.

A detailed communication plan to guide outreach and education efforts can be found in Appendix 3.

SCHEDULE

Table 7. Proposed implementation schedule for the MSP.

Action	Date
Public outreach and education	November 2016
Initiate private lands conflicts mitigation contacts/actions	January, 2017
Implement enhanced forage monitoring	January, 2017
Initiate changes in supplemental feeding protocol	January/February 2017
GPS Collar 30-40 elk (Iridium platform)	March 2017
Monitoring/Evaluation/Annual Report	June 2017

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BUDGET

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

	Year				
Agency / Activity	**1**	**2**	**3**	**4**	**5**
National Elk Refuge:					
Monitoring:					
Seasonal Biological Technician (0.5 FTE, GS-7)	$24,000	$25,000	$26,000	$27,000	$28,000
Bison/elk fed days					
Mid-winter census					
Elk summer herd segment distribution[1]					
Expanded standing forage estimates[1]					
Chronic Wasting Disease, 2 seasonal bio.-techs	$32,000	$32,000	$32,000	$32,000	$32,000
Winter bison/elk distribution					
Irrigation					
50 Elk radio telemetry collars; Iridium Platform	$115,000	$25,000	$25,000	$25,000	$25,000
Bison barrier maintenance at NER south entrance	$500	$500	$500	$500	$500
Step Down Management Plan annual reporting	$2,000	$2,000	$2,000	$2,000	$2,000
Private lands:					
Easements / Leases (Private Foundations)	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000
Conflict mitigation technicians (WGFD)	$91,000	$91,000	$91,000	$91,000	$91,000
Hazing (helicopter)	$6,000	$6,000	$6,000	$6,000	$6,000
Vegetation restoration/protection[1]					
Public Outreach and Education	$11,000	$1,000	$1,000	$1,000	$1,000
Subtotal					
Grand Teton National Park:					
Monitoring:					
Summer elk classification/distribution	$10,000	$11,000	$12,000	$13,000	$14,000
Collaborative elk monitoring (GRTE portion)	$5,000	$5,000	$5,000	$5,000	$5,000
Vegetation Restoration/Protection					
Monitoring	$16,000	$16,000	$18,000	$18,000	$12,000
Temporary bison fencing	$24,000				
Temporary fence maintenance	$6,000	$8,000	$8,000	$4,000	
Hayfields restoration	$84,000	$70,000	$70,000	$31,000	
Exotic plant mitigation	$50,000	$52,000	$46,000	$32,000	$16,000
Elk Reduction Program (subject to annual review)					
Hunter harvest evaluation	$1,500	$1,500	$1,500	$1,500	$1,500
Harvest age distribution	$2,000	$2,000	$2,000	$2,000	$2,000
CWD monitoring (0.15 FTE, GS-6)	$7,000	$7,000	$7,000	$7,000	$7,000
Law Enforcement and Visitor Protection (0.15 FTE for 20 LE and support staff; supplies, and permitting)[3]	Unknown				

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
Subtotal					
Wyoming Game and Fish Department:[2]					
Subtotal					
Grand Total					

[1]See detail in Appendix

[2] Dependent on size of elk reduction program; current annual expenditures are approx. $295,000 for 0.15 FTE for 20 LE and support staff; supplies, and permitting.

[3]Through Interagency Agreement

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APPENDIX ?? Frequently Asked Questions

Q1: Why is the MSP vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?

A1: This is the first time that the strategy of delaying feed season initiation has been employed to reduce reliance on supplemental feeding. There is uncertainty regarding the effects of this strategy on elk and bison distribution and elk winter mortality, and therefore it is important to maintain flexibility in plan implementation to avoid significant unintended negative consequences. Unintended negative consequences the MSP seeks to avoid include 1) elk or bison moving to areas where they damage property, risk human safety, or commingle with livestock, and 2) elk winter mortality levels significantly higher than baseline levels.

Q2: Why were reductions to the Jackson Elk Herd and Jackson Bison Herd population objectives not considered as a strategy to reduce reliance on supplemental feeding?

A2: The BEMP has clear population objectives of 5,000 elk wintering on NER and 500 wintering bison. Modifying those population objectives would require additional NEPA analysis. The BEMP also agreed to support State elk herd objectives. The WGFD completed a public process in 2016 to set the population objective for the overall Jackson Elk Herd, and that objective remains unchanged at 11,000 elk.

Q3: The BEMP has an objective of 5,000 elk wintering on NER. Why has that objective not been achieved through increased elk harvest?

A3: The overall Jackson Elk Herd population has declined and is currently close to the 11,000 elk objective, but the number of elk wintering on NER has been well above the 5,000 elk objective since implementation of the BEMP in 2007 (Mean =7,100 elk). When the analysis was conducted for the BEMP, elk winter distribution data suggested that 5,000 elk could winter on NER while still maintaining 11,000 elk in the Jackson Elk Herd overall. However, the proportion of the Jackson Elk Herd that winters on NER has increased significantly over time, and based on current elk distribution it is no longer possible to winter 5,000 elk on NER and maintain 11,000 elk in the overall Jackson Elk Herd. Although increasing elk harvest above current levels would likely allow us to achieve the 5,000 elk objective for NER, it would also reduce the overall Jackson Elk Herd population below the 11,000 objective. If increasing elk harvest in not plausible, the only other option to meet the 5,000 elk objective on NER is to change winter elk distribution, which is the principal strategy of the MSP.

Q4: Why is your principal strategy to delay the start of the feed season?

A4: By delaying the start of the supplemental feed season we decrease the probability that elk that use native winter range or state feed grounds will discover NER feed grounds. Because elk use of feed grounds is a learned behavior, over time this could increase the proportion of elk that winter on native winter range, reduce the number of elk that move from the Gros Ventre drainage to NER, and decrease the NER wintering elk population. The resulting shift in elk distribution would allow us to achieve the

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5,000 elk objective for NER. Because 5,000 elk and 500 bison is close to the estimated carrying capacity of NER habitat, less feeding will be necessary at these population levels.

Q5: Will delaying the start of the feed season result in elk starvation?

A5: Our goal is to delay elk feeding a sufficient amount of time to affect elk distribution without causing an increase in elk mortality.

APPENDIX 1. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007).

Comment [CE10]: If the Frequently Asked Questions section will go in the Appendix, then subsequent appendix numbers will have to be changed

Populations

- Jackson elk herd objective of 11,000 would be maintained.
- New Jackson bison herd objective of 500 established.

Winter Feeding

- Supplemental feeding could be delayed or could occur earlier compared to current practices.
- Changes [to feeding program could] include alterations in the timing of feeding and providing supplemental feed in fewer years.
- Ration or pellet composition might need to be changed.
- Supplemental feeding would be initiated according to established criteria, including pre-winter forage production, assessments of forage utilization (done jointly by WGFD and NER personnel), elk condition and movements, and potentially on the January 1 index of winter severity calculations for elk (Farnes, Heydon, and Hansen 1999).
- Mechanical means could be used to increase forage access for elk after snow crusting events.
- Changes in the refuge supplemental feeding program could begin to affect elk nutrition (negligible adverse effect on NER elk from lower nutrition).
- Displacement of elk by bison during competition for standing forage would decrease as the bison herd is reduced.
- Aggressive social interactions involving competition for food among elk and bison would increase overall as feeding periods are reduced.

Winter Distribution

- Elk densities on the NER would decline due to more reliance on standing forage and wider distribution.
- Elk use of lands surrounding the NER would increase, including:
    - USFS lands east of the NER
    - Gros Ventre feedgrounds possibly
    - Southern GRTE
    - State feedgrounds south of the NER
- Most of winter distribution shift would involve elk in the Yellowstone, Teton Wilderness, and Gros Ventre segments.
- As ungulate numbers decreased and supplemental feeding was reduced, competition and aggressive social interactions on the refuge would also be reduced.
- Elk and bison distribution would increase as the animals relied more on native winter range.
- Fewer animals would be present on the refuge.

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Mortality

- As supplemental feeding is reduced, natural factors such as climate and native forage availability would have a greater influence on numbers, movements, distribution, and mortality.
- More elk would be subject to natural factors affecting mortality, including loss of body condition, predation, and starvation.
- Increased mortality on and off the refuge would mainly affect older elk and calves, and some prime bulls entering the winter energetically stressed due to rut activities.
- Late winter calf ratios could decrease as a result of higher winter calf mortality
- Average winter mortality on the refuge would increase from 1%–2% annually to an estimated 1%–5%.
- Overall, a higher total winter mortality rate of approximately 5% could be expected.

Disease

- Reductions in supplemental feeding or elk numbers would reduce the potential for impacts due to tuberculosis, septicemic pasturelosis, and CWD.
- The health and sustainability of the Jackson elk herd would be increased gradually as supplemental feeding was reduced and there was greater reliance on standing forage and wider ungulate distribution.
- Health and sustainability of the Jackson elk herd would be enhanced in the long term.
- Wider distribution of elk would result in moderate reductions in both the prevalence and potential transmission of brucellosis, as well as potential for spread of diseases not yet in the population.

Private Lands

- The agencies would work closely with the WGFD and landowners, including livestock producers, to coordinate actions that would prevent conflicts due to elk dispersal and to defray costs of managing potential conflicts. Preventing access to food/hay rewards on private lands would be vital for effective management.
- Private land conservation easements within NER boundaries would promote wider distribution.

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APPENDIX 2. Monitoring Supplemental Materials: Feeding Initiation Methods

At each sample site, 10 subplots will be measured at every 5 steps along the random bearing determined for each site. At each subplot a 13.27" diameter metal sampling ring will be placed on the ground. The amount of forage available to elk within the sampling ring (dry weight in grams) will be visually estimated. The 13.27" diameter subplot allows easy conversion from grams to lbs. per acre (each gram is equivalent to 100 lbs. per acre). During annual forage production sampling, refuge biologist Eric Cole has made approximately 1,000 of these visual estimates per year for 17 years, and 33% of Cole's estimates have been verified by clipping and weighing. Therefore, Cole will be the principal estimator, but additional personnel will be trained in these techniques to provide redundancy in the event of personnel changes, and to increase the number of observers to facilitate estimation of error.

Estimating available forage within the sample ring at each subplot is relatively straightforward when snow cover is limited, but estimating how much of the forage is accessible to elk when snow is dense, deep and crusted can be subjective. To decrease the subjectivity of the estimation process, if the area under the sample ring is covered with snow, only forage that can be exposed with a gloved hand will be included in the estimate of available forage. Forage that is fouled with manure and/or flush with the ground due to trampling and/or encrusted in ice will not be included in the estimate of available forage. At each subplot the estimate of available forage (dry weight g) will be converted to an equivalent lbs./acre value (1 gram=100 lbs./acre). The arithmetic mean of available forage (lbs./acre) for the 10 subplots provides an estimate of available forage for each index site. There are 3 sample site categories: 1) Historic Key Index Sites that have been used since 2007, 2) New randomly selected sites within areas preferred by elk, and 3) New randomly selected sites in areas not preferred by elk. Historic key index sites were not randomly selected, but were instead selected to represent areas most preferred by elk on the south end of NER. These were the sites used to determine when supplemental feeding would be initiated from 2007 until the implementation of the MSP. To facilitate comparison with pre-MSP data, we will continue to use mean lbs. per acre across historic key index sites to determine the 300 lbs. per acre threshold. However, post MSP implementation we will delay feeding initiation by 2 weeks once the 300 lbs./acre level has been reached. We will concurrently sample at randomly selected sites stratified on an annual basis between areas highly preferred and not highly preferred by elk. This will enable us to quantify the relationship between mean forage availability at historic key index sites and random sites over time.

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APPENDIX 3. Communication Plan

Communication Goals

Prior to the MSP's Implementation

- Utilize a variety of outreach methods to inform the public on the goals and timing of the MSP implementation and possible effects on wintering herds.
- Utilize a variety of outreach methods to inform the public on public comment opportunities.
- Identify and coordinate key messages and outreach with USFWS regional and national offices, State and federal agency partners, non-profits, elected officials, and other identified audiences.

During the MSP's Implementation

- Continue to utilize a variety of outreach methods to describe current management actions as well as measurable and noticeable changes on the landscape, in animal behavior, or in animal health.
- Provide a comprehensive overview of the MSP by providing links and references to previous outreach and background information.

Communication Objectives

- Work with current media contacts to promote news of the MSP via print, radio, Web, and social media platforms.
- Utilize new media and social media tools to provide information on why the MSP was developed, what public comment opportunities exist, and how the plan is being implemented.
- Plan, coordinate, and execute public meetings to allow for public comment and questions on the plan.
- Develop and provide methods for the public to submit written comments on the MSP.
- Monitor print media on Refuge elk and bison management to see how the Step own Plan objectives and reactions are being portrayed to the public.

Current Outreach Resources

- National Elk Refuge web site
- National Elk Refuge news release list
- (approximately 300 contacts)
- National Elk Refuge Twitter site (1,039 followers)
- Bison and Elk Management Plan web site (http://www.fws.gov/bisonandelkplan/)
- Space for an 11" x 17" poster in the Visitor Center on Refuge management topics
- Display panels in the Visitor Center theater for temporary displays

Available Supporting Outreach Resources

- USFWS Mountain–Prairie External Affairs staff
- USFWS Mountain–Prairie web site, including the
- "Top Stories" feature
- USFWS Mountain–Prairie Twitter site USFWS Mountain-Prairie Region Facebook page
- USFWS National Wildlife Refuge System

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- Facebook page
- USFWS Facebook page

Previous Outreach Efforts

- NER routinely writes and disseminates news releases on Refuge management activities, including the Comprehensive Conservation Plan, supplemental feeding, herd health monitoring, and forage production.
- Post the above news stories as Content.
- Management System (CMS) articles.
- Post CMS news story promos so they prominently appear on the home page, linking readers to the articles.
- Send out Twitter messages linking viewers back to the news stories.
- Prepare, upload and provide links to Adobe PDF versions of news stories with additional photos where additional images are available and/or help understand or visualize the content.
- Utilized the Conservation link on the web Content
- Management System to post information about the Bison and Elk Management Plan and the draft Comprehensive Conservation Plan.
- Retained and provided a link to the original Bison and Elk Management web page (http://www.fws.gov/bisonandelkplan/) that was developed during the planning process. The web site includes links to the Final Plan/EIS, Record of Decision, Federal Register Notice of Availability for both the Record of Decision and Final Plan/EIS, associated news releases, public meeting highlights, and other related documents. Note: the National Elk Refuge does not manage the site.

Additional Outreach Opportunities

- Public meetings in Jackson and other identified locations.
- Service produced video; video could be posted to the National Elk Refuge's multimedia web page, or USFWS Mountain–Prairie home page "Top Video" feature.
- Live radio interview on KHOL (Jackson, WY radio)
- Wyoming Public Radio interview with Refuge management staff
- Interviews with local print media sources
- Updates at community leader meetings such as Rotary Club, Jackson Hole Chamber of Commerce board meetings, and interagency breakfast meetings (with Federal agencies and local elected officials).

Target Audiences

Internal

- Regional and National USFWS Leadership
- Refuge permanent staff
- Refuge seasonal staff
- Refuge volunteers

External

- Congressional representatives
- State of Wyoming leadership
- Federal agency partners, particularly Grand Teton National Park and the Bridger–Teton National

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Forest
- Wyoming Game & Fish Department
- Other NER partners, including county and town agencies and local nonprofit organizations
- Local elected officials
- Private landowners in proximity to the National
- Elk Refuge or neighboring Federal lands
- Tribes
- Local and state media
- Local public

Key Outreach Topics

- Overview of BEMP objectives
- Strategy to change elk/bison behavior
- Threat of disease
- Natural mortality rates
- Anticipated winter distribution changes for bison/elk
- Mitigate negative effects on private lands
- Change elk behavior and distribution while avoiding increased mortality.
- Explain the historic reasons a supplemental feeding program began and why it was continued.
- Explain the NER's limited large ungulate carrying capacity and the disproportionate impact of bison on available forage; 3 elk = 1 bison.

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APPENDIX 4. Models

Elk winter distribution model

The proportion of the JEH that winter on the NER will be linked to factors hypothesized to influence elk winter distribution using a generalized linear mixed effects model (GLMM). A GLMM can account for a proportional response variable (i.e., constrained to the interval 0–1) using a log link and binomially-distributed errors. A GLMM also includes fixed and random effects, with the latter capturing residual model variance otherwise not explained by fixed effects. Year will be including as a random effect, providing several benefits. First, we don't assume years are independent and comprise all of the factor levels of interest. Instead, the effect of year is treated as a random variable, with individual year effects realizations of that distribution. This allows inference to non-sampled factor levels, i.e. years, by estimating a latent population-level proportion of elk expected to winter on the NER regardless of fixed effect influences. Thus, the random year effect can be considered a latent variable describing elk behavior manifested as observed winter distribution. Second, because year effects are not treated as independent, estimated effects of year on the proportion of JEH elk wintering on the NER are dependent on all factor levels, leading to greater precision when estimating individual year effects (Kéry 2010).

The full GLMM incorporating fixed effects for each factor identified as influencing elk winter distribution is:

$$P_t = \beta_{0(t)} + \beta_1 * AFI_t + \beta_2 * SDM_t + \beta_3 * WP_t + \beta_4 * GSP_t + \beta_5 * SWE_t + \varepsilon_t$$

where the random intercept and residual model variance are

$B_{0(t)} \sim N(\mu_{\beta_0}, \sigma^2_{\beta_0})$, and

$\varepsilon_t \sim N(0, \sigma^2)$, respectively.

Fixed effects include 1) per capita available forage at initiation of winter feeding (*AFI*) , 2) proportion of the JEH that are short-distance migrants (*SDM*), 3) number of wolf packs present on JEH native winter range (*WP*), 4) growing season (May–August) precipitation for the Wyoming Snake Drainage climate division (*GSP*; a proxy for available forage on native winter range), and 5) snow water equivalent on 1 January at Thumb Divide (*SWE*; a proxy for early winter severity).

Elk calf winter survival and forage deficits

The Forage Accounting Model of Hobbs et al. (2003) has as an output weekly available forage biomass for the NER (sum of predictions for 30 × 30 m cells). These predictions account for snow conditions using a proxy of SWE and decrement total available biomass by 35% to account for unpalatable plants within the total estimate.

While calf survival is a function of multiple factors the primary management action influencing calf survival is supplemental winter feeding. Current winter feeding initiation criteria lead to calf survival generally higher than in unfed populations. Proposed feeding initiation criteria will result in later initiation of supplemental feed, which will be most influential to calf survival. There is currently little

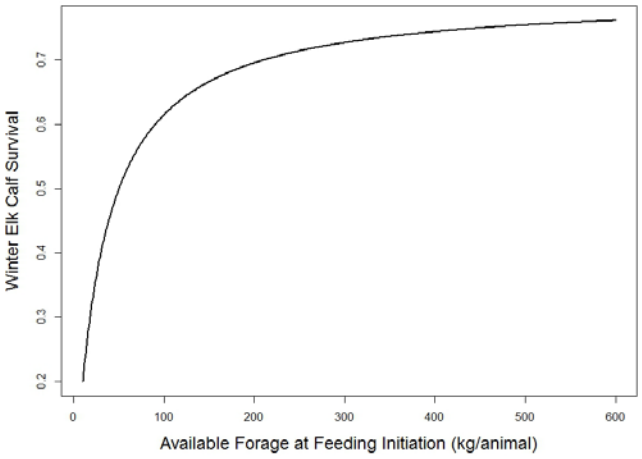
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understanding regarding the relationship between initiation of winter feeding and calf survival, except that current feeding initiation criteria result in high calf survival. We believe a threshold level of available forage at initiation of winter feeding exists such that winter calf survival reaches an asymptote. Below this threshold, calf survival is hypothesized to decline quickly with reductions in available forage at winter feeding initiation. Available forage at the initiation of winter feeding will be related to on elk calf winter survival using a saturating function (i.e., Holling type-II functional response; Fig. 6) by

$$S_t = \frac{aAFI_t}{b + AFI_t}.$$

The parameters *a* and *b* determine how calf survival is related to available forage. Maximum calf survival is *a*, and *b* represents the value of available forage to an individual when survival is 50% of *a* (Hilborn and Mangel 1997).

Although this approach doesn't capture forage deficits *per se*, it does provide a potentially sensitive proxy for this concept. It is assumed that a forage deficit for calves would occur at a point on the curve of the relationship between calf survival and available forage at initiation of supplemental feeding. Modeling the response of winter calf elk survival to changes in feeding initiation criteria facilitates our ability to maximize the influence of feeding initiation criteria on winter distribution while minimizing the likelihood of a large mortality event.



Hypothesized relationship between winter survival of elk calves and per capita available forage at initiation of winter feeding on the National Elk Refuge.

U.S. Fish and Wildlife Service National Park Service

September 2016 Draft

BISON AND ELK MANAGEMENT STEP DOWN PLAN

A Structured Framework for Reducing Reliance on Supplemental Winter Feeding

National Elk Refuge
Grand Teton National Park

DRAFT

September, 2016

September 2016 Draft

BISON AND ELK MANAGEMENT STEP DOWN PLAN

For the

National Elk Refuge,
Grand Teton National Park,
John D. Rockefeller, Jr. Memorial Parkway

Teton County, Wyoming

DRAFT

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Appendix I. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section

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EXECUTIVE SUMMARY

Overview

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands, focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The final plan directed the NER and GRTE (in conjunction with the Wyoming Game and Fish Department: WGFD) to maintain the state's elk herd objective of 11,000; establish a bison population objective of 500; restore habitat on the NER and in GRTE; continue hunting bison and elk on the NER; continue the elk reduction program, when necessary, in GRTE; allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available; and develop a dynamic, structured framework and Step Down Management Plan for decreasing the need for supplemental feeding on the NER. ***This Bison and Elk Management Step Down Plan (MSP) was developed to specifically addresses the criteria for a structured framework referenced in the Record of Decision.***

Background

Winter feeding of elk in Jackson was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. The loss of available winter range in Jackson Hole due to new ranching operations and a growing town resulted in significant numbers of elk dying during several severe winters in the late 1800s and early 1900s. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, established the National Elk Refuge. Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding.

Bison were extirpated outside Yellowstone National Park (YNP) by the mid-1880s but in 1948 were reintroduced to Jackson Hole when 20 bison from YNP were released near Moran, Wyoming. The herd remained small until discovering elk feedlines in 1980, when the population began sustained population growth. Bison and elk that winter on the NER are migratory and occupy summer ranges predominantly to the north.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER (Boyce 1989), high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases (Murie 1951, Franson and Smith 1988, Samuel et al. 1991), which is currently demonstrated by the high level of brucellosis in the elk and bison herds (Cross et al. 2010, Kamath et al. 2016). It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands (Smith et al. 2004), thereby reducing other wildlife associated with woody vegetation.

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. The potential risk of catastrophic disease outbreaks and the need to mitigate this threat is a vital component in achieving the BEMP Sustainable Populations Goal.

Comment [CE1]: This might be worth its own callout box similar to FAQs to draw attention to this critical point

Objectives

This MSP addresses several objectives under a broader BEMP goal of sustainable populations, which directed the agencies to: 1) develop a

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dynamic, structured framework for reducing NER supplemental feeding; 2) implement a phased reduction of animals on feed: a) Phase 1, to 5,000 elk and 500 bison, and b) Phase 2, elk and bison rely predominantly on native habitat; 3) maintain natural elk bull-to-cow ratios in park summer herd; and 4) enhance public outreach/education. The BEMP further stated that consideration criteria for implementing the 2nd phase of reduced feeding would include some or all of: 1) the level of forage production and availability on the National Elk Refuge, 2) desired herd sizes and age/sex ratios, 3) effective mitigation of bison and elk co-mingling with livestock on private lands , 4) winter distribution patterns of elk and bison, 5) prevalence of brucellosis, chronic wasting disease, and other wildlife diseases, and 6) public support. **In short, the overall objective of this plan is to provide a path for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives and public support.**

Strategies

Elk have been fed for some period during nearly every winter on the National Elk Refuge since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during a time of year when natural forage is typically most limited is powerful to both species, and their knowledge of its existence has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Attempting to modify this behavior on a large scale is unprecedented and will necessarily require investigation, constant evaluation, adaptive modifications to the approach when indicated, and repeated trials.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into the 3 broad categories of 1) timing and intensity of winter feeding, 2) timing and intensity of hunting, and 3) herd segment specific and overall harvest levels.

Measuring the success of MSP strategies will require knowledge of several bison and elk herd attributes. Because we are interested in reducing the intensity of elk and bison feeding throughout the entire winter season, which includes both the number of animals on feed and the duration of feeding, we will use measurements of elk-fed-days (EFD; the total number of elk fed per day per season derived from daily feedground estimates) and bison-fed-days (BFD; the total number of bison fed per day derived from daily feedground estimates) to evaluate feeding intensity. For example, if 5,000 elk were fed for 100 days during a given winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD. Average baseline feeding intensity during the post-BEMP to pre-MSP period from 2008-2016 was 487,838 EFD (range = 223,614-746,800), and 45,224 BFD (range = 26,035-82,124). Reductions in EFD and BFD compared to these baselines will represent progress in meeting feeding reduction objectives under the MSP. Reductions in EFD and BFD could be achieved through reducing the length of the feed season, reducing the number of elk and bison on feed, or some combination of both factors.

Initial success of MSP implementation will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP did not provide specific measurement criteria for the definition of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage" we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. These levels of reduction are consistent with elk and bison predominantly relying on free standing forage rather than supplemental feed.

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Similarly there are population-specific objectives derived from the BEMP and Phase 1 of the MSP for 5,000 elk wintering on NER and 500 bison wintering in the Jackson Hole area. Progress towards these objectives will be measured using annual classification counts and the average number of elk and bison counted during daily feedground estimates.

Chronic Wasting Disease. As of 2016, CWD has been detected within 40 miles of the Jackson Elk Herd (JEH) in moose, within 35 miles in deer, and within 175 miles in elk. Continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence will take place. Some aspects of CWD response planning could change based on implementation of WGFD's CWD management plan (WGFD 2016).

Winter Feeding. Currently, the initiation of supplemental winter feeding occurs when available forage drops to 300 lbs./acre along transects in areas with highly preferred grasses. This protocol will change to delay the initiation of feeding.

The strategy of delaying the start of supplemental feeding is to encourage elk and bison to use native winter range, especially those individuals that have not previously received a food reward on the Refuge. Over time, it's anticipated a cohort of animals will develop that are not conditioned to the Refuge supplemental feeding program, which will reduce herd concentrations and the risk of disease transmission.

To reduce supplemental feeding overall, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk and bison fed days, the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years of MSP implementation, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require focused mitigation measures.

As bison and elk behavioral responses are better understood, feeding delays will be extended to encourage a redistribution of elk and bison to native winter range. However other factors outside of the scope of this plan such as wolf numbers and distribution could reduce the effectiveness of this strategy.

Variables that influence feeding initiation date will be considered (Table 4, Fig. 10). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. And finally, the distribution of animals, particularly on private, livestock producing lands, would be considered prior to delaying feeding initiation date.

Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years.

In the early years of MSP implementation, the seasonal termination of feeding is expected to

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occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date as the MSP is implemented.

Harvest. Few options for manipulating elk hunting are currently available because the JEH is at or near the 11,000 WGFD objective. Proposed changes include allowing limited any elk permits, allowing a bow season near developments on the NER, delaying the elk season so it will better coincide with migration timing, and alternating areas that are closed and open to hunting over time to encourage animal movements or facilitate harvest.

Based on summer bull ratios in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded hunting opportunities are considered.

The proportion of the Jackson Elk Herd that winters on NER has increased in the past 2 decades. This trend is correlated with a decline in elk use of native winter range and an increase in the proportion of NER elk that occupy winter ranges immediately adjacent to the Refuge. If efforts to encourage increased use of native winter range are unsuccessful, agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. This will provide a level of harvest flexibility more commensurate with addressing changes in herd distribution.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution or discouraging bison from attempting to leave the NER via the south boundary into the town of Jackson.

The effectiveness of NER late-season harvest regimes is influenced by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could help reduce winter elk numbers on the Refuge. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st .

Private Lands Mitigation. Several strategies would be employed to mitigate likely changes in bison and elk distribution, including providing incentives for non-breeding cattle operations, increased fencing in limited areas to separate elk and bison from livestock feed lines, hazing elk and bison away from livestock feed lines, and purchasing private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal wildlife conflict technician positions supervised by WGFD.

Vegetation Restoration. Various approaches to restore the Kelly Hayfields in GRTE (4,500 acres) were initiated in 2008. Work will likely be complete in 2035. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and providing visitor opportunities to enjoy wildlife viewing within a natural setting. The restoration process involves removal of non-native vegetation, collecting and propagating native seeds and plants, as well as the seeding of native plants.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres are currently under restoration treatment and 3,265 acres remain non-native pasture. Maintenance of restored ecological conditions

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will require management efforts in perpetuity to keep non-native species from colonizing restored areas. The park will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Strategies Considered But Rejected

Strategies considered but rejected include fertility control in elk and bison, agency reduction of either elk or bison, and altering rations of supplemental feed. These strategies were rejected because they were not included in the BEMP preferred alternative and/or because there was not support for them by cooperating agencies.

Models and Monitoring

Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

A robust monitoring program will be necessary to track the effects of actions implemented under this plan. Critical monitoring components will include: 1) enhanced forage production and availability sampling; 2) measuring animal abundance and distribution including differences in some sex and age classes; 3) determining elk and bison fed days each feeding season; 4) estimating winter mortality; 5) brucellosis seroprevalence rates; and 6) CWD surveillance. In many cases, attribute baselines for the period preceding implementation of this plan have been developed for comparison after the plan is implemented.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Actions completed each year, the results of monitoring programs, and any proposed changes in management direction will be presented in an annual MSP update/report, completed by NER staff by the end of June.

Public Outreach/Education

De-emphasizing the supplemental feeding program will be a major paradigm shift especially for the residents of Jackson Hole and Teton County, but will also be of interest to others in Wyoming and across the nation familiar with the long history of feeding elk on the National Elk Refuge. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk and bison herd management methods. A detailed communication plan has been developed that identifies key messages and utilizes a variety of outreach methods, including print, video, and voice material, utilizing social media, and meetings with elected officials, state and local governments, agency and tribal partners, community organizations, stakeholders, and the general public.

Schedule

GPS collars were deployed on 30 adult cow elk in February 2016. Assuming adequate funding, , additional GPS collars will be deployed in winter 2017. Public outreach, private lands conflict mitigation and contacts, and enhanced forage monitoring will occur in fall 2016 through January 2017. Reductions in feed season length will begin in winter 2017.

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INTRODUCTION

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands. It included directives for forthcoming development of adaptive management practices to address several objectives in the plan, including a desired future condition of elk and bison relying predominantly on native forage. This MSP has been developed expressly for that purpose.

Bison and Elk Populations

While Jackson Hole is probably best known for the splendor and ruggedness of the Teton Range, the Jackson bison and elk herds rank among the top characterizing features of the valley. Both figure prominently in Jackson Hole's history and culture, although bison were absent from the valley for about 100 years between the mid-1800s and mid-1900s.

The JEH occupies approximately 8,000 km^2 in the upper Snake River watershed north of the town of Jackson (Fig. 1). Much of the herd is migratory, moving between distinct wintering and summer ranges. Primary wintering areas include the Buffalo Valley, lower elevations of the Gros Ventre River drainage, the NER, and areas adjacent to the NER on Bridger-Teton National Forest (BTNF) lands. Summering areas occur throughout the herd's range and for convenience are divided into five geographic regions that include GRTE, Yellowstone National Park (YNP), the Gros Ventre drainage, Teton Wilderness, and Southwest Boundary area, which includes private and public lands in the vicinity of GRTE's southwest boundary.

In the late 1800s, when elk populations all over North America were being extirpated, the residents of Jackson Hole protected elk from "tusk hunters" and large-scale commercial hunting operations. Elk are just as important to today's residents of the valley. Thousands of people each year have the opportunity to see elk at close range on the refuge while riding on horse-drawn sleighs. Thousands of pounds of shed elk antlers are sold at an annual antler auction each spring in the town square. Elk are important to backcountry users as well as to people that never leave the road. Jackson Hole is a popular destination for instate and out-of-state elk hunters. The draw of elk to visitors contributes significantly to the local economy.

Winter feeding of elk in Jackson Hole began in 1910 and was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. According to historical reports, before Euro-American settlement some Jackson elk wintered in the southern portion of Jackson Hole (present location of the NER town of Jackson) and may have used areas outside Jackson Hole, including the Green River and Wind River basins to the south and east, respectively, and the Snake River basin to the southwest in what is now eastern Idaho (Allred 1950; Anderson 1958; Blair 1987; Barnes 1912; Sheldon 1927). Radio-collar studies have documented small numbers of Jackson elk wintering in each of these areas in recent times as well (NER and GRTE, unpublished data). Over time, changes in land use and development in these areas, over hunting, and establishment of feedgrounds probably reduced the use of these areas by Jackson elk.

By the end of the 19th century the JEH was believed to be largely confined to Jackson Hole and the immediately surrounding area, where wintering conditions are often harsh. Significant numbers of elk died during several severe winters in the late 1800s and early 1900s> Primary reasons for these mortality events included the loss of available winter range in Jackson Hole from new ranching operations and a and

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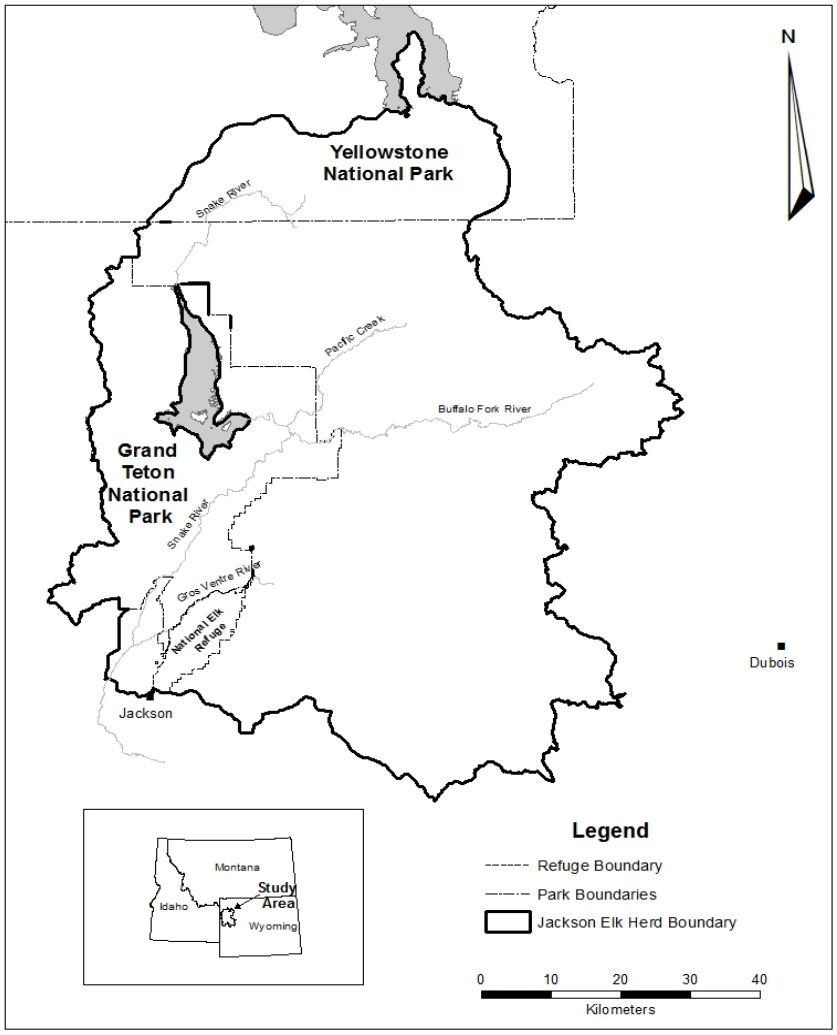


Figure 1. Jackson elk and bison herd ranges, including the National Elk Refuge, Grand Teton and Yellowstone National Parks, and Bridger-Teton National Forest. [include bison range, labels for continental divide and Bridger-Teton National Forest, and in Legend Jackson elk herd unit]. Also Gros Ventre drainage and state feedgrounds because they are referenced in text

expansion of Jackson. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, appropriated $45,000 for the purchase of lands and maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first winter census in the area was conducted in 1912 and showed about 20,000 elk residing in Jackson Hole and the

Hoback River drainage (the latter is not within the JEH's range).

Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding. In recent times the population has fluctuated near the herd objective of 11,000 that was adopted by the WGFD (Fig. 2).

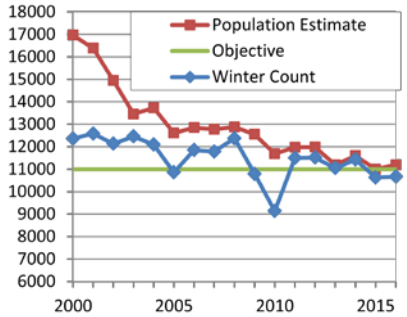


Figure 2. Winter Counts, population estimates, and herd objective for the Jackson elk herd, 2000-2016.

An iconic symbol of the American West, bison are also popular with visitors and residents. Because so few opportunities remain to see bison in the wild, viewing and photographing them in GRTE with the Teton Range in the background is a treasured opportunity for many of the valley's visitors. Similar to elk, there is also a high level of interest in bison hunting. Bison are of particular interest to nearby American Indian tribes and tribes in other parts of the United States because the animals are central to their culture and tradition.

Bison are native to Jackson Hole, as evidenced by the presence of prehistoric bison remains throughout the valley, but were extirpated outside Yellowstone National Park by the mid-1880s. In 1948, 20 bison from YNP were reintroduced to the 1,500-acre Jackson Hole Wildlife Park near Moran. The Jackson Hole Wildlife Park was a private, non-profit organization sponsored by the New York Zoological Society, the Jackson Hole Preserve, Inc., and the WGFD. A population of 15–30 bison was maintained in a large enclosure there until 1963, when brucellosis was discovered in the herd (likely transferred with the original 20 animals from YNP). At that time, all the adult animals were destroyed, but four vaccinated yearlings and five vaccinated calves were retained. In 1964 twelve certified brucellosis free bison from Theodore Roosevelt National Park were added to the herd. In 1968 the herd (down to 11 animals) escaped the confines of the wildlife park, and a year later the decision was made to allow them to range freely. The expansion of GRTE in 1950 had enveloped the Wildlife Park, and this allowed the bison to range freely and was consistent with National Park Service wildlife management policy. The herd remained small and wintered mostly in the Snake River bottoms in GRTE until 1975, when it followed the winter environmental gradient to the NER and began wintering there. The use of standing forage by bison on the NER was viewed as natural behavior thus acceptable to managers. In 1980, however, bison discovered and utilized supplemental feed provided to elk in winter, and they have continued to do so ever since.

The discovery of supplemental feed by bison has had several consequences, including a significant increase in the population's growth rate (Fig 3). Bison on the elk feedlines have at times disrupted feeding operations and displaced and injured elk. To minimize conflicts between bison and elk, managers have provided separate feedlines for bison since 1984. As the population has grown, separating elk and bison on feedlines has become increasingly difficult, and a variety of feeding strategies are employed to help reduce displacement of elk.

As the herd has grown it has maintained fairly stable movement patterns, wintering almost entirely on the NER and summering within GRTE and adjacent lands on the BTNF (Fig. 1).

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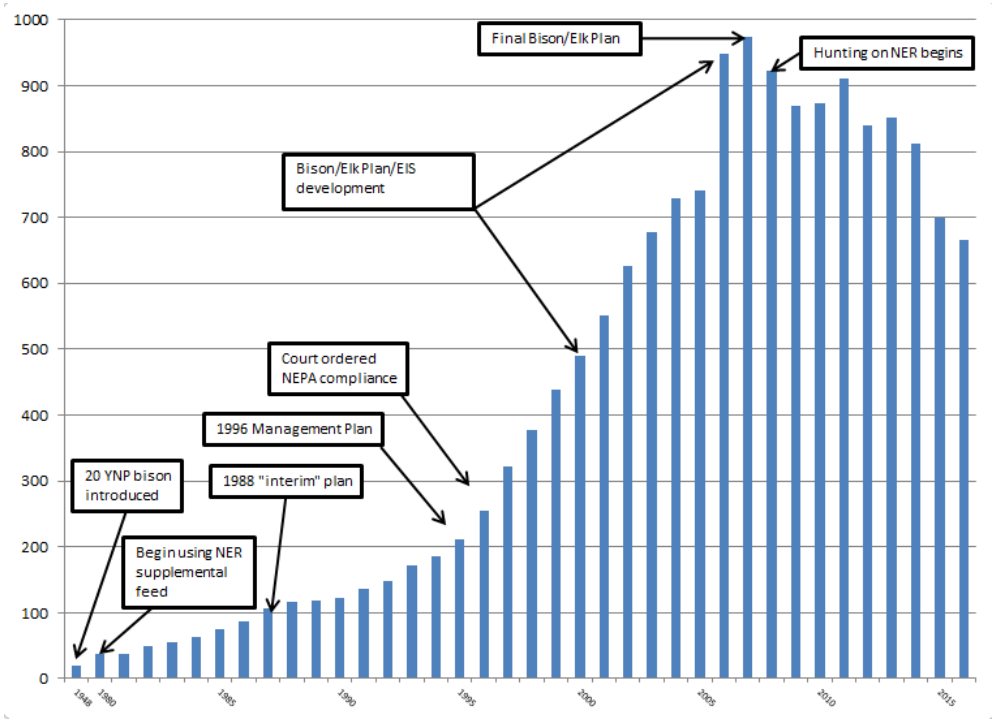


Figure 3. Population growth and planning history for the Jackson bison herd, 1948-2016.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands and thereby reducing availability of these habitats to other wildlife as well as unusually low winter mortality, which has affected predators and other species and has required intensive hunting programs.

Planning History

Jackson's bison and elk populations have been the subject of previous planning efforts. Elk management and research has been guided by the Jackson Hole Cooperative Elk Studies Group since it was established in 1958. The group consists of biologists and agency administrators from the NER, GRTE, YNP, BTNF, and WGFD, who meet at least annually to coordinate management of the population and its habitat. Coordination of bison management began soon after they started frequenting the NER in 1976 and using supplemental feed provided to elk in 1980 (Fig. 3). Release of an "Interim" plan that called for maintaining a herd of 90-110 bison while data were gathered for a long term plan occurred in 1988. It was followed by implementation of a sport hunt outside GRTE, administered by WGFD. This plan was halted after litigation in which the plan's violation of NEPA was successfully argued by plaintiffs.

In 1996, after considerable herd growth, a new long term management plan and environmental

assessment for the Jackson bison herd was released (Fig 3). This plan had strong support and called for maintaining a herd size of 350-400 bison, but it was shelved a year later when plaintiffs from the earlier litigation successfully argued that, because the plan failed to consider the effects of feeding elk on bison management, it also violated NEPA and was not sufficient. This led to development of the draft bison and elk management plan and environmental impact statement from 2000-2006 and release of the final plan in 2007 (Fig 3).

The 2007 Bison and Elk Management Plan (BEMP; USFWS 2007) considered six alternatives for bison and elk management focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The primary management scenarios presented in the alternatives included the status quo, terminating elk and bison hunting on the NER and the elk reduction program in GRTE, brucellosis vaccination options, restoring habitat, improving forage, and decreasing or phasing out supplemental winter feeding.

The final BEMP (USFWS 2007; www.fws.gov/bisonandelkplan) which set management direction for 15 years or until a subsequent plan is developed, proposed to maintain the state's elk herd objective of 11,000, establish a bison population objective of 500, restore habitat in the NER and GRTE, continue hunting bison and elk on the NER, continue the elk reduction program in GRTE in concert with the parks enabling legislation, allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available, and develop a dynamic framework of management actions which adaptively decrease the need for supplemental feeding on the NER. ***This Bison and Elk Management MSP was developed to address the latter and specifically addresses the criteria for a structured framework listed on page 5 of the Record of Decision*** **(Fig. 4).** It does not address other on-going bison and elk management actions already prescribed by the BEMP.

The BEMP scheduled the completion of the MSP for 2008. However, litigation challenging the BEMP in 2008 led to the decision to postpone its development until litigation was resolved. As of March 2015, two court rulings have upheld the 2007 BEMP and ROD. In a lawsuit against the BEMP and its author agencies (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2010), plaintiffs argued that the BEMP violated the National Wildlife Refuge System Improvement Act (National Wildlife Refuge System Improvement Act 1997) by disrupting the biological integrity of the Refuge, and that the plan and the accompanying EIS violated NEPA because they were insufficiently detailed to allow a reasonably complete discussion of mitigation. The crux of the plaintiff's argument was that the plan did not set a specific date for the cessation of supplemental feeding. In response, the agencies argued that the plan constituted a valid exercise of discretion and that it and the EIS were sufficiently detailed to satisfy the requirements of NEPA. In March 2010, the United States District Court for the District of Columbia sided in favor of the agencies in this case. In 2011, the plaintiffs appealed this ruling to the United States Court of Appeals for the District of Columbia Circuit. This Court affirmed the District Court ruling (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2011).

National Environmental Protection Act Compliance

The 2007 BEMP/EIS and ROD satisfied NEPA requirements for current bison and elk management through a detailed analysis of alternative management actions and their likely effect on the environment, and substantial involvement of the public in the process. This MSP does not duplicate or add to this process. It is designed to tier off of the BEMP as a dynamic implementation guide to one part of the preferred alternative outlined in the BEMP ROD. As such, references to NEPA covered in the BEMP

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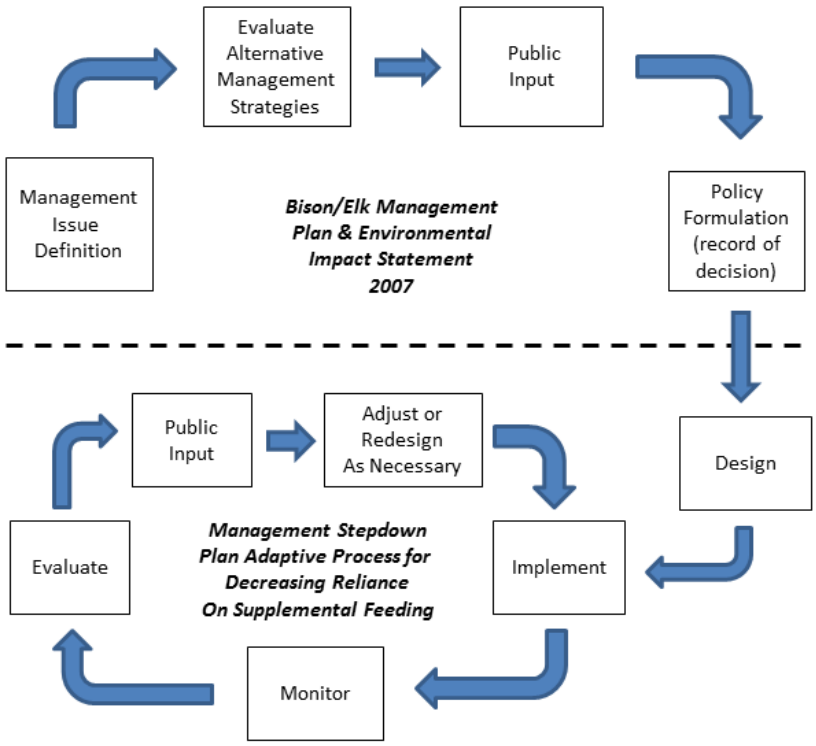


Figure 4. Management step down planning for supplemental feeding on the National Elk Refuge and its relationship to the 2007 Bison/Elk Management Plan and Environmental Assessment.

will be included where necessary in this document, and the discussion of any action that would require additional NEPA compliance will be explicitly stated as such in that context.

Management Step Down Planning

The use of adaptive management plans has gained popularity in natural resource management planning because, by definition, they allow modifications of strategy based on monitoring results and outcomes toward reaching specific goals or objectives. Four elements generally included in an adaptive management approach include: 1) well defined and mutually agreed upon objectives; 2) knowledge (including descriptive models) of the dynamics of the system being managed; 3) clearly articulated management actions and strategies; and 4) a monitoring program to evaluate responses of the system to management actions (Walters 1986).

This MSP utilizes adaptive management planning principles but is not intended to include all of the adaptive management planning elements outlined in the Department of Interior Adaptive Management Technical Guide (2007). This MSP is more accurately described as a "structured framework" of adaptive management actions that progressively transitions from supplemental winter feeding to greater reliance on free-standing forage (BEMP ROD p.5).

Table 1. 2007 Bison/Elk Management Plan Goals and Objectives (Step Down Plan objectives shaded)

Goal: Habitat Conservation

Objectives:

- Conserve important private lands.
- Increase forage production.
- Minimize non-native plants.
- Protect sagebrush grasslands.
- Restore willow, aspen, and cottonwood.
- Perpetuate natural mosaic of plant communities.

Goal: Sustainable Populations

Objectives (BEMP pages 135-136):

- Develop structured framework for reducing NER supplemental feeding.
- Phase reduction of animals on feed: 1) to 5,000 elk and 500 bison, and 2) elk and bison rely predominantly on native habitat.
- Maintain 35:100bull-to-cow ratios in park summer elk herd.
- Ensure a genetically viable bison herd with close to an even sex ratio.
- Enhance public outreach/education.

Goal: Elk and Bison Numbers

Objectives:

- Maintain state elk herd objective of 11,000.
- Maintain a genetically viable bison population of about 500 animals.

Goal: Disease Management

Objectives:

- Manage brucellosis transmission risk from elk and bison to livestock.
- Manage feeding to reduce brucellosis transmission among bison and elk.
- Educate hunters about wildlife disease human health hazards.

OBJECTIVES

The management direction and desired conditions stated in the BEMP called for the NER and GRTE staffs to work with others (agencies, partners, etc.) to "adaptively manage elk and bison in a manner that contributes to the State's herd objectives yet allows for the biotic integrity and environmental health of the resources to be sustained," so that the public can enjoy a variety of compatible wildlife-dependent recreational opportunities. Under the BEMP's 4 primary goals, 20 associated objectives were identified (Table 1). This MSP addresses four objectives under the goal of sustainable populations (Fig. 5).

The reduction of animals on feed at the NER was proposed to be spread over two phases. In Phase 1, the aim is to reduce the average number of elk on feed to 5,000 (while maintaining WGFD's 11,000 elk herd objective), and reduce the winter

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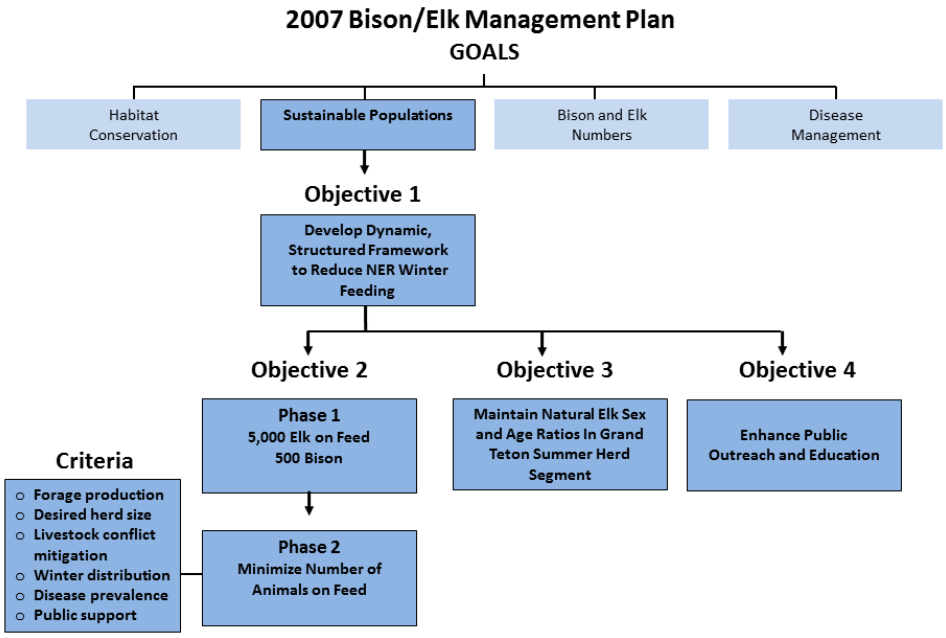


Figure 5. Relationship of MSP to the 2007 Bison/Elk Management plan goals, phasing of objectives, and consideration criteria for reducing the reliance of elk and bison on supplemental feed during Phase 2.

population of bison to the BEMP recommended, and WGFD adopted, objective of 500. In Phase 2, the overall objective is to reduce the reliance of bison and elk on supplemental feed (USFWS and USNPS 2007a). Desired conditions include animals relying predominantly on native habitat and cultivated forage on NER. Important consideration criteria for implementing Phase 2 will include: 1) the level of forage production and availability on the NER and adjacent winter ranges; 2) maintenance of desired herd sizes and age/sex ratios; 3) the ability to effectively mitigate bison and elk livestock conflicts; such as co-mingling on private lands during high risk disease transmission periods; 4) maintaining desirable winter distribution patterns of elk and bison; 5) the prevalence of brucellosis, chronic wasting disease, and other wildlife diseases; and 6) public support. In short, the overall objective of this plan is to outline a framework for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives.

This Plan focuses on management actions to initially achieve Phase 1 objectives. However, if successful, these actions will continue to be used to achieve the Phase 2 objective of reducing reliance on supplemental feeding while considering the six criteria listed above.

MANAGEMENT ACTIONS AND STRATEGIES

Background

The principal goal of reducing reliance on

supplemental feeding is to limit transmission of density dependent diseases in elk and bison while simultaneously minimizing winter mortality in elk. We will attempt to achieve this goal by experimentally reducing feed season length and closely monitoring elk and bison distribution and winter mortality.

Elk have been fed on the NER each year in all but 9 winters since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during winter months is powerful to both species, and their knowledge of NER feed grounds has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Because use of feed grounds is a learned behavior, decreasing feed season length will potentially reduce the likelihood of elk that winter on native range finding NER feed grounds. Over time this could result in a greater percentage of elk using native winter range relative to NER feed grounds. Because it is largely unprecedented, the concept of modifying this behavior on such a large scale is daunting and poses questions for which there are no immediate answers. In some cases, the likelihood a specific management strategy's success will only be able to be roughly estimated, and unanticipated results are likely. Closely monitoring forage availability, elk and bison distribution, and elk mortality will allow us to evaluate the effectiveness of management actions and adjust management actions as needed should unintended negative consequences arise.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into 3 broad categories: 1) timing and duration of winter feeding; 2) timing and intensity of hunting; and 3) herd segment specific and overall harvest levels.

Important Changes Since 2007

The BEMP was developed based on data collected and knowledge that existed up until its ROD. Since then, important changes have taken place, some of which are advantageous to this effort and some of which are not.

A primary change that will facilitate meeting objectives under this plan is the reduction of the bison population from nearly 1,200 animals in 2007 to about 675 during winter 2015-2016 (Fig. 3) through hunting programs administered by WGFD. Licensing changes enacted in 2014 included a reduction in the bison cow/calf license fee (from $416 to $263 for residents and $2522 to $1022 for non-residents) and eliminating the once-in-a-lifetime restriction on a successful bison hunter to only those that successfully harvested a bull. Continued progress toward the 500 animal herd objective will require sustained harvest success.

During the same period, the Jackson Elk Herd has declined from nearly 13,000 to its objective of 11,000, but because the proportion of the JEH that winters on NER has increased dramatically (Fig. 6), this will make achieving the Phase I objective of 5,000 elk on feed and any future elk population reductions more difficult. Preliminary analysis suggests that the increasing proportion of the JEH wintering on NER has been associated with 1) Declines in elk use of native winter range and movements of elk from State feed-grounds in the Gros Ventre drainage to NER.and 2) increasing numbers of elk that summer immediately adjacent to NER (Cole and Foley et al. 2015).

Refuge-wide herbaceous forage production averaged 14,387 (SD = 4,125) tons during 1998–2013. In recent years irrigation of approximately 3,600 acres has increased refuge-wide forage production by approximately 10% compared to what would have been produced with

Comment [CE4]: Alternative location for FAQ callout on why elk harvest cannot be increased to meet 5,000 elk objective

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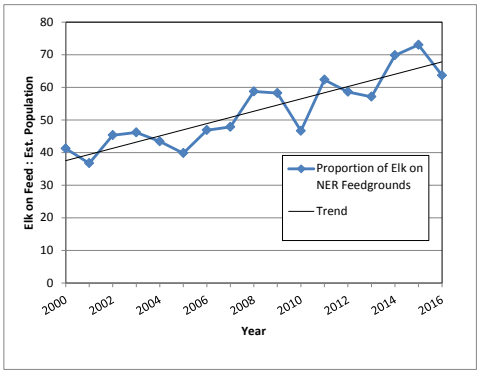


Figure 6. Increasing trend of National Elk Refuge elk on feed as a proportion of the Jackson Elk Herd estimated population size.

precipitation alone, and by 15% in the southern portion of NER which receives the greatest use by elk and bison.

Since 2007, the general awareness of climate change among the public has greatly increased. A strong, credible body of scientific evidence shows that climate change is occurring, is caused largely by human activities, and poses significant risks for a broad range of human and natural systems (National Academy of Science 2010). Ecological systems in the GYE are likely to be affected and associated changes may have implications for elk and bison management. Moderate term to long term effects of climate change in Jackson Hole will likely include increases in average temperature, a reduction in the duration and distribution of snow cover, an increase in the number of frost free days, increased wildfire frequency, and changes in plant community composition and structure including loss of forest and shrub cover and an increase in invasive plants (Riginos and Newcomb 2015). The net effect of these changes relative to the implementation of the MSP remains uncertain.

Current Management

Ongoing primary management actions on the NER include winter feeding, harvest, irrigation, and hazing. In GRTE, harvest of elk during the Elk Reduction Program takes place, when necessary, in collaboration with WGFD, and restoration of previously cultivated and irrigated sagebrush-grasslands is ongoing. Fundamental components of each of these will be briefly described below to provide a basis for comparison to MSP strategies that will follow.

Chronic Wasting Disease

Supplemental feeding has occurred in all but 9 winters on NER since 1912, and although this strategy minimizes winter elk mortality from starvation, contributes to Wyoming state elk herd objectives, eliminates commingling with livestock, and keep elk off adjacent roadways, elk occur at numbers and densities well in excess of carrying capacity (Smith et al. 2004, Lubow and Smith 2004). Considerable evidence suggests that Chronic Wasting Disease (CWD) transmission and prevalence are density dependent (Peters et al. 2000, Williams et al. 2002). Monello et al. (2014) found that elk densities of 15-110/km^2 (0.06 to 0.45/ac) in Rocky Mountain National Park were associated with 13% CWD prevalence, and they predicted elk population declines when CWD prevalence exceeded 13%. NER elk densities range from 77-16,850/km^2 (0.31-68/ac; NER unpublished data), which suggests that the introduction of CWD to NER elk would have significant negative population effects over time.

Winter Feeding

Initiation of feeding has the primary objectives of 1) minimizing elk winter mortality, focusing on calves since they are the most susceptible age class, and 2) minimizing comingling of elk with cattle on nearby adjacent private lands. Winter feeding begins when available forage reaches approximately 300 lbs/ac. Historic radio telemetry data and observations of elk movements indicate that when available forage declines below 300 lbs/ac., some elk leave NER for surrounding private lands. Therefore, the purpose of this feeding "trigger" is to keep elk on the NER and prevent them from searching for forage off the NER, which would increase the potential of comingling with cattle causing damage to private lands, and moving across

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Highway 89 where the risk of vehicles hitting elk is high. This trigger is not a warning that a significant nutritional deficit threshold has been reached. Available winter forage for elk and bison on the NER is largely determined by biomass of forage produced during the previous growing season, rate of forage consumption during fall and winter, and how snow conditions affect forage availability.

Index sites are used to sample forage biomass and determine when feeding should be initiated. These sites are selected annually to represent plant communities that are highly preferred by elk due to plant species composition and the persistence of green vegetation. Weekly sampling begins in late December to estimate available forage biomass at each index site. When average available forage across index sites is below 300 lbs/ac, biologists typically recommend that supplemental feeding be initiated.

During 1995–2013, the average initiation of winter feeding in NER occurred 28 January (range = 30 December–28 February), and feeding was terminated on 3 April (range = 20 March–20 April). Variation in feeding initiation and termination dates has been based on winter conditions and a desire to avoid elk-cattle comingling on nearby private lands. Coordination of winter feeding dates on the NER and WGFD-operated Gros Ventre drainage feedgrounds (Alkali, Patrol Cabin, and Fish Creek) occurs annually to help minimize movement of elk between these areas. This coordination will continue regardless of the management strategy employed. The relationship of recent elk numbers and objectives for NER and WGFD-operated feedgrounds and native range is shown in Table 2.

Bison discovered refuge feeding operations in 1980, and since that time they have been fed each year to help minimize disruption to elk feeding operations. Because bison displace elk from feedlines, NER staff attempt to feed most bison in the northernmost refuge feedground and provide a heavy feed ration, which helps keep them in this area. This strategy prevents bison from mingling with elk and also prevents bison from moving to areas where conflicts with humans are more likely.

Harvest

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Table 2. Annual distribution of wintering elk from the Jackson Elk Herd during February classification counts, 2011–2016, relative to the current objective.

	OBJECTIVE	2011	2012	2013	2014	2015	2016	mean
NER	5,000	7,746	7,360	6,285	8,296	8,390	7,290	7,561
Gros Ventre	3,500	2,775	3,265	2,982	2,326	1,162	1,667	2,362
Native Range[1]	2,500	982	894	1,784	801	913	1,711	1,180
Total	11,000	11,503	11,519	11,051	11,423	10,465	10,668	11,105

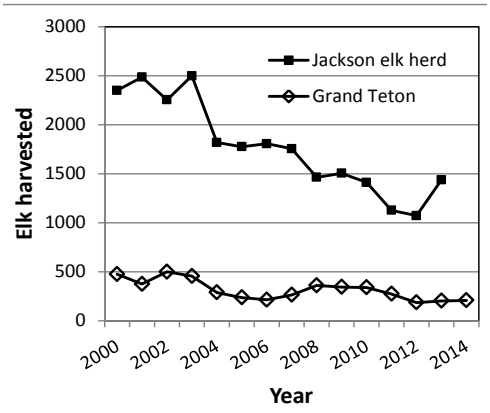


Figure 7. Estimated elk harvests for the Jackson Elk Herd and the amount of that harvest that occurs in Grand Teton National Park, 2000–2014.

Total hunter harvest of the JEH was gradually reduced over the last decade as the population neared objective (Fig. 7). Elk hunting on the NER (Hunt Area 77) typically begins in mid-October and ends in mid-December, with peak harvest in recent years occurring in late November to early December. From 2005 to 2015, 422 ± 102 (mean ± SD, range = 329-612) hunters harvested 196 ± 95 (range = 126-457) elk per year during the NER hunt.

The 1950 legislation that created GRTE provided for a controlled reduction of elk, when necessary, in specific portions of the park, primarily east of the Snake River. Elk reduction programs have taken place in the park each year since 1950 except two (1959 and 1960), when GRTE and WGFD officials agreed a reduction was not necessary (Figure 8). Season dates have varied over the years but recently have run from mid-October to early-December. The GRTE harvest accounts for about 25% of the JEH overall harvest, thus has been an important factor in regulating the population. Increased predation, likely a result of increases in grizzly bears and wolves over the last 20 years, has decreased the need for large harvests in GRTE.

Bison hunting begins 15 August and ends in early to mid-January. Most harvest occurs on the NER, with some additional harvest on private and BTNF lands. Since resuming the bison hunt in 2007, harvest has been 210 ± 45.5 (range 139-301) bison per year. This level of harvest has been sufficient to arrest the exponential growth of the population, reducing bison numbers from the peak in 2007 to about 700 animals in winter 2015 (Fig 3). Tribal bison harvest of up to 5 animals for ceremonial purposes was authorized in the BEMP. Translocation of wild bison to lands outside of Teton County is not currently permitted due to brucellosis concerns.

Bison hunting is not allowed in GRTE because of long standing NPS policy that prohibits most hunting in national parks. Bison quickly learned to take advantage of the safety of GRTE, which has made hunter harvest goals difficult to achieve. Many bison stay in GRTE during the hunting season, with only occasional short term movements to the NER, until severe winter conditions occur. In response, NER and WGFD managers have attempted to extend the hunt to late January while minimizing the conflict with the initiation of winter feeding. The unpredictable nature of winter conditions that time of year makes this challenging, and has (or could) result in the use of emergency season extensions or reductions.

Hazing

NER staff haze elk and bison to conserve winter forage, prevent year-round use of winter range, and in some cases to prevent elk and bison from moving to private lands or other areas where conflicts with humans are likely. Hazing using ATVs has proven most effective. The strategy is typically employed during 3 time periods: 1) in May to move elk and bison off NER that are lingering on NER winter range; 2) in July when some bison typically return to NER; and 3) in the period just prior to feeding initiation when elk and bison are most likely to leave NER for private lands. Hazing of elk and bison by WGFD staff also occurs on private lands adjacent to NER periodically throughout the year.

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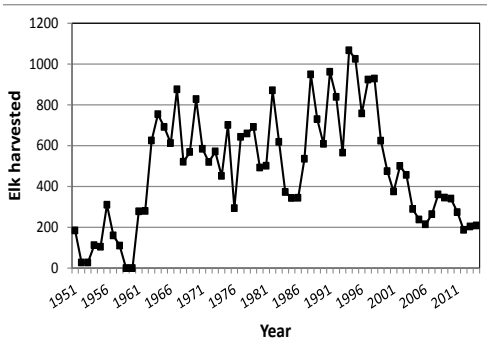


Figure 8. Elk harvest in Grand Teton National Park, 1950-2015.

Vegetation Restoration and Protection

The BEMP identified approximately 4,500 acres of previously irrigated and cultivated grasslands in GRTE in need of restoration to native sagebrush grasslands community. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. After 2 years of research and field studies, restoration efforts began in 2008. The restoration process involves several steps including: removal of non-native vegetation through repeated herbicide applications, collection and propagation of native grass, forb and shrub seeds and finally native seeding. Repeated herbicide treatments have been warranted prior to native seed planting as well as spot treatments of invasive weed species subsequent to native seeding. Substantial progress in this endeavor has been made since 2008, including 1,235 acres of previously cultivated lands under restoration treatment. Of the 1,235 acres undergoing treatment, 745 acres has been seeded with native grass, shrub, and select forb mixes, and 89 acres is considered fully restored. Two-hundred and seventy-five of these acres are currently fenced to reduce grazing pressure of early native vegetation establishment from bison and other ungulates. An additional 490 acres are targeted for native seeding in 2016 once removal of the invasive vegetation is successful. All treatments are monitored for native plant establishment and invasive plant infestations and treatments will be adjusted as necessary. Invasive plant treatments may have to continue indefinitely. GRTE will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Private Lands Mitigation

Fencing of hay stacks and livestock feedlines has been historically used to mitigate particularly difficult conflicts on private lands. Targeted fencing of golf course greens and sand traps fall through spring has also been successful in some situations for mitigating elk and bison presence and associated damage in these areas. It is important to note that the county has a "wildlife-friendly" fence policy and does not support extensive fencing that is impermeable to wildlife in residential areas.

Methods, Assumptions, and Constraints Common to All Strategies

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes, particularly population sizes. Measurements of the Jackson bison herd will be based on the annual mid-winter census and sex and age classification survey performed by NER, GRTE, and WGFD biologists. This survey occurs one day in February and includes ground counts of animals on feed at the NER and aerial counts of outlying bison across their winter ranges on the refuge, park, and Bridger-Teton National Forest.

Elk population estimates will also be based on mid-winter aerial and ground counts. However, the mid-winter counts are undertaken during a single survey period and do not necessarily represent either peak or cumulative abundance of elk on feed. Rather than basing progress toward the number of elk on feed for the entire season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in

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Table 3. Summary of potential Step Down Plan constraints.

Policy

- ESA[1] Lynx – limits on habitat impacts
- Greater Sage Grouse – core area protection
- 2007 BEMP/EIS (federal actions/lands)
  - No fertility control
  - No test and slaughter
  - Limited tribal ceremonial take
- Bison/elk hunt end date (Feb. 1st)
  - WGFD, brucellosis safety
- Carcass disposal (Feb. 15th)
  - WGFD, brucellosis safety
- Forest Service winter closure (Dec. 1st – April 30th)
- Easement limitation (NER boundary)

Winter Feeding

- Only during non-hunting periods

Harvest

- State regulations

Vegetation Restoration/Protection

- Bison/elk distribution
- Exotic plant species management

Private Lands

- Owner agreements

Social

- Hunter density (safety; hunt quality)
- Elk/bison winter mortality levels
- Public safety (ungulate/vehicle collisions)
- Disease
- Land-use conflicts (agricultural and residential)

Biological

- Disease (bison/elk/cattle commingling)
- Sage grouse habitat conflicts
- Fencing/wildlife conflicts
- Elk herd distribution
  - summer segment distribution goals

Funding

- Easement purchase
- Plan implementation

[1]Endangered Species Act

the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 elk were fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000.

We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both species on supplemental winter feeding.

Initial success of the MSP will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP does not provide specific measurement criteria to determine when the NER has successfully attained the objective of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage", we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. This level was chosen to define success because it indicates that elk and bison will predominately be foraging on free standing natural and cultivated plants on NER and adjacent winter ranges rather than on supplemental feed.

Several management constraints are common to the strategies discussed below (Table 3). Many law and policy constraints are applicable but we include here only those most pertinent. Endangered Species Act (16 USC 1531 et seq.) requirements for wolves, grizzly bears, lynx, and others apply. Lynx requirements for maintaining certain habitat types could limit methods used and areas considered for habitat improvements

in GRTE and the BTNF. Such improvements could increase elk and bison use of native winter range off the Refuge while simultaneously reducing use of feedlines. Similarly, compliance with the 2015 sage grouse amendment to the 1990 Bridger-Teton National Forest Land and Resource Management Plan and the Wyoming greater sage-grouse core area protection executive order (2011-5 and supplement 2013-3) could affect habitat manipulations. NEPA compliance conducted as part of the BEMP/EIS constrains what federal actions can be taken as a part of this plan. State regulations constrain late (winter) hunt and carcass disposal timing to protect against brucellosis contamination, since February-April represent the period bison and elk are most likely to transmit the disease. Restrictions on hunting timing also result from BTNF winter range closures, immediately east of the NER and elsewhere, December 1 to April 30. Additional details about these and other constraints will be included in discussions about specific strategies that follow.

Strategies

This section describes the management action this MSP proposes to implement. As such, it unveils the heart of management changes proposed to begin the process of transitioning to greater reliance of bison and elk on native forage during winter. Fundamentally, the strategies discussed in this plan represent an experiment designed to achieve Phase I objectives of 5,000 elk and 500 bison on NER and are a first step towards reducing reliance on supplemental feeding while meeting the sustainable population goals identified in the BEMP.

Initial strategies for achieving sustainable population goals identified in the BEMP (Table 1) are presented by the objectives below. The primary management actions available to the agencies to achieve Phase I objectives are modifications to winter feeding and hunting seasons. To a lesser extent, vegetation protection and restoration can be important, particularly for improving long-term ecological function and enhancing natural production of native forage. Private lands are also an integral component as changes in elk and bison distribution occur and new challenges develop. The likely consequences of implementing these strategies were evaluated in the BEMP. The most relevant of these are summarized in Appendix 1.

Objective: 1) *Implement a phased reduction of animals on NER feed to 5,000 elk and 500 bison, and, 2) influence elk and bison to rely predominantly on native habitat* (Table 1).

The first phase will be to reduce the number of elk on NER feed to approximately 5,000 and achieve a target population of about 500 bison. The second phase will be to adaptively manage bison and elk populations to achieve desired conditions, with animals relying predominately on available native habitat (NER, GRTE, and USFS lands) and cultivated forage (NER).

As previously mentioned, the concept of reducing winter feeding after more than 100 years of the practice, and the associated behavioral conditioning of elk and bison to its presence, represents a formidable challenge that must be approached cautiously and systematically. Efforts to scale back elk supplemental feeding operations in other parts of North America have been rare and fraught with controversy (Smith 2001). The strategies discussed below have been developed in this context, with appropriate feedback mechanisms through rigorous monitoring and frequent evaluation. Inability to meet this objective under the strategies presented here would trigger a thorough evaluation and consideration of more aggressive strategies when the BEMP is updated in 2022.

Comment [CE6]: Consider FAQ concerning why harvest cannot be increased to meet objectives and distribution changes are the only viable strategy

Chronic Wasting Disease

Since 1997, NER has cooperated with WGFD to conduct intensive surveillance for CWD in the JEH unit. GRTE has also collaborated with WGFD to collect samples from the ERP and from road-killed cervids. Although this effort indicates that CWD is not currently found in the JEH, continued surveillance at sample sizes sufficient to detect

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1% prevalence with 95% confidence annually will be critical to ensure a timely management response and limit the long-term population effects of the [USFWS and USNPS, 2007b]. Given that CWD has been detected within 40 miles of the JEH in moose, within 35 miles in deer, and within 175 miles in elk, this level of surveillance is warranted.

In 2016, the WGFD cooperated with federal agencies and other stakeholders to revise the 2006 Wyoming CWD Management Plan. The NER and USFWS Region 6 Wildlife Health Office staff participated in several meetings associated with this effort. The Wyoming CWD Plan lists several management responses for consideration if CWD be is detected on or adjacent to State or NER elk feedgrounds. Early detection of CWD in the JEH is essential to allow implementation of management responses.

The BEMP (2007) identifies the management response to the arrival of CWD as following the State of Wyoming CWD Plan in effect in 2007. The Wyoming CWD Plan was updated and significantly changed in 2016. In light of changes in the Wyoming State CWD Plan, and the results of CWD Studies completed since 2007, the NER management response to CWD will be reviewed and updated in a NER Disease Contingency Plan, as identified in the NER Comprehensive Conservation Plan (2016). The CWD section of the NER Disease Contingency Plan will remain consistent with the goals of the BEMP. The NER Disease Contingency Plan is scheduled to be completed in 2017.

Winter Feeding

Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the long run, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning animals to "expect" feed to be available later in the winter; this could build cohorts of animals that rely primarily on native winter range. To reduce supplemental feeding, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, which is the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding (Figure ?) and identify private land conflict areas that may require assistance with focused mitigation measures.

As bison and elk behavioral responses are better understood, and targeted mitigation on private lands is achieved as needed, feeding delays will be extended depending on several variables (Table 4, Fig. 9). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence on feeding initiation date, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Forage availability would also be affected by the numbers of elk and bison on the NER. And finally, the distribution of animals, particularly on private, livestock producing lands would be considered in determining feeding initiation date. A primary concern of manipulating feeding is elk winter mortality, particularly among calves. For example, research on unfed elk populations in Yellowstone National Park suggested average winter elk calf mortality of 28%, with the majority of cases caused by malnutrition (Singer et al. 1997). Similarly Smith and Anderson (1998) found unfed winter elk calf mortality of 29% compared to 11% for elk calves using feedgrounds. As food becomes limited in winter, calves are usually the first to experience nutritional deficit and winter

Comment [CE7]: The map that shows where elk and bison should not be could be placed in this section. This would be figure number? And subsequent figure numbers will need to be adjusted accordingly. Also the text does not currently reference the map?

Comment [CE8]: Consider FAQ on principal strategy of delaying feeding initiation here

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mortality because they are displaced by more dominant animals, they have limited fat reserves, and are more susceptible to cold temperatures than larger animals. Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years (Appendix 1).

In the early years of MSP implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date during the period of MSP implementation.

The MSP winter feeding strategy would include the establishment of additional key forage index sites and on-going measurements at those sites throughout the winter.

Harvest

Currently the JEH is at the Wyoming Game and Fish Commission established objective of 11,000 animals, which means there is less flexibility in manipulation of harvest regimes than there would be if the herd was above objective. Initially there would be little change in elk harvest programs on the NER, with the exception of allowing a limited number of any elk permits throughout the season, considering allowing bow hunting near developed areas (roads and buildings) and shifting the season about a week later (Table 4). Allowing a limited number of any elk permits would be consistent with providing sport hunting recreation on National Wildlife Refuges (NWRS Improvement Act; 1997) and the NER CCP [USFWS, 2015] and possibly encourage more hunters to participate in antlerless elk hunts. Monitoring programs and consideration of bull ratios in the GRTE summer segment (since most park bulls migrate to the NER) would help inform levels of proposed take. Bow hunting in areas currently closed to firearms will likely increase harvest by eliminating “no-hunt” areas which can become sanctuaries for large numbers of elk. Shifting the hunt one week later is consistent with later migrations and will improve harvest effectiveness (Fig. 9).

General elk harvest patterns in GRTE would continue to be based on need for harvest, summer segment population estimates, herd status relative to population objective, herd demographic parameters, herd-wide distribution of harvest, and mitigation for impacts on other resources and visitor activities.

Elk herd population objectives are reviewed every five years by the Wyoming Game and Fish Commission and adjusted as necessary. Agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. Lowering the population would help compensate for reduced use of traditional native winter range and increased growth of short-distance migrants which has led to significant increases of winter elk concentrations on the NER.

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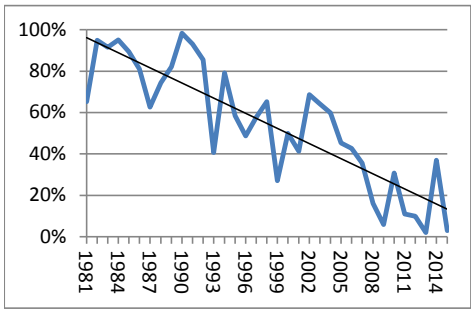


Figure 9. The percentage of elk that wintered on NER counted there on December 1, showing progressively later annual fall/winter arrival of elk to the NER during the past several decades.

The annual fall/winter arrival of elk to the NER during the past several decades has been occurring progressively later. This trend may necessitate extending the elk hunting season later into the year to achieve harvest objectives.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later end dates that are commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution. Special limited hunts designed to discourage bison from attempting to leave the NER via the south boundary into the town of Jackson will also be considered. If progress toward reaching the herd objective of 500 animals continues and the objective is reached, WGFD will adjust harvest quotas in the context of the objective, as necessary, to address population changes through time.

A cattle guard was installed on the Refuge Road near the east end of Broadway Avenue to help prevent bison and elk herds from entering the Town of Jackson. This will reduce the potential for dangerous human/wildlife interactions.

Currently, the effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives, but also that elk are sensitive to hunting pressure which can cause elk movements to areas that cause management issues for WGFD. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st in the future.

Annual herd-wide population estimates, elk summer herd segment estimates in GRTE and NER, temporal and spatial harvest patterns, and animal-fed-days would be monitored, and the resulting information would be used to inform ongoing evaluation of elk and bison management harvest programs (Figs. 9 and 10).

Hazing

No change in hazing practices is anticipated initially under this MSP framework.

Private Lands Mitigation

Delaying the onset of NER feeding is likely to result in changes in bison and elk distribution (Appendix 1). Some elk or bison may move to private lands in search of forage. Of greatest concern is the potential for elk or bison to commingle with cattle of cow/calf operations, where brucellosis transmission could have considerable consequences, such as requiring depopulation of the cattle herd.

Several strategies would be employed to mitigate potential problems (Table 4), including providing incentives for non-breeding cattle operations (because brucellosis transmission to slaughter-bound cattle is not economically important), increased fencing in some limited areas to separate elk/bison from livestock feed lines, haze elk/bison away from livestock feed lines and purchase private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal Wildlife Conflict Technician positions which are supervised by the

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WGFD. These Technicians are also critical to the success of an expanded monitoring program vital to the MSP (see Monitoring section below).

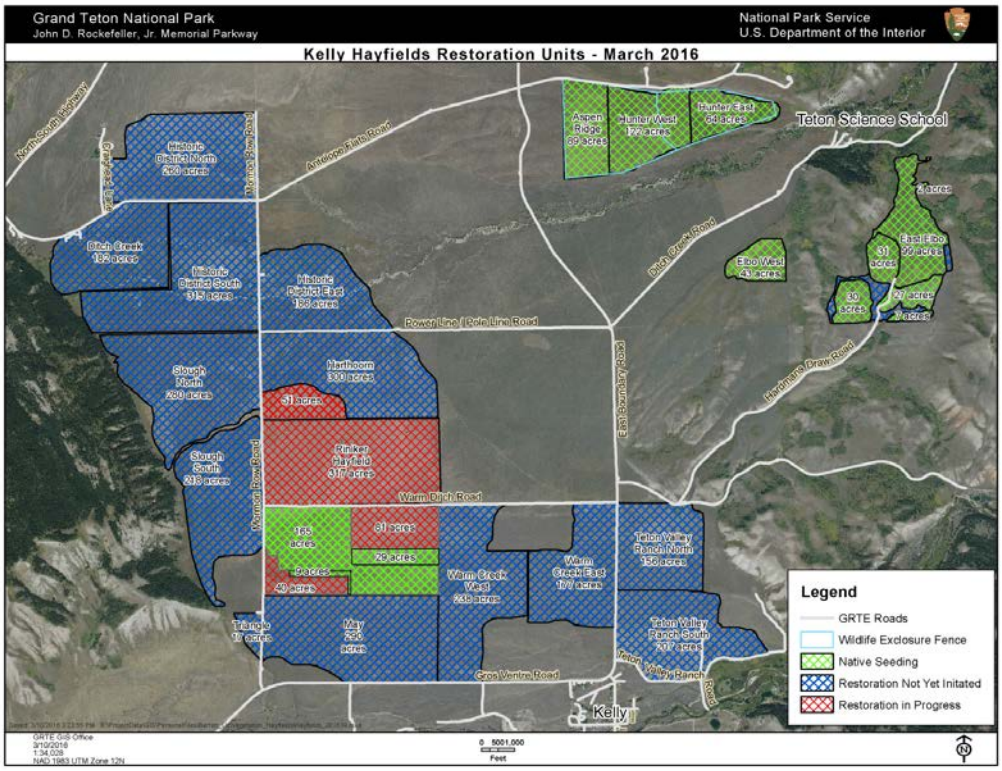


Figure 9. Units and status for the Kelly Hayfields ecological restoration effort in Grand Teton National Park, March 2016.

A database will be established to track non-agricultural conflicts on private lands to determine trends which will help evaluate the effectiveness of MSP mitigation efforts.

Preventing elk and especially bison from entering the Town of Jackson is essential in maximizing publicsafety and minimizing private property conflicts. Currently, bison are hazed northward when they drift south of Miller Butte. A cattle guard was installed on the Refuge Road just north of Broadway Avenue. This barrier is designed to prevent elk/bison from entering the Town of Jackson.

Vegetation Restoration/Protection

The varied approaches to restore the Kelly Hayfields in GRTE (4,500 acres) was initiated in 2008 following 2 years of research and field studies (Moeny 2008). The approach to ecological restoration includes serial treatments to 1) remove non-native species (e.g., herbicide application and prescribed burning); 2) seed native shrub, grass, and forb species; and 3) treat subsequent invasive plants by applying herbicides and, where appropriate, construct temporary fences to protect recently seeded pastures from colonization of non-native species and damage from large herbivores during early phases of restoration.

Of the 4,500 acres targeted for ecological

restoration in the Kelly Hayfields of GRTE, 1,235 acres within 7 pasture units are currently under restoration treatment and 3,265 acres remain non-native grass pasture (as of 2016; Figure 9). The non-native grass pastures are divided into 13 pasture treatment areas and are projected to be likely restored by 2035. As of 2016, approximately 745 acres are seeded with native vegetation, and 89 acres are considered fully restored. Maintenance of restored ecological conditions, however, will likely require management efforts in perpetuity to keep non-native species from colonizing restored areas. All 1,235 acres that are underway toward ecological restoration are being monitored for native plant establishment, invasive plant infestations, including cheatgrass spread. Park staff will continue to monitor and adaptively adjust treatments and restoration strategies according to our results.

Objective: *Maintain bull-to-cow ratios in park summer herd* (Table 1).

National Park Service management policy (NPS 2006) provides guidance for maintaining naturally regulated wildlife populations, free from the impacts of humans, to the greatest extent possible. The final BEMP identified a goal of maintaining park elk bull:cow ratios (a common way of expressing sex and age ratios in wild ungulate populations) near 35 adult bulls per 100 adult cows, based on estimates of what this ratio would be in a herd free from the effects of human harvest. The sex and age ratios of most North American elk populations are affected by sport hunting and herd managers generally maintain lower bull ratios.

Harvest

Based on summer bull ratios for elk in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded refuge hunting opportunities are considered.

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Table 4. Comparison of current and primary MSP components and parameters.			
Action	**Current Management**	**Management**	**Comment**
Winter Feeding:			
Feed	Pelleted alfalfa	Pelleted alfalfa	No change
Ration	Full ration average: 8-12 lbs/day/elk	No Change	No change, to minimize calf mortality. Note average daily ration over the entire feed season is lower than a full ration because feed rate is gradually increased at the beginning of the feed season and gradually reduced at the end to facilitate rumen acclimation
	20-22 lbs/day/bison	20 lbs/day/bison	
Start criteria:			
Available standing forage	300 lbs/acre, as measured at traditional key index sites	Generally later; index sites to be increased in number and distribution	Influencing factors: -time of season -forage availability -number of elk/bison on NER -elk/bison distribution
End criteria:			
Available forage	Based on a snow cover index and subjective estimate of when residual or new forage is adequate	Generally 1 week earlier than current management	Ongoing development of more objective criteria for future implementation ongoing
Monitoring:			
Animals on feed	Mid-winter census	Elk/bison fed days[1]	
Proportion of JEH on NER	Mid-winter census	Mid-winter census	
feed			
Calf mortality	2008-2015 Average: 3.3% (range 1.1-9.0%)	Potentially higher than current levels but less than native winter range	
Elk/bison distribution – collars	Almost no documented use of private lands during feeding operations	Unknown, but likely higher use of private lands than current management	
Elk Winter mortality (all age classes)	2008-2015 Average:	<=3%	
	1.2% (range 0.6-1.9%)		

Table 4. Comparison of current and primary MSP components and parameters.			
Action	**Current Management**	**Management**	**Comment**
Elk summer range segment Proportions for NER wintering elk	Approximately -40% GTNP North of Moose -35% South Snake River -10% Gros Ventre/Flat Creek -10% Teton Wilderness -5% Southern Yellowstone	Unknown, but will be monitored based on summer distribution of radio collared elk	Based on summer distribution of elk that were randomly radio collared on NER.
Harvest, National Elk Refuge elk:			
Frequency	Annual	Annual	
Begin Date	2nd week October	No Change	Modified as necessary
End Date	3nd week December	No Change	Modified as necessary
Structure	- 1 week initial drawing	- 1 week initial drawing	
	- 1 week left over 1st served	- 1 week left over 1st served	
	- partial week alternate	- partial week alternate	
	-daily 1st served alternates	- daily 1st served alternates	
Refuge permit types	- 1st week any elk	- Primarily antlerless only	
	- Antlerless only remainder of season	- limited any elk permits throughout season	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries		Consider expanding to allow bow hunting near developed areas	
Harvest, National Elk Refuge bison:			
Frequency	Annual	Annual	
Begin date	August 15th	August 15th	Modified as necessary
End date	2nd or 3rd week January	Consider later dates as appropriate	Modified as necessary
Hunting Season Structure	As per WGFD	As per WGFD	
Refuge permit types	Any bison or cow/calf per state license	Any bison or cow/calf per state license	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries	Limited to north of Nowlin Creek area	Consider escorted hunting in South Unit as needed	Guided hunts in South Unit when authorized
Harvest, Grand Teton NP elk:			
Frequency	As needed	As needed	
Begin Date	3rd week October	3rd week October	Modified as necessary
End Date	2nd week December	2nd week December	Modified as necessary
License types	Antlerless only	Antlerless only[2]	
Special regulations:	Cartridge limits	Cartridge limits	

Table 4. Comparison of current and primary MSP components and parameters.			
Action	**Current Management**	**Management**	**Comment**
	Bear spray required	Bear spray required	
	Hunter safety card required	Hunter safety card required	
Harvest, Bridger-Teton NF, Elk Hunt Area 80:			
Begin Date			
End Date		15-Dec	Would require change in winter closure dates
Harvest, Elk Hunt Area 78			
Structure			Changes at discretion of WGFD
License Types			
Private Lands Mitigation:			
Cattle commingling		Incentives for non-breeding operation	
Hay depredation		Increased fencing	
Landscape damage			
Easement acquisition			
Vegetation Restoration/ Protection: Elk Refuge			
Vegetation Restoration/ Protection: Grand Teton	Herbicide treatments, prescribed burning, native seed propagation and planting, and protection and maintenance of restored pastures	Same as Current Management for remaining non-native grasslands in Kelly Hayfields	
[1]Number elk and bison on feed per day, totaled by feeding season.			
[2]Any elk licenses could be offered if bull ratios in the park consistently exceed BEMP criteria.			

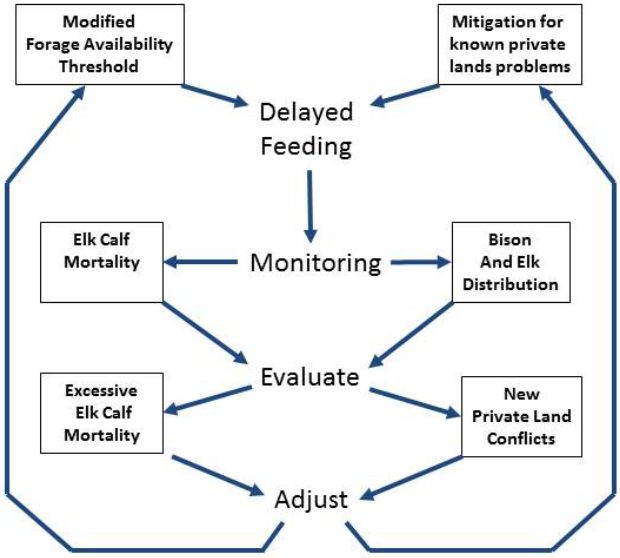


Figure 10. Framework for delayed feeding strategy under MSP.

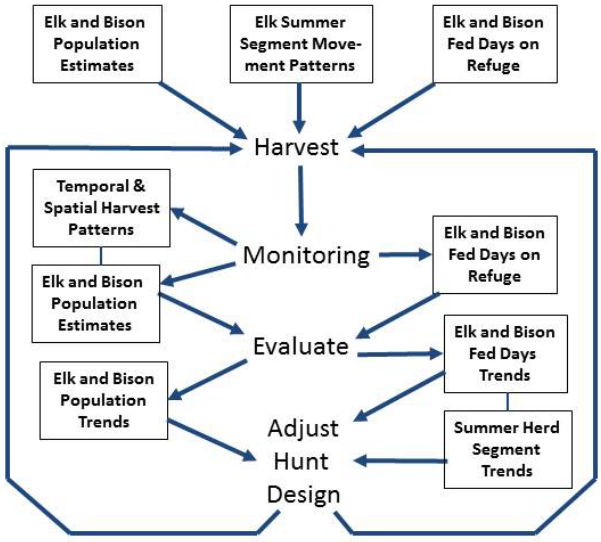


Figure 11. Framework for harvest strategy under MSP.

Strategies Considered But Rejected

The BEMP considered several additional strategies for elk and bison management that, for a variety of reasons, were not selected for implementation in the preferred alternative and Record of Decision. The agencies reconsidered a subset of these during the development of this MSP (Table 5). Since they were not part of the ROD, additional NEPA compliance would be necessary to incorporate any of them into this MSP, and thus they are not being considered at this time.

Table 5. Strategies considered but rejected.

Strategy Considered	Reason Rejected
Fertility control in elk	Judged not reasonable or feasible in BEMP, primarily due to major technical, social, and financial hurdles[1]. For MSP discussed primarily with regard to the difficult to harvest herd segment in Hunt Area 78 on private lands, where federal agencies have no jurisdiction.
Fertility control in bison	Impacts discussed at length in BEMP[2]. Not considered for MSP because current hunting programs appear effective at slowly moving the herd toward the 500 animal herd objective.
Agency reduction of bison or elk	Not considered necessary or desirable on federal lands because current hunting programs that utilize sport hunters are effective at meeting herd objectives.
Altering rations of supplemental feed	Rejected as a strategy because reducing daily feed ration below 8 lbs/elk would be enough feed to encourage elk to remain on NER but would result in unacceptably high elk calf mortality rates.
Private Lands Hunting Coordinator	The WGFD contacted private landowners and ranchers in the Spring Gulch area and discussed this concept to enhance elk harvest of short distance migrants. Generally, landowner interest was low.

MODELS OF SYSTEM DYNAMICS

Models provide a simplified representation of the biological system being managed. We will use modeling to quantify the effects of our management actions on 2 key responses of interest, elk distribution and winter elk calf mortality. There are a suite of possible factors that affect the proportion of elk on NER feedgrounds versus native winter range. Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

An increase in calf elk winter mortality is a potential result of reduced feed season length. Several factors influence winter calf elk survival on NER (Fig. 13). Models will be used to assess the effects of available forage on winter calf elk survival (Appendix 4). Over time this will allow us to assess the effects of our principal management strategy (reducing feed season length) relative to winter elk calf survival.

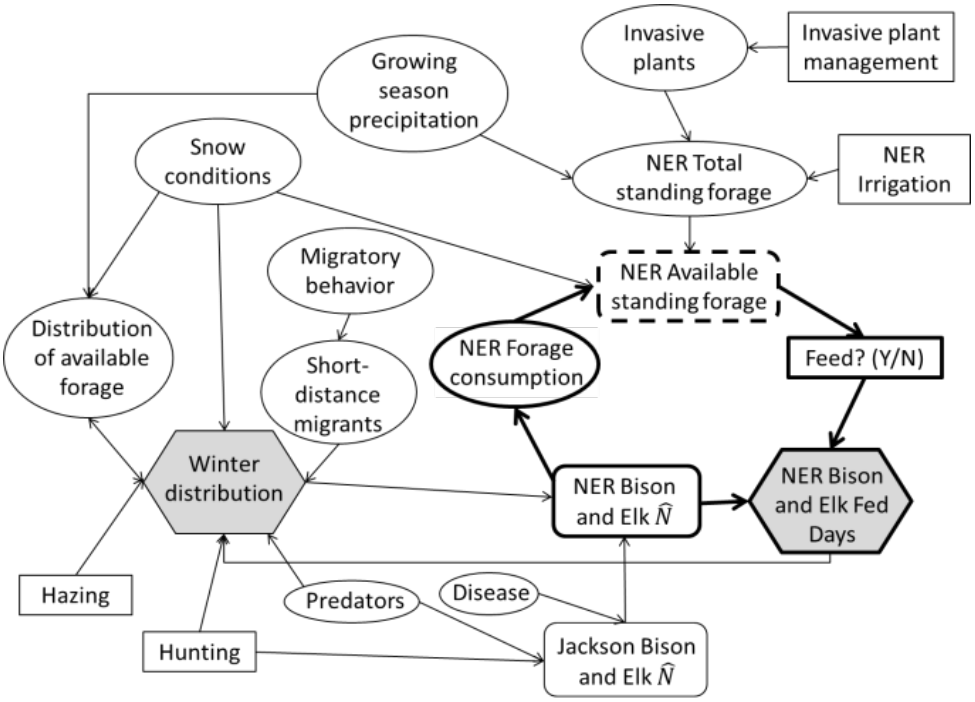


Figure 12. Diagram depicting the factors that potentially influence outcomes identified in the Bison and Elk Management Plan (BEMP; USFWS 2007a). Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

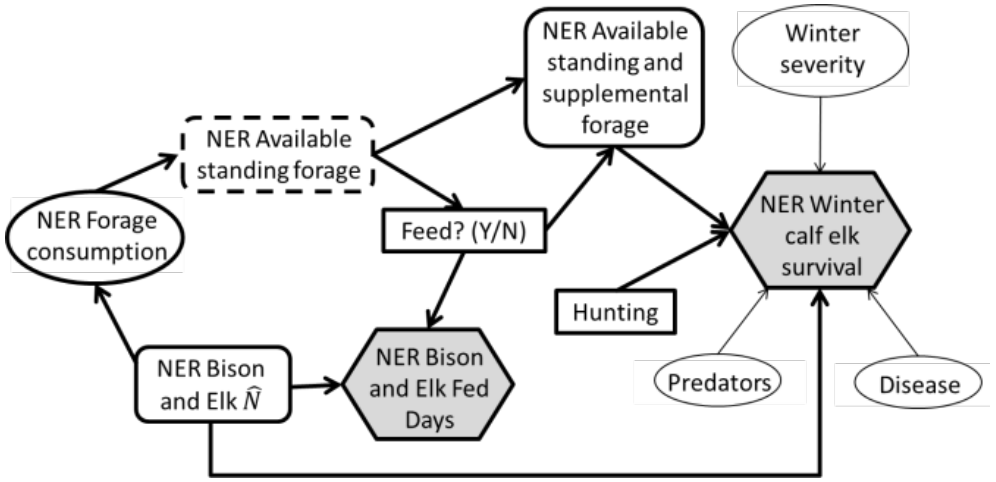


Figure 13. Diagram depicting the factors that potentially influence bison and elk fed days on the National Elk Refuge and winter calf elk survival. Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

MONITORING

Feeding Initiation Monitoring

NER uses weekly field estimates of the amount of forage available to elk to determine feeding initiation date. Currently measurements are taken at key index sites representing areas preferred by elk on NER (see supplemental materials at end of this section). These methods will be enhanced by 1) increasing the number of sampled sites to better represent the total amount of forage available to elk on the southern half of NER; 2) increasing the precision of estimates at each site by increasing the number of observers; and 3) extending the monitoring period later in the winter to assess the relationship between available forage and elk and bison distribution.

To better represent the total amount of forage available on the southern half of NER, a subsample of current key index sites will be retained to facilitate comparison with historic data, but additional random sample sites stratified by elk habitat preference will be added. Historic elk distribution mapping and elk GPS collar data (NER unpublished data) suggest that the areas most preferred by elk on southern NER are associated with moderate to high forage production and green vegetation. Because the distribution of forage production and greenness characteristics vary annually based on irrigation and precipitation patterns, we will annually map areas preferred and not preferred by elk and sample sites will be randomly selected within each of these mapped categories. At least 3 historic key index sites, 3 random sites in areas preferred by elk, and 3 sites in areas not preferred by elk will be sampled each week from late December through the initiation of supplemental feeding.

Currently the NER biologist is the only person trained in the techniques used to estimate available forage (see supplemental materials). At least 2 additional personnel will be trained in these techniques. This will provide a backup in the event of future personnel changes and will facilitate error estimates of the available forage measurements at each site.

Currently NER and WYGFD biologists monitor available forage conditions at least weekly from late December until average available forage at key index sites nears the threshold level of 300 lbs. per acre and feeding is initiated. The principal MSP strategy is to delay the initiation of supplemental feeding after average forage production reaches the 300 lbs/ac level at key index sites. Therefore the monitoring period will be extended to include this period of delayed feeding.

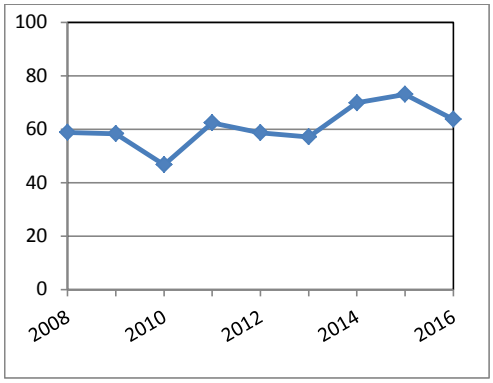


Figure 14. Proportion of the Jackson Elk Herd that was classified on NER feedgrounds in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

Proportion of Elk Wintering on NER

A principal MSP goal is to reduce the number of elk wintering on NER. Our strategy will be to effect redistribution of elk to native winter range from NER over time via shortening the duration of the feed season, and thus slowly conditioning elk to seek food elsewhere. As feeding periods are shortened, the probability of younger elk age classes discovering NER feedgrounds will be reduced, and, hypothetically, that proportion of the JEH that utilizes NER feedgrounds will decline over time. We will measure this effect by examining changes in the winter distribution of the JEH. WGFD annual trend/classification count data provide a multi-year baseline data set to measure changes in the winter distribution of the JEH and categorizes observations by location. In each year, we will calculate the proportion of total classified elk in the JEH that are classified on NER feedgrounds. We will compare the 3-year running average post MSP implementation to the pre-implementation baseline. The pretreatment baseline will be comprised of data from 2008 2016, a time period that represents BEMP implementation prior to MSP actions (Figure 13).

Elk Fed Days and Bison Fed Days

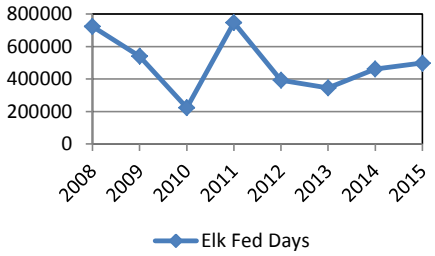
The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. We further assume the variables elk-fed-days (EFD) and bison-fed-days (BFD) are a proxy for these conditions. EFD and BFD will be calculated annually for each species based on the following formulas:

EFD= ∑ Total elk counted on feed during daily feedground counts for duration of feed season

BFD= ∑ Total bison counted on feed during daily feedground counts for duration of feed season

Because EFD and BFD are influenced by feed season length and the number of animals on feed, the MSP strategy of delaying the initiation of supplemental feeding will inherently reduce the number of EFD and BFD through a reduction in average feed season length. We believe that EFD will be further reduced by encouraging a greater proportion of the JEH to winter on native winter range, thereby reducing the number of elk occupying NER feedgrounds. We will evaluate changes in EFD and BFD by comparing the 3-year running average post MSP implementation compared to mean EFD and BFD from 2008–2015. The running average is an appropriate comparison because it will help

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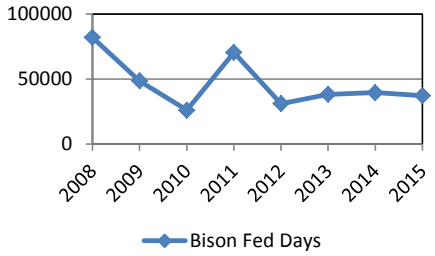


Figure 15. Elk Fed Days (EFD) and Bison Fed Days (BFD) in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the Management Step Down Plan (2008-2015). These values represent the pretreatment baseline which will be compared to the 3-year running average EFD and BFD post MSP implementation.

account for wide annual variation in EFD and BFD associated with winter severity (Figure 15)

Elk Winter Mortality Monitoring

NER has used consistent methods to monitor winter elk mortality since 1982. Each winter NER biologists and other refuge staff conduct a survey of all non-hunting related winter elk mortalities that occur on NER from November through April. Mortalities are tallied by age/sex class and percent mortality is calculated using the corresponding number of elk classified on NER feedgrounds as the denominator. We will continue to monitor elk winter mortality using the same methods post-MSP implementation, which will allow trend comparisons to the pre MSP baseline (Figure 15). Under the MSP framework, we believe the 3-year running averages for total and calf winter elk mortality will be within the range of variation exhibited by the pre MSP baseline. Historic monitoring suggests that calf and total mortality are sensitive to winter severity and disease outbreaks, and that winter mortality occasionally exceeds >3% total mortality and >10% calf mortality. Post-MSP mortality in excess of these levels may warrant shortening the feeding initiation delay in subsequent years.

Elk Collaring

One of the MSP's principal strategies is to shorten the length of the feed season to encourage elk use of native winter range, but we anticipate that this strategy will also result in an increase in elk conflicts on surrounding private land in the town of Jackson and the Spring Gulch areas, potentially including large groups of elk. To quantify this effect and provide real-time information to WGFD and NER managers to facilitate a response, we propose maintaining a sample of 50 GPS-collared elk that winter on NER throughout the MSP implementation period. Forty-five elk represents approximately 0.5% (1 in 200) of the NER winter elk population. This sample size will not be sufficient to detect all elk movements from NER to surrounding private lands, particularly movements by small groups of mature bull elk, but it will be sufficient to detect and quantify significant movements of cow/calf/yearling elk groups compared to pre-MSP baseline data.

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NER has elk GPS-collar data available from the 2008-2013, which represents the post-BEMP, pre-MSP baseline period. We hypothesize that elk movements from NER to surrounding private lands will increase during the MSP implementation period compared to the pre-treatment baseline. This will be tested by comparing the number of incidents that elk left NER for surrounding private lands (per elk/per year), and the proportion of elk GPS fixes on NER versus private lands during time periods of interest. The principal time period of interest is late December–March because this represents the period after the NER elk hunting season, and prior to, and during, NER feeding operations. This is the season when changes to the NER feeding program would be most likely to result in elk distribution changes.

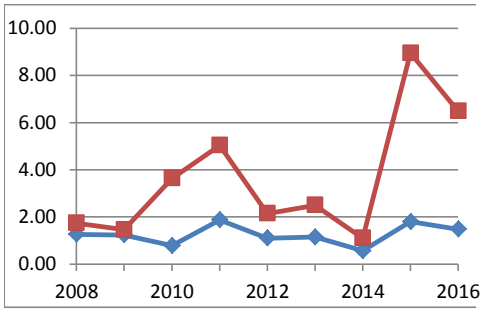


Figure 16. Total (blue) and calf (red) elk winter mortality (%) on NER in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

Thirty adult cow elk were captured on NER feedgrounds in February 2016 and Telonics Iridium GPS collars were deployed with a 90 minute fix interval. Collars will be deployed on up to 50 additional adult cow elk in February-March 2017. Given 83% annual survival for adult cow elk in the JEH (Cole and Foley et al. 2015) and 3-year collar life, approximately 10 additional elk will need to be collared each year in winter 2018 and 2019 to maintain the 50 elk desired sample size over the life of the MSP implementation period.

Ancillary data that will be collected and analyzed during the elk capture and collar data analysis process includes brucellosis seroprevalence, pregnancy rate, and elk summer range determination for comparison to the findings of Cole and Foley et al. (2015).

Disease

The primary purpose of limiting reliance on supplemental feeding is to reduce the prevalence of endemic elk and bison diseases and mitigate transmission risk associated with the introduction of novel diseases. We hypothesize that brucellosis seroprevalence will decline post MSP implementation. There are no recent brucellosis seroprevalence data for elk on the NER, but >50 elk will be captured during elk collaring operations in winter 2016, and each elk will be tested for brucellosis exposure. The 2016 Brucellosis seroprevalence rate will be the pre-treatment baseline to evaluate post MSP change. Chronic wasting disease (CWD) has been monitored in the JEH since 1997, and since 2008 it has been monitored with sufficient sample size to detect 1% prevalence with 95% confidence. No CWD positive cases have been detected in the JEH, which given the long term persistence of the disease, provides overwhelming evidence that CWD is not currently endemic to the JEH. However, most evidence suggests that the distribution of CWD is increasing and that its introduction to the JEH is inevitable. Early detection is critical to ensure a management response, and therefore ongoing monitoring at sample sizes sufficient to detect 1% CWD prevalence with 95% confidence is necessary. CWD is sampled by testing tissues collected primarily from hunter harvested elk, and past experience suggests that 2 full time technicians working from September-December are necessary to ensure minimum sample size. Typical costs associated with 2 technicians are $32,000 per year.

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Data Collected for Modeling

Table 6. Variables to be used in models to explain elk winter distribution in the Jackson Elk Herd and elk calf mortality on NER.

VARIABLE	SOURCE	Elk Winter Distribution Model	Elk Calf Mortality Model
Proportion Jackson Elk Herd on NER Feedgrounds	WGFD/NER Jackson Elk Herd February Classification Count	Yes	No
Proportion Jackson Elk Herd from South Snake River summer segment	Determined from elk GPS collar data for elk captured on NER	Yes	No
Number of wolf packs in the Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated total wolf numbers in Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated number of wolves using NER in winter	NER observations	Yes	Yes
Total NER herbaceous forage biomass	NER forage production survey data	Yes	Yes
Snow Water Equivalent	NOAA snowtell site data	Yes	Yes
NER Winter elk Mortality (calf)	NER winter elk mortality survey	No	Yes
Snow Depth	NOAA Snowtell sites and NER measurements	Yes	Yes
Available Forage	NER and GTNP monitoring in winter months	Yes	Yes
NER Elk and Bison Fed Days	NER feeding records and daily feedground estimates of elk and bison	Yes	Yes
NER Feeding Start Date	NER feeding records	Yes	Yes
Gros Ventre Feeding Start date	WGFD feeding records	Yes	No
Elk Hunting Pressure by Hunt Area	Estimated number of hunter days from WGFD completion reports	Yes	Yes

To facilitate modeling, we will collect data on the following associated variables (Table 6). The table lists variables and how they relate to our efforts to use modeling to explain changes in elk distribution and elk calf mortality relative to our principal action of reducing feed season length.

EVALUATION/FUTURE MANAGEMENT

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Consequently, we anticipate that the strategies outlined in this plan will be in place for a minimum of 5 years, after which an initial evaluation of the program will be made. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented at an annual management MSP update/report, completed by NER staff by the end of March for the previous year.

Consistent with objectives outlined in the BEMP, the long-term goal of this plan is reduce the reliance of bison and elk on intensive supplemental feeding, using adaptive management principles through a structured framework of management actions, to achieve a desired condition of animals relying predominately on native habitat on NER, GRTE, and USFS lands, and on NER cultivated forage. But because there is no precedent for what this plan proposes, there are few responses to proposed management actions that can be predicted to a degree of certainty commensurate with establishing definable thresholds or other objective criteria for success in the short term.

Factors that will be considered in evaluating the success of the program will include the trend of EFD and BFD, type and frequency of private lands conflicts, the proportion of the JEH wintering on the NER, presence or absence of CWD and other infectious diseases, elk and bison population size and distribution, elk calf winter mortality, and public support. These are complex, dynamic, and interwoven components that, together with the MSP, make up the framework for decreasing reliance on supplemental feeding. As such, the effects of changing biological, social, and political conditions on these components will be part of the evaluation process.

In the context of this larger framework, however, we believe evaluation of the trend in EFD and BFD will be most important after the first 5 years of MSP implementation. The direction and magnitude of the trend observed will provide a preliminary basis for evaluation and decisions about continued management actions. Initial success with reduced feeding will be associated with a declining trend in EFD and BFD, with greater magnitudes indicating higher degrees of success. However, determinations of overall program success will necessarily include evaluation of all system components. For example, gains in reduced feeding come could be accompanied by an increase in private land conflicts, which would affect overall success determinations. While the overriding strategy will be to decrease feeding as aggressively as possible while gauging effects on other system components, overall measures of program success through time will necessarily involve evaluating a matrix of effects. These evaluations will be included in annual MSP reports.

As proposed and new management strategies are implemented and evaluated under this plan, at some point in the future it may become apparent that meeting reduced feeding goals will not possible without reducing elk and/or bison population objectives. Population objectives for both herds are set by Wyoming Game and Fish Commission and are evaluated regularly by WGFD personnel, including public review through annual season setting meetings. The BEMP supported the State herd objectives of 500 bison and 11,000 elk, and thus due to NEPA requirements any further consideration of reduced herd sizes by the NER or GRTE are beyond the scope of this plan. However, Wyoming Game and Fish Commission changes to Jackson bison or elk herd objectives are not constrained by the BEMP.

Comment [CE9]: Consider FAQ callout "**Why is the MSP vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?"**

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Investigating the potential effects of climate change on elk and bison management will also be important in the long-term. During implementation of this plan, we will collect a variety of data that could be drawn upon for this purpose.

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PUBLIC OUTREACH AND EDUCATION

The practice of winter feeding is inexorably woven into the historic fabric of Jackson Hole. Elk are identified with the rich and unique legacy for which Jackson Hole is known around the world. De-emphasizing the supplemental feeding program will be a major paradigm shift for the residents of Jackson Hole, Teton County, and the State of Wyoming.

An effective Public Outreach and Education program is essential for effective MSP implementation. The practice of feeding elk evokes passionate responses from those that oppose and those that support this practice. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk/bison herd management methods.

A detailed communication plan to guide outreach and education efforts can be found in Appendix 3.

SCHEDULE

Table 7. Proposed implementation schedule for the MSP.

Action	Date
Public outreach and education	November 2016
Initiate private lands conflicts mitigation contacts/actions	January, 2017
Implement enhanced forage monitoring	January, 2017
Initiate changes in supplemental feeding protocol	January/February 2017
GPS Collar 30-40 elk (Iridium platform)	March 2017
Monitoring/Evaluation/Annual Report	June 2017

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BUDGET

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

	Year				
Agency / Activity	**1**	**2**	**3**	**4**	**5**
National Elk Refuge:					
Monitoring:					
Seasonal Biological Technician (0.5 FTE, GS-7)	$24,000	$25,000	$26,000	$27,000	$28,000
Bison/elk fed days					
Mid-winter census					
Elk summer herd segment distribution[1]					
Expanded standing forage estimates[1]					
Chronic Wasting Disease, 2 seasonal bio.-techs	$32,000	$32,000	$32,000	$32,000	$32,000
Winter bison/elk distribution					
Irrigation					
50 Elk radio telemetry collars; Iridium Platform	$115,000	$25,000	$25,000	$25,000	$25,000
Bison barrier maintenance at NER south entrance	$500	$500	$500	$500	$500
Step Down Management Plan annual reporting	$2,000	$2,000	$2,000	$2,000	$2,000
Private lands:					
Easements / Leases (Private Foundations)	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000
Conflict mitigation technicians (WGFD)	$91,000	$91,000	$91,000	$91,000	$91,000
Hazing (helicopter)	$6,000	$6,000	$6,000	$6,000	$6,000
Vegetation restoration/protection[1]					
Public Outreach and Education	$11,000	$1,000	$1,000	$1,000	$1,000
Subtotal					
Grand Teton National Park:					
Monitoring:					
Summer elk classification/distribution	$10,000	$11,000	$12,000	$13,000	$14,000
Collaborative elk monitoring (GRTE portion)	$5,000	$5,000	$5,000	$5,000	$5,000
Vegetation Restoration/Protection					
Monitoring	$16,000	$16,000	$18,000	$18,000	$12,000
Temporary bison fencing	$24,000				
Temporary fence maintenance	$6,000	$8,000	$8,000	$4,000	
Hayfields restoration	$84,000	$70,000	$70,000	$31,000	
Exotic plant mitigation	$50,000	$52,000	$46,000	$32,000	$16,000
Elk Reduction Program (subject to annual review)					
Hunter harvest evaluation	$1,500	$1,500	$1,500	$1,500	$1,500
Harvest age distribution	$2,000	$2,000	$2,000	$2,000	$2,000
CWD monitoring (0.15 FTE, GS-6)	$7,000	$7,000	$7,000	$7,000	$7,000
Law Enforcement and Visitor Protection (0.15 FTE for 20 LE and support staff; supplies, and permitting)[3]	Unknown				

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
Subtotal					
Wyoming Game and Fish Department:[2]					
Subtotal					
Grand Total					

[1]See detail in Appendix

[2] Dependent on size of elk reduction program; current annual expenditures are approx. $295,000 for 0.15 FTE for 20 LE and support staff; supplies, and permitting.

[3]Through Interagency Agreement

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APPENDIX ?? Frequently Asked Questions

Q1: Why is the MSP vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?

A1: This is the first time that the strategy of delaying feed season initiation has been employed to reduce reliance on supplemental feeding. There is uncertainty regarding the effects of this strategy on elk and bison distribution and elk winter mortality, and therefore it is important to maintain flexibility in plan implementation to avoid significant unintended negative consequences. Unintended negative consequences the MSP seeks to avoid include 1) elk or bison moving to areas where they damage property, risk human safety, or commingle with livestock, and 2) elk winter mortality levels significantly higher than baseline levels.

Q2: Why were reductions to the Jackson Elk Herd and Jackson Bison Herd population objectives not considered as a strategy to reduce reliance on supplemental feeding?

A2: The BEMP has clear population objectives of 5,000 elk wintering on NER and 500 wintering bison. Modifying those population objectives would require additional NEPA analysis. The BEMP also agreed to support State elk herd objectives. The WGFD completed a public process in 2016 to set the population objective for the overall Jackson Elk Herd, and that objective remains unchanged at 11,000 elk.

Q3: The BEMP has an objective of 5,000 elk wintering on NER. Why has that objective not been achieved through increased elk harvest?

A3: The overall Jackson Elk Herd population has declined and is currently close to the 11,000 elk objective, but the number of elk wintering on NER has been well above the 5,000 elk objective since implementation of the BEMP in 2007 (Mean =7,100 elk). When the analysis was conducted for the BEMP, elk winter distribution data suggested that 5,000 elk could winter on NER while still maintaining 11,000 elk in the Jackson Elk Herd overall. However, the proportion of the Jackson Elk Herd that winters on NER has increased significantly over time, and based on current elk distribution it is no longer possible to winter 5,000 elk on NER and maintain 11,000 elk in the overall Jackson Elk Herd. Although increasing elk harvest above current levels would likely allow us to achieve the 5,000 elk objective for NER, it would also reduce the overall Jackson Elk Herd population below the 11,000 objective. If increasing elk harvest in not plausible, the only other option to meet the 5,000 elk objective on NER is to change winter elk distribution, which is the principal strategy of the MSP.

Q4: Why is your principal strategy to delay the start of the feed season?

A4: By delaying the start of the supplemental feed season we decrease the probability that elk that use native winter range or state feed grounds will discover NER feed grounds. Because elk use of feed grounds is a learned behavior, over time this could increase the proportion of elk that winter on native winter range, reduce the number of elk that move from the Gros Ventre drainage to NER, and decrease the NER wintering elk population. The resulting shift in elk distribution would allow us to achieve the

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5,000 elk objective for NER. Because 5,000 elk and 500 bison is close to the estimated carrying capacity of NER habitat, less feeding will be necessary at these population levels.

Q5: Will delaying the start of the feed season result in elk starvation?

A5: Our goal is to delay elk feeding a sufficient amount of time to affect elk distribution without causing an increase in elk mortality.

APPENDIX 1. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007).

Comment [CE10]: If the Frequently Asked Questions section will go in the Appendix, then subsequent appendix numbers will have to be changed

Populations

- Jackson elk herd objective of 11,000 would be maintained.
- New Jackson bison herd objective of 500 established.

Winter Feeding

- Supplemental feeding could be delayed or could occur earlier compared to current practices.
- Changes [to feeding program could] include alterations in the timing of feeding and providing supplemental feed in fewer years.
- Ration or pellet composition might need to be changed.
- Supplemental feeding would be initiated according to established criteria, including pre-winter forage production, assessments of forage utilization (done jointly by WGFD and NER personnel), elk condition and movements, and potentially on the January 1 index of winter severity calculations for elk (Farnes, Heydon, and Hansen 1999).
- Mechanical means could be used to increase forage access for elk after snow crusting events.
- Changes in the refuge supplemental feeding program could begin to affect elk nutrition (negligible adverse effect on NER elk from lower nutrition).
- Displacement of elk by bison during competition for standing forage would decrease as the bison herd is reduced.
- Aggressive social interactions involving competition for food among elk and bison would increase overall as feeding periods are reduced.

Winter Distribution

- Elk densities on the NER would decline due to more reliance on standing forage and wider distribution.
- Elk use of lands surrounding the NER would increase, including:
    - USFS lands east of the NER
    - Gros Ventre feedgrounds possibly
    - Southern GRTE
    - State feedgrounds south of the NER
- Most of winter distribution shift would involve elk in the Yellowstone, Teton Wilderness, and Gros Ventre segments.
- As ungulate numbers decreased and supplemental feeding was reduced, competition and aggressive social interactions on the refuge would also be reduced.
- Elk and bison distribution would increase as the animals relied more on native winter range.
- Fewer animals would be present on the refuge.

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Mortality

- As supplemental feeding is reduced, natural factors such as climate and native forage availability would have a greater influence on numbers, movements, distribution, and mortality.
- More elk would be subject to natural factors affecting mortality, including loss of body condition, predation, and starvation.
- Increased mortality on and off the refuge would mainly affect older elk and calves, and some prime bulls entering the winter energetically stressed due to rut activities.
- Late winter calf ratios could decrease as a result of higher winter calf mortality
- Average winter mortality on the refuge would increase from 1%–2% annually to an estimated 1%–5%.
- Overall, a higher total winter mortality rate of approximately 5% could be expected.

Disease

- Reductions in supplemental feeding or elk numbers would reduce the potential for impacts due to tuberculosis, septicemic pasturelosis, and CWD.
- The health and sustainability of the Jackson elk herd would be increased gradually as supplemental feeding was reduced and there was greater reliance on standing forage and wider ungulate distribution.
- Health and sustainability of the Jackson elk herd would be enhanced in the long term.
- Wider distribution of elk would result in moderate reductions in both the prevalence and potential transmission of brucellosis, as well as potential for spread of diseases not yet in the population.

Private Lands

- The agencies would work closely with the WGFD and landowners, including livestock producers, to coordinate actions that would prevent conflicts due to elk dispersal and to defray costs of managing potential conflicts. Preventing access to food/hay rewards on private lands would be vital for effective management.
- Private land conservation easements within NER boundaries would promote wider distribution.

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APPENDIX 2. Monitoring Supplemental Materials: Feeding Initiation Methods

At each sample site, 10 subplots will be measured at every 5 steps along the random bearing determined for each site. At each subplot a 13.27" diameter metal sampling ring will be placed on the ground. The amount of forage available to elk within the sampling ring (dry weight in grams) will be visually estimated. The 13.27" diameter subplot allows easy conversion from grams to lbs. per acre (each gram is equivalent to 100 lbs. per acre). During annual forage production sampling, refuge biologist Eric Cole has made approximately 1,000 of these visual estimates per year for 17 years, and 33% of Cole's estimates have been verified by clipping and weighing. Therefore, Cole will be the principal estimator, but additional personnel will be trained in these techniques to provide redundancy in the event of personnel changes, and to increase the number of observers to facilitate estimation of error.

Estimating available forage within the sample ring at each subplot is relatively straightforward when snow cover is limited, but estimating how much of the forage is accessible to elk when snow is dense, deep and crusted can be subjective. To decrease the subjectivity of the estimation process, if the area under the sample ring is covered with snow, only forage that can be exposed with a gloved hand will be included in the estimate of available forage. Forage that is fouled with manure and/or flush with the ground due to trampling and/or encrusted in ice will not be included in the estimate of available forage. At each subplot the estimate of available forage (dry weight g) will be converted to an equivalent lbs./acre value (1 gram=100 lbs./acre). The arithmetic mean of available forage (lbs./acre) for the 10 subplots provides an estimate of available forage for each index site. There are 3 sample site categories: 1) Historic Key Index Sites that have been used since 2007, 2) New randomly selected sites within areas preferred by elk, and 3) New randomly selected sites in areas not preferred by elk. Historic key index sites were not randomly selected, but were instead selected to represent areas most preferred by elk on the south end of NER. These were the sites used to determine when supplemental feeding would be initiated from 2007 until the implementation of the MSP. To facilitate comparison with pre-MSP data, we will continue to use mean lbs. per acre across historic key index sites to determine the 300 lbs. per acre threshold. However, post MSP implementation we will delay feeding initiation by 2 weeks once the 300 lbs./acre level has been reached. We will concurrently sample at randomly selected sites stratified on an annual basis between areas highly preferred and not highly preferred by elk. This will enable us to quantify the relationship between mean forage availability at historic key index sites and random sites over time.

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APPENDIX 3. Communication Plan

Communication Goals

Prior to the MSP's Implementation

- Utilize a variety of outreach methods to inform the public on the goals and timing of the MSP implementation and possible effects on wintering herds.
- Utilize a variety of outreach methods to inform the public on public comment opportunities.
- Identify and coordinate key messages and outreach with USFWS regional and national offices, State and federal agency partners, non-profits, elected officials, and other identified audiences.

During the MSP's Implementation

- Continue to utilize a variety of outreach methods to describe current management actions as well as measurable and noticeable changes on the landscape, in animal behavior, or in animal health.
- Provide a comprehensive overview of the MSP by providing links and references to previous outreach and background information.

Communication Objectives

- Work with current media contacts to promote news of the MSP via print, radio, Web, and social media platforms.
- Utilize new media and social media tools to provide information on why the MSP was developed, what public comment opportunities exist, and how the plan is being implemented.
- Plan, coordinate, and execute public meetings to allow for public comment and questions on the plan.
- Develop and provide methods for the public to submit written comments on the MSP.
- Monitor print media on Refuge elk and bison management to see how the Step own Plan objectives and reactions are being portrayed to the public.

Current Outreach Resources

- National Elk Refuge web site
- National Elk Refuge news release list
- (approximately 300 contacts)
- National Elk Refuge Twitter site (1,039 followers)
- Bison and Elk Management Plan web site (http://www.fws.gov/bisonandelkplan/)
- Space for an 11" x 17" poster in the Visitor Center on Refuge management topics
- Display panels in the Visitor Center theater for temporary displays

Available Supporting Outreach Resources

- USFWS Mountain–Prairie External Affairs staff
- USFWS Mountain–Prairie web site, including the
- "Top Stories" feature
- USFWS Mountain–Prairie Twitter site USFWS Mountain-Prairie Region Facebook page
- USFWS National Wildlife Refuge System

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- Facebook page
- USFWS Facebook page

Previous Outreach Efforts

- NER routinely writes and disseminates news releases on Refuge management activities, including the Comprehensive Conservation Plan, supplemental feeding, herd health monitoring, and forage production.
- Post the above news stories as Content.
- Management System (CMS) articles.
- Post CMS news story promos so they prominently appear on the home page, linking readers to the articles.
- Send out Twitter messages linking viewers back to the news stories.
- Prepare, upload and provide links to Adobe PDF versions of news stories with additional photos where additional images are available and/or help understand or visualize the content.
- Utilized the Conservation link on the web Content
- Management System to post information about the Bison and Elk Management Plan and the draft Comprehensive Conservation Plan.
- Retained and provided a link to the original Bison and Elk Management web page (http://www.fws.gov/bisonandelkplan/) that was developed during the planning process. The web site includes links to the Final Plan/EIS, Record of Decision, Federal Register Notice of Availability for both the Record of Decision and Final Plan/EIS, associated news releases, public meeting highlights, and other related documents. Note: the National Elk Refuge does not manage the site.

Additional Outreach Opportunities

- Public meetings in Jackson and other identified locations.
- Service produced video; video could be posted to the National Elk Refuge's multimedia web page, or USFWS Mountain–Prairie home page "Top Video" feature.
- Live radio interview on KHOL (Jackson, WY radio)
- Wyoming Public Radio interview with Refuge management staff
- Interviews with local print media sources
- Updates at community leader meetings such as Rotary Club, Jackson Hole Chamber of Commerce board meetings, and interagency breakfast meetings (with Federal agencies and local elected officials).

Target Audiences

Internal

- Regional and National USFWS Leadership
- Refuge permanent staff
- Refuge seasonal staff
- Refuge volunteers

External

- Congressional representatives
- State of Wyoming leadership
- Federal agency partners, particularly Grand Teton National Park and the Bridger–Teton National

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Forest
- Wyoming Game & Fish Department
- Other NER partners, including county and town agencies and local nonprofit organizations
- Local elected officials
- Private landowners in proximity to the National
- Elk Refuge or neighboring Federal lands
- Tribes
- Local and state media
- Local public

Key Outreach Topics

- Overview of BEMP objectives
- Strategy to change elk/bison behavior
- Threat of disease
- Natural mortality rates
- Anticipated winter distribution changes for bison/elk
- Mitigate negative effects on private lands
- Change elk behavior and distribution while avoiding increased mortality.
- Explain the historic reasons a supplemental feeding program began and why it was continued.
- Explain the NER's limited large ungulate carrying capacity and the disproportionate impact of bison on available forage; 3 elk = 1 bison.

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APPENDIX 4. Models

Elk winter distribution model

The proportion of the JEH that winter on the NER will be linked to factors hypothesized to influence elk winter distribution using a generalized linear mixed effects model (GLMM). A GLMM can account for a proportional response variable (i.e., constrained to the interval 0–1) using a log link and binomially-distributed errors. A GLMM also includes fixed and random effects, with the latter capturing residual model variance otherwise not explained by fixed effects. Year will be including as a random effect, providing several benefits. First, we don't assume years are independent and comprise all of the factor levels of interest. Instead, the effect of year is treated as a random variable, with individual year effects realizations of that distribution. This allows inference to non-sampled factor levels, i.e. years, by estimating a latent population-level proportion of elk expected to winter on the NER regardless of fixed effect influences. Thus, the random year effect can be considered a latent variable describing elk behavior manifested as observed winter distribution. Second, because year effects are not treated as independent, estimated effects of year on the proportion of JEH elk wintering on the NER are dependent on all factor levels, leading to greater precision when estimating individual year effects (Kéry 2010).

The full GLMM incorporating fixed effects for each factor identified as influencing elk winter distribution is:

$$P_t = \beta_{0(t)} + \beta_1 * AFI_t + \beta_2 * SDM_t + \beta_3 * WP_t + \beta_4 * GSP_t + \beta_5 * SWE_t + \varepsilon_t$$

where the random intercept and residual model variance are

$B_{0(t)} \sim N(\mu_{\beta_0}, \sigma^2_{\beta_0})$, and

$\varepsilon_t \sim N(0, \sigma^2)$, respectively.

Fixed effects include 1) per capita available forage at initiation of winter feeding (*AFI*) , 2) proportion of the JEH that are short-distance migrants (*SDM*), 3) number of wolf packs present on JEH native winter range (*WP*), 4) growing season (May–August) precipitation for the Wyoming Snake Drainage climate division (*GSP*; a proxy for available forage on native winter range), and 5) snow water equivalent on 1 January at Thumb Divide (*SWE*; a proxy for early winter severity).

Elk calf winter survival and forage deficits

The Forage Accounting Model of Hobbs et al. (2003) has as an output weekly available forage biomass for the NER (sum of predictions for 30 × 30 m cells). These predictions account for snow conditions using a proxy of SWE and decrement total available biomass by 35% to account for unpalatable plants within the total estimate.

While calf survival is a function of multiple factors the primary management action influencing calf survival is supplemental winter feeding. Current winter feeding initiation criteria lead to calf survival generally higher than in unfed populations. Proposed feeding initiation criteria will result in later initiation of supplemental feed, which will be most influential to calf survival. There is currently little

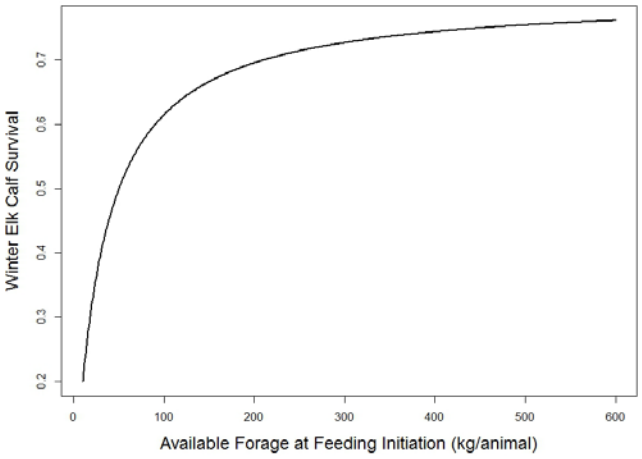
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understanding regarding the relationship between initiation of winter feeding and calf survival, except that current feeding initiation criteria result in high calf survival. We believe a threshold level of available forage at initiation of winter feeding exists such that winter calf survival reaches an asymptote. Below this threshold, calf survival is hypothesized to decline quickly with reductions in available forage at winter feeding initiation. Available forage at the initiation of winter feeding will be related to on elk calf winter survival using a saturating function (i.e., Holling type-II functional response; Fig. 6) by

$$S_t = \frac{aAFI_t}{b + AFI_t}.$$

The parameters *a* and *b* determine how calf survival is related to available forage. Maximum calf survival is *a*, and *b* represents the value of available forage to an individual when survival is 50% of *a* (Hilborn and Mangel 1997).

Although this approach doesn't capture forage deficits *per se*, it does provide a potentially sensitive proxy for this concept. It is assumed that a forage deficit for calves would occur at a point on the curve of the relationship between calf survival and available forage at initiation of supplemental feeding. Modeling the response of winter calf elk survival to changes in feeding initiation criteria facilitates our ability to maximize the influence of feeding initiation criteria on winter distribution while minimizing the likelihood of a large mortality event.



Hypothesized relationship between winter survival of elk calves and per capita available forage at initiation of winter feeding on the National Elk Refuge.

BASIC COMMUNICATIONS STRATEGY

SECTION I: GENERAL INFORMATION

1. **Plan title:** Release of the National Elk Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA)

2. **DTS number: 44T**

3. **What is the action triggering this communications plan?** *(Please explain in no more than three sentences)*

The CCP and EA have been approved since September 2015, so this announcement is overdue. A separate engagement strategy for the Bison and Elk Management step-down plan is currently in development and will be available for leadership review soon.

4. **What is the proposed date to announce this action? Why has that date been selected?** *(Please note whether this date is flexible)*

We propose to release this CCP/EA as soon as possible and no later than September 2016.

SECTION II: GOALS AND MESSAGES

5. **What are our primary communications goals?**

Our primary communications goal is to inform our primary partners at the Wyoming Game and Fish Department, National Park Service, U.S. Forest Service, and the local public that the CCP/EA have been finalized and that certain activities under the CCP are underway. Our secondary communications goal is to draw a clear line between the CCP/EA and the Bison and Elk Management Plan, separating those items in the minds of our constituents and indicating to interested stakeholders that information about the latter plan is forthcoming this Fall.

6. **What are our key messages?** *(List no more than four!)*

- The purpose of Comprehensive Conservation Plans is to guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will

implement to protect species, manage habitats, and support compatible, public recreational and other uses.

- A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).
- Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.
- The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the refuge, including supplemental feeding. A separate announcement and a series of meetings on the Bison and Elk Management Plan are forthcoming this Fall.

SECTION III: IMPLEMENTATION

7. Who is leading this communications effort? *(Check one. Note if the response is neither of these, you should be using either a Partnership, Full or Targeted plan)*

◉ **Region** ○ **HQ**

8. Which programs and/or regions does this issue involve?

The National Elk Refuge (R6)

Refuges (R6)

External Affairs (R6)

9. Implementation timeline:

Date	Time	Tactic	Responsible
August 12	COB	Draft news release and comms plan, submit to NER staff for review	Ryan Moehring
August 19	COB	Review outreach package and return any edits to Ryan Moehring	NER Staff
ASAP	COB	Refuges Planning re-submits *Federal Register* package to HQ for clearance.	Toni Griffin
Day before release	10:00 a.m. MDT	Contact Scott Talbot, Director WGFD	Steve Kallin
Day before release	10:00 a.m. MDT	Congressional notifications	Ryan Moehring
Day of release *(Day available in the Reading Room)*	10:00 a.m. MDT	Distribute press release	Ryan Moehring Lori Iverson will also forward the news release to the NER's news release list.
Day of release	10:00 a.m. MDT	Post Final CCP on Mountain-Prairie Refuge Planning website. Distribute Final CCP (electronic and hard copy) to individuals on the CCP mailing list.	Danielle Stevens will work with Rob Mansheim to post files on RO website. Toni Griffin will distribute the Final CCP to the mailing list.
Day of release	10:00 a.m. MDT	Post press release on R6 website and FWS homepage. Also, post link to press release on social media	Rob Mansheim Lori Iverson will send out a link on the NER's Twitter account.

Day of release	10:00 a.m. MDT	Email Dear Interested Party Letter to interested stakeholders.	Toni Griffin

10. Which communications tools are needed to support these strategies and tactics? *(Be as specific as possible about the products identified and who will produce them)*

Tool	Responsible	Due Date
News Release	Ryan Moehring	8/12/16
Communications Plan	Ryan Moehring	8/12/16
Dear Interested Party Letter	Toni Griffin	8/26/16

11. Which agencies, organizations and/or individuals should be notified?

Stakeholder Name	Contact Info	Pro/Anti/ Neutral	Contact By
Grand Teton National Park	David Vela, Superintendent; david_vela@nps.gov.	neutral	Day before announcement
National Park Service, Intermountain Region	James Doyle, Chief – Communication and Legislation; 303-969-2321; james_doyle@nps.gov	neutral	Day before announcement
Bridger-Teton National Forest	Patricia O'Connor, Supervisor; poconnor@fs.fed.us	neutral	Day before announcement
Wyoming Game and Fish Department	Brad Hovinga; brad.hovinga@wyo.gov	neutral	Day before announcement

12. Who are the primary points of contact for this action?

Media coordinators *(For national-level plans, list at least one person from HQ Public Affairs and others*

from region/program if appropriate. For regional-level plans, only regional coordinators are required. Enter name, email and phone)

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Congressional coordinators *(Optional. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Subject matter experts available for interview *(Must be approved by HQ Public Affairs for an HQ-led announcement or Regional Public Affairs for region-led announcement. Enter name, email and phone)*

- Steve Kallin, 307-201-5409; Steve_Kallin@fws.gov

Additional technical experts for reference *(Enter name, email and phone)*

- Eric Cole, 307-201-5432; Eric_Cole@fws.gov

SECTION IV: DOCUMENT INFO

13. Date Created **Created By**

8/12/2016	Ryan Moehring

14. Date last edited **Edited By**

1/25/2017	Ryan Moehring

SECTION V: CONGRESSIONAL CONTACT LISTS

Delegation Contacts

Member Title	State	Member Name	STAFF_EMAIL
Senator	Wyoming	John Barrasso	brian_clifford@barrasso.senate.gov; kaitlynn_glover@ba kristi_wallin@barrasso.senate.gov

Senator	Wyoming	Michael Enzi	alison_mcguire@enzi.senate.gov karen_mccreery@enzi.senate.gov
Representative	Wyoming	Cynthia Lummis	landon.stropko@mail.house.gov tucker.fagan@mail.house.gov

Committee Contacts

N/A

From:	Steve Kallin
To:	David Gustine
Cc:	Eric Cole
Subject:	FW: amended Table 8 . . .
Date:	Tuesday, September 13, 2016 3:57:13 PM
Attachments:	Table 8_modified_Draft NER Step Down Plan Post Peer Review_13-Sep-2016.docx

---

Dave:

Thank you for this update. We will incorporate into the next version.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Gustine, David [mailto:dave_gustine@nps.gov]
Sent: Tuesday, September 13, 2016 3:52 PM
To: Steve Kallin
Subject: amended Table 8 . . .

hey Steve-

I sent out draft BEMP to regional office as well as management here with need for additional $76K as per our discussion. I felt like it would be a good idea to amend table 8 to reflect this attempt at cost-sharing -- see attached.

thanks again for running lead on this cat herd!

dave

--

Dave Gustine, PhD
Branch Chief, Fish and Wildlife Program
Grand Teton National Park
Moose, WY 83012
dave_gustine@nps.gov
307-739-3485

BUDGET

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
National Elk Refuge:					
Monitoring:					
Seasonal Biological Technician (0.5 FTE, GS-7)	$24,000	$25,000	$26,000	$27,000	$28,000
Bison/elk fed days					
Mid-winter census					
Elk summer herd segment distribution[1]					
Expanded standing forage estimates[1]					
Chronic Wasting Disease, 2 seasonal bio.-techs	$32,000	$32,000	$32,000	$32,000	$32,000
Winter bison/elk distribution					
Irrigation					
50 Elk radio telemetry collars; Iridium Platform	$115,000	$25,000	$25,000	$25,000	$25,000
Bison barrier maintenance at NER south entrance	$500	$500	$500	$500	$500
Step Down Management Plan annual reporting	$2,000	$2,000	$2,000	$2,000	$2,000
Private lands:					
Easements / Leases (Private Foundations)	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000
Conflict mitigation technicians (50%; administered by WGFD)	$46,000	$46,000	$46,000	$46,000	$46,000
Hazing (helicopter)	$6,000	$6,000	$6,000	$6,000	$6,000
Vegetation restoration/protection[1]					
Public Outreach and Education	$11,000	$1,000	$1,000	$1,000	$1,000
Subtotal					
Grand Teton National Park:					
Monitoring:					
Summer elk classification/distribution	$10,000	$11,000	$12,000	$13,000	$14,000
Collaborative elk monitoring (GRTE portion)	$10,000	$11,000	$12,000	$13,000	$14,000
Conflict mitigation technicians (50%; administered by WGFD)	$46,000	$46,000	$46,000	$46,000	$46,000
Vegetation Restoration/Protection					
Monitoring	$16,000	$16,000	$18,000	$18,000	$12,000
Temporary bison fencing	$24,000				
Temporary fence maintenance	$6,000	$8,000	$8,000	$4,000	
Hayfields restoration	$84,000	$70,000	$70,000	$31,000	
Exotic plant mitigation	$50,000	$52,000	$46,000	$32,000	$16,000
Elk Reduction Program (subject to annual review)					
Hunter harvest evaluation	$1,500	$1,500	$1,500	$1,500	$1,500
Harvest age distribution	$2,000	$2,000	$2,000	$2,000	$2,000
CWD monitoring (0.24 FTE, GS-6)	$10,200	$11,000	$11,800	$12,500	$13,300

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
Law Enforcement and Visitor Protection (0.15 FTE for 20 LE and support staff; supplies, and permitting)[3]	Unknown				
Subtotal					
Wyoming Game and Fish Department:[2]					
Subtotal					
Grand Total					

[1]See detail in Appendix

[2] Dependent on size of elk reduction program; current annual expenditures are approx. $295,000 for 0.15 FTE for 20 LE and support staff; supplies, and permitting.

[3]Through Interagency Agreement

September 2016 Draft

BISON AND ELK MANAGEMENT STEP DOWN PLAN

A Structured Framework for Reducing Reliance on Supplemental Winter Feeding

National Elk Refuge
Grand Teton National Park

DRAFT

September, 2016

BISON AND ELK
MANAGEMENT STEP DOWN PLAN

For the

National Elk Refuge,
Grand Teton National Park,
John D. Rockefeller, Jr. Memorial Parkway

Teton County, Wyoming

DRAFT

***Suggested Citation**:* U.S. Fish and Wildlife Service: 2015. Bison and Elk Management Feeding Reduction Step Down Plan, National Elk Refuge and Grand Teton National Park. U.S. Department of the Interior, Washington D.C. Available online at:

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Appendix I. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section

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of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007)**. .....**
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EXECUTIVE SUMMARY

Overview

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands, focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The final plan directed the NER and GRTE (in conjunction with the Wyoming Game and Fish Department: WGFD) to maintain the state's elk herd objective of 11,000; establish a bison population objective of 500; restore habitat on the NER and in GRTE; continue hunting bison and elk on the NER; continue the elk reduction program, when necessary, in GRTE; allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available; and develop a dynamic, structured framework and Step Down Management Plan for decreasing the need for supplemental feeding on the NER. ***This Bison and Elk Management Step Down Plan (MSP) was developed to specifically addresses the criteria for a structured framework referenced in the Record of Decision.***

Background

Winter feeding of elk in Jackson was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. The loss of available winter range in Jackson Hole due to new ranching operations and a growing town resulted in significant numbers of elk dying during several severe winters in the late 1800s and early 1900s. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, established the National Elk Refuge. Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding.

Bison were extirpated outside Yellowstone National Park (YNP) by the mid-1880s but in 1948 were reintroduced to Jackson Hole when 20 bison from YNP were released near Moran, Wyoming. The herd remained small until discovering elk feedlines in 1980, when the population began sustained population growth. Bison and elk that winter on the NER are migratory and occupy summer ranges predominantly to the north.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER (Boyce 1989), high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases (Murie 1951, Franson and Smith 1988, Samuel et al. 1991), which is currently demonstrated by the high level of brucellosis in the elk and bison herds (Cross et al. 2010, Kamath et al. 2016). It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands (Smith et al. 2004), thereby reducing other wildlife associated with woody vegetation.

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. The potential risk of catastrophic disease outbreaks and the need to mitigate this threat is a vital component in achieving the BEMP Sustainable Populations Goal.

Objectives

This MSP addresses several objectives under a broader BEMP goal of sustainable populations, which directed the agencies to: 1) develop a

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dynamic, structured framework for reducing NER supplemental feeding; 2) implement a phased reduction of animals on feed: a) Phase 1, to 5,000 elk and 500 bison, and b) Phase 2, elk and bison rely predominantly on native habitat; 3) maintain natural elk bull-to-cow ratios in park summer herd; and 4) enhance public outreach/education. The BEMP further stated that consideration criteria for implementing the 2nd phase of reduced feeding would include some or all of: 1) the level of forage production and availability on the National Elk Refuge, 2) desired herd sizes and age/sex ratios, 3) effective mitigation of bison and elk co-mingling with livestock on private lands , 4) winter distribution patterns of elk and bison, 5) prevalence of brucellosis, chronic wasting disease, and other wildlife diseases, and 6) public support. **In short, the overall objective of this plan is to provide a path for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives and public support.**

Strategies

Elk have been fed for some period during nearly every winter on the National Elk Refuge since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during a time of year when natural forage is typically most limited is powerful to both species, and their knowledge of its existence has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Attempting to modify this behavior on a large scale is unprecedented and will necessarily require investigation, constant evaluation, adaptive modifications to the approach when indicated, and repeated trials.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into the 3 broad categories of 1) timing and intensity of winter feeding, 2) timing and intensity of hunting, and 3) herd segment specific and overall harvest levels.

Measuring the success of MSP strategies will require knowledge of several bison and elk herd attributes. Because we are interested in reducing the intensity of elk and bison feeding throughout the entire winter season, which includes both the number of animals on feed and the duration of feeding, we will use measurements of elk-fed-days (EFD; the total number of elk fed per day per season derived from daily feedground estimates) and bison-fed-days (BFD; the total number of bison fed per day derived from daily feedground estimates) to evaluate feeding intensity. For example, if 5,000 elk were fed for 100 days during a given winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD. Average baseline feeding intensity during the post-BEMP to pre-MSP period from 2008-2016 was 487,838 EFD (range = 223,614-746,800), and 45,224 BFD (range = 26,035-82,124). Reductions in EFD and BFD compared to these baselines will represent progress in meeting feeding reduction objectives under the MSP. Reductions in EFD and BFD could be achieved through reducing the length of the feed season, reducing the number of elk and bison on feed, or some combination of both factors.

Initial success of MSP implementation will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP did not provide specific measurement criteria for the definition of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage" we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. These levels of reduction are consistent with elk and bison predominantly relying on free standing forage rather than supplemental feed.

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Similarly there are population-specific objectives derived from the BEMP and Phase 1 of the MSP for 5,000 elk wintering on NER and 500 bison wintering in the Jackson Hole area. Progress towards these objectives will be measured using annual classification counts and the average number of elk and bison counted during daily feedground estimates.

Chronic Wasting Disease. As of 2016, CWD has been detected within 40 miles of the Jackson Elk Herd (JEH) in moose, within 35 miles in deer, and within 175 miles in elk. Continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence will take place. Some aspects of CWD response planning could change based on implementation of WGFD's CWD management plan (WGFD 2016).

Winter Feeding. Currently, the initiation of supplemental winter feeding occurs when available forage drops to 300 lbs./acre along transects in areas with highly preferred grasses. This protocol will change to delay the initiation of feeding.

The strategy of delaying the start of supplemental feeding is to encourage elk and bison to use native winter range, especially those individuals that have not previously received a food reward on the Refuge. Over time, it's anticipated a cohort of animals will develop that are not conditioned to the Refuge supplemental feeding program, which will reduce herd concentrations and the risk of disease transmission.

To reduce supplemental feeding overall, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk and bison fed days, the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years of MSP implementation, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require focused mitigation measures.

As bison and elk behavioral responses are better understood, feeding delays will be extended to encourage a redistribution of elk and bison to native winter range. However other factors outside of the scope of this plan such as wolf numbers and distribution could reduce the effectiveness of this strategy.

Variables that influence feeding initiation date will be considered (Table 4, Fig. 10). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. And finally, the distribution of animals, particularly on private, livestock producing lands, would be considered prior to delaying feeding initiation date.

Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years.

In the early years of MSP implementation, the seasonal termination of feeding is expected to

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occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date as the MSP is implemented.

Harvest. Few options for manipulating elk hunting are currently available because the JEH is at or near the 11,000 WGFD objective. Proposed changes include allowing limited any elk permits, allowing a bow season near developments on the NER, delaying the elk season so it will better coincide with migration timing, and alternating areas that are closed and open to hunting over time to encourage animal movements or facilitate harvest.

Based on summer bull ratios in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded hunting opportunities are considered.

The proportion of the Jackson Elk Herd that winters on NER has increased in the past 2 decades. This trend is correlated with a decline in elk use of native winter range and an increase in the proportion of NER elk that occupy winter ranges immediately adjacent to the Refuge. If efforts to encourage increased use of native winter range are unsuccessful, agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. This will provide a level of harvest flexibility more commensurate with addressing changes in herd distribution.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution or discouraging bison from attempting to leave the NER via the south boundary into the town of Jackson.

The effectiveness of NER late-season harvest regimes is influenced by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could help reduce winter elk numbers on the Refuge. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st .

Private Lands Mitigation. Several strategies would be employed to mitigate likely changes in bison and elk distribution, including providing incentives for non-breeding cattle operations, increased fencing in limited areas to separate elk and bison from livestock feed lines, hazing elk and bison away from livestock feed lines, and purchasing private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal wildlife conflict technician positions supervised by WGFD.

Vegetation Restoration. Various approaches to restore the Kelly Hayfields in GRTE (4,500 acres) were initiated in 2008. Work will likely be complete in 2035. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and providing visitor opportunities to enjoy wildlife viewing within a natural setting. The restoration process involves removal of non-native vegetation, collecting and propagating native seeds and plants, as well as the seeding of native plants.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres are currently under restoration treatment and 3,265 acres remain non-native pasture. Maintenance of restored ecological conditions

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will require management efforts in perpetuity to keep non-native species from colonizing restored areas. The park will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Strategies Considered But Rejected

Strategies considered but rejected include fertility control in elk and bison, agency reduction of either elk or bison, and altering rations of supplemental feed. These strategies were rejected because they were not included in the BEMP preferred alternative and/or because there was not support for them by cooperating agencies.

Models and Monitoring

Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

A robust monitoring program will be necessary to track the effects of actions implemented under this plan. Critical monitoring components will include: 1) enhanced forage production and availability sampling; 2) measuring animal abundance and distribution including differences in some sex and age classes; 3) determining elk and bison fed days each feeding season; 4) estimating winter mortality; 5) brucellosis seroprevalence rates; and 6) CWD surveillance. In many cases, attribute baselines for the period preceding implementation of this plan have been developed for comparison after the plan is implemented.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Actions completed each year, the results of monitoring programs, and any proposed changes in management direction will be presented in an annual MSP update/report, completed by NER staff by the end of June.

Public Outreach/Education

De-emphasizing the supplemental feeding program will be a major paradigm shift especially for the residents of Jackson Hole and Teton County, but will also be of interest to others in Wyoming and across the nation familiar with the long history of feeding elk on the National Elk Refuge. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk and bison herd management methods. A detailed communication plan has been developed that identifies key messages and utilizes a variety of outreach methods, including print, video, and voice material, utilizing social media, and meetings with elected officials, state and local governments, agency and tribal partners, community organizations, stakeholders, and the general public.

Schedule

GPS collars were deployed on 30 adult cow elk in February 2016. Assuming adequate funding, , additional GPS collars will be deployed in winter 2017. Public outreach, private lands conflict mitigation and contacts, and enhanced forage monitoring will occur in fall 2016 through January 2017. Reductions in feed season length will begin in winter 2017.

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INTRODUCTION

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and USNPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and USNPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands. It included directives for forthcoming development of adaptive management practices to address several objectives in the plan, including a desired future condition of elk and bison relying predominantly on native forage. This MSP has been developed expressly for that purpose.

Bison and Elk Populations

While Jackson Hole is probably best known for the splendor and ruggedness of the Teton Range, the Jackson bison and elk herds rank among the top characterizing features of the valley. Both figure prominently in Jackson Hole's history and culture, although bison were absent from the valley for about 100 years between the mid-1800s and mid-1900s.

The JEH occupies approximately 8,000 km^2 in the upper Snake River watershed north of the town of Jackson (Fig. 1). Much of the herd is migratory, moving between distinct wintering and summer ranges. Primary wintering areas include the Buffalo Valley, lower elevations of the Gros Ventre River drainage, the NER, and areas adjacent to the NER on Bridger-Teton National Forest (BTNF) lands. Summering areas occur throughout the herd's range and for convenience are divided into five geographic regions that include GRTE, Yellowstone National Park (YNP), the Gros Ventre drainage, Teton Wilderness, and Southwest Boundary area, which includes private and public lands in the vicinity of GRTE's southwest boundary.

In the late 1800s, when elk populations all over North America were being extirpated, the residents of Jackson Hole protected elk from "tusk hunters" and large-scale commercial hunting operations. Elk are just as important to today's residents of the valley. Thousands of people each year have the opportunity to see elk at close range on the refuge while riding on horse-drawn sleighs. Thousands of pounds of shed elk antlers are sold at an annual antler auction each spring in the town square. Elk are important to backcountry users as well as to people that never leave the road. Jackson Hole is a popular destination for instate and out-of-state elk hunters. The draw of elk to visitors contributes significantly to the local economy.

Winter feeding of elk in Jackson Hole began in 1910 and was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. According to historical reports, before Euro-American settlement some Jackson elk wintered in the southern portion of Jackson Hole (present location of the NER town of Jackson) and may have used areas outside Jackson Hole, including the Green River and Wind River basins to the south and east, respectively, and the Snake River basin to the southwest in what is now eastern Idaho (Allred 1950; Anderson 1958; Blair 1987; Barnes 1912; Sheldon 1927). Radio-collar studies have documented small numbers of Jackson elk wintering in each of these areas in recent times as well (NER and GRTE, unpublished data). Over time, changes in land use and development in these areas, over hunting, and establishment of feedgrounds probably reduced the use of these areas by Jackson elk.

By the end of the 19th century the JEH was believed to be largely confined to Jackson Hole and the immediately surrounding area, where wintering conditions are often harsh. Significant numbers of elk died during several severe winters in the late 1800s and early 1900s> Primary reasons for these mortality events included the loss of available winter range in Jackson Hole from new ranching operations and a and

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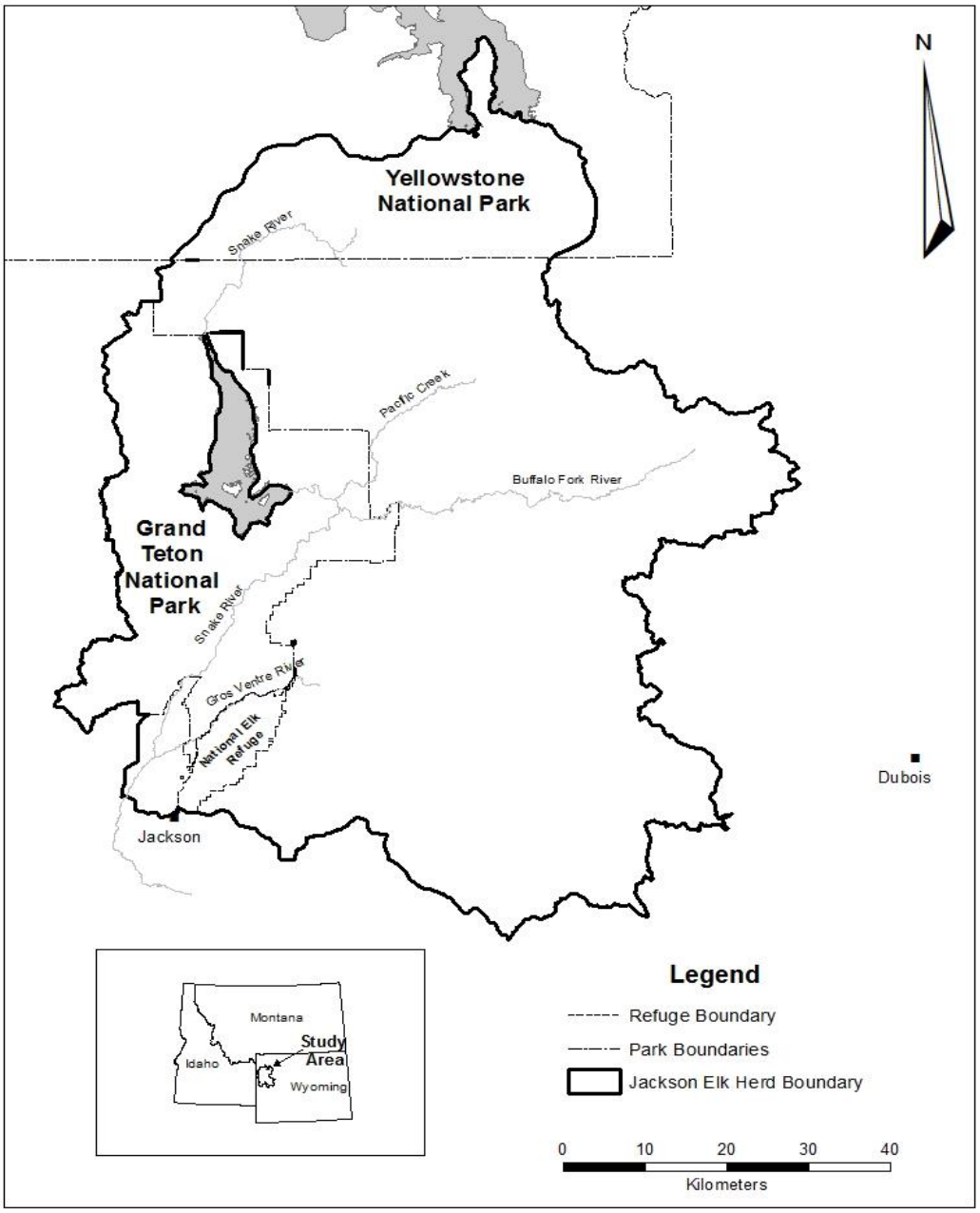


Figure 1. Jackson elk and bison herd ranges, including the National Elk Refuge, Grand Teton and Yellowstone National Parks, and Bridger-Teton National Forest. [include bison range, labels for continental divide and Bridger-Teton National Forest, and in Legend Jackson elk herd unit]. Also Gros Ventre drainage and state feedgrounds because they are referenced in text

expansion of Jackson. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, appropriated $45,000 for the purchase of lands and maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first winter census in the area was conducted in 1912 and showed about 20,000 elk residing in Jackson Hole and the

Hoback River drainage (the latter is not within the JEH's range).

Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding. In recent times the population has fluctuated near the herd objective of 11,000 that was adopted by the WGFD (Fig. 2).

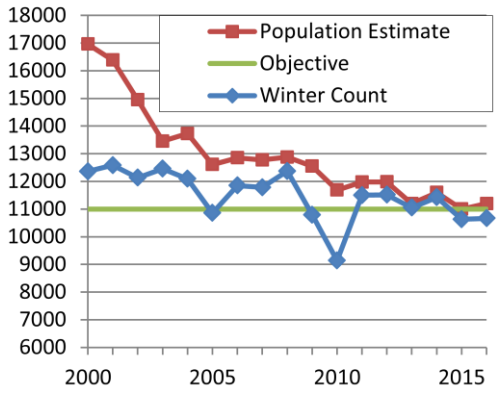


Figure 2. Winter Counts, population estimates, and herd objective for the Jackson elk herd, 2000-2016.

An iconic symbol of the American West, bison are also popular with visitors and residents. Because so few opportunities remain to see bison in the wild, viewing and photographing them in GRTE with the Teton Range in the background is a treasured opportunity for many of the valley's visitors. Similar to elk, there is also a high level of interest in bison hunting. Bison are of particular interest to nearby American Indian tribes and tribes in other parts of the United States because the animals are central to their culture and tradition.

Bison are native to Jackson Hole, as evidenced by the presence of prehistoric bison remains throughout the valley, but were extirpated outside Yellowstone National Park by the mid-1880s. In 1948, 20 bison from YNP were reintroduced to the 1,500-acre Jackson Hole Wildlife Park near Moran. The Jackson Hole Wildlife Park was a private, non-profit organization sponsored by the New York Zoological Society, the Jackson Hole Preserve, Inc., and the WGFD. A population of 15–30 bison was maintained in a large enclosure there until 1963, when brucellosis was discovered in the herd (likely transferred with the original 20 animals from YNP). At that time, all the adult animals were destroyed, but four vaccinated yearlings and five vaccinated calves were retained. In 1964 twelve certified brucellosis free bison from Theodore Roosevelt National Park were added to the herd. In 1968 the herd (down to 11 animals) escaped the confines of the wildlife park, and a year later the decision was made to allow them to range freely. The expansion of GRTE in 1950 had enveloped the Wildlife Park, and this allowed the bison to range freely and was consistent with National Park Service wildlife management policy. The herd remained small and wintered mostly in the Snake River bottoms in GRTE until 1975, when it followed the winter environmental gradient to the NER and began wintering there. The use of standing forage by bison on the NER was viewed as natural behavior thus acceptable to managers. In 1980, however, bison discovered and utilized supplemental feed provided to elk in winter, and they have continued to do so ever since.

The discovery of supplemental feed by bison has had several consequences, including a significant increase in the population's growth rate (Fig 3). Bison on the elk feedlines have at times disrupted feeding operations and displaced and injured elk. To minimize conflicts between bison and elk, managers have provided separate feedlines for bison since 1984. As the population has grown, separating elk and bison on feedlines has become increasingly difficult, and a variety of feeding strategies are employed to help reduce displacement of elk.

As the herd has grown it has maintained fairly stable movement patterns, wintering almost entirely on the NER and summering within GRTE and adjacent lands on the BTNF (Fig. 1).

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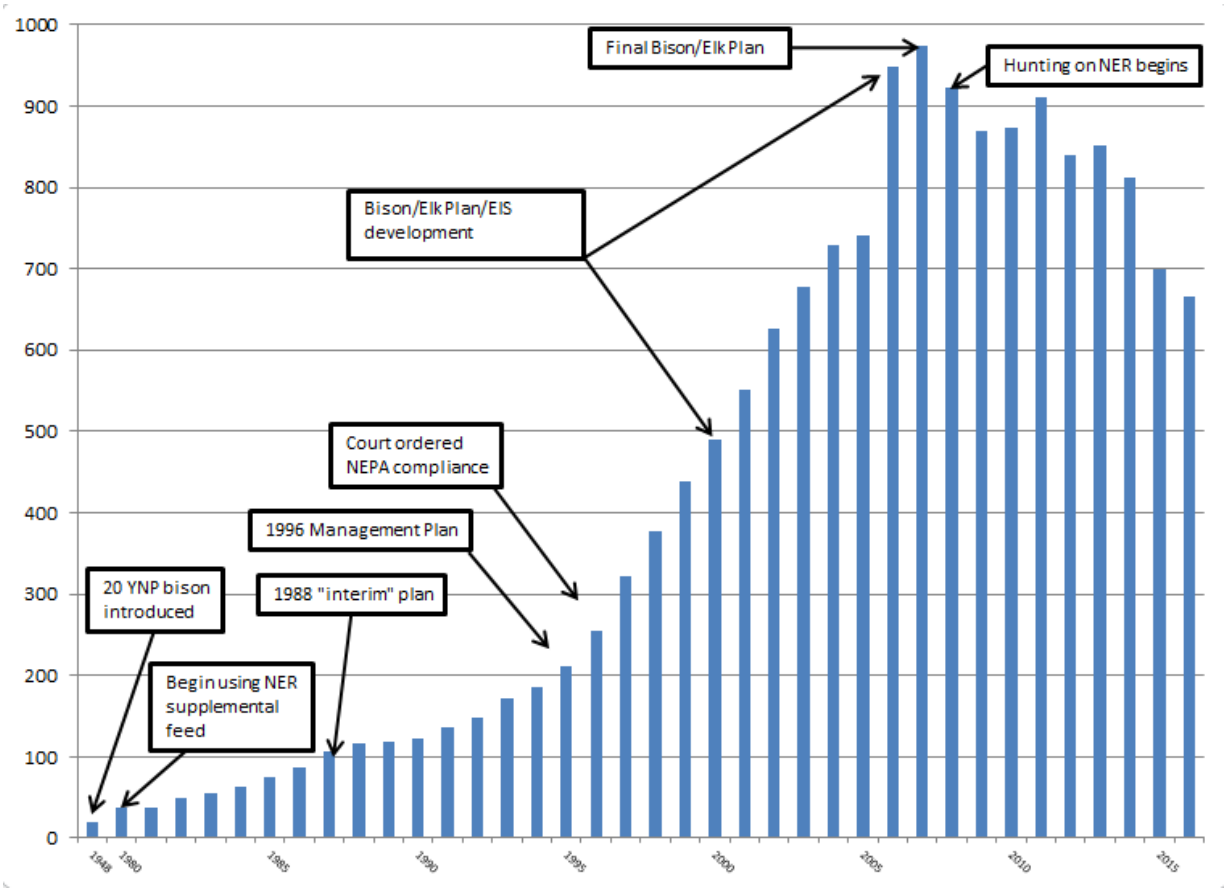


Figure 3. Population growth and planning history for the Jackson bison herd, 1948-2016.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands and thereby reducing availability of these habitats to other wildlife as well as unusually low winter mortality, which has affected predators and other species and has required intensive hunting programs.

Planning History

Jackson's bison and elk populations have been the subject of previous planning efforts. Elk management and research has been guided by the Jackson Hole Cooperative Elk Studies Group since it was established in 1958. The group consists of biologists and agency administrators from the NER, GRTE, YNP, BTNF, and WGFD, who meet at least annually to coordinate management of the population and its habitat. Coordination of bison management began soon after they started frequenting the NER in 1976 and using supplemental feed provided to elk in 1980 (Fig. 3). Release of an "Interim" plan that called for maintaining a herd of 90-110 bison while data were gathered for a long term plan occurred in 1988. It was followed by implementation of a sport hunt outside GRTE, administered by WGFD. This plan was halted after litigation in which the plan's violation of NEPA was successfully argued by plaintiffs.

In 1996, after considerable herd growth, a new long term management plan and environmental

assessment for the Jackson bison herd was released (Fig 3). This plan had strong support and called for maintaining a herd size of 350-400 bison, but it was shelved a year later when plaintiffs from the earlier litigation successfully argued that, because the plan failed to consider the effects of feeding elk on bison management, it also violated NEPA and was not sufficient. This led to development of the draft bison and elk management plan and environmental impact statement from 2000-2006 and release of the final plan in 2007 (Fig 3).

The 2007 Bison and Elk Management Plan (BEMP; USFWS 2007) considered six alternatives for bison and elk management focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The primary management scenarios presented in the alternatives included the status quo, terminating elk and bison hunting on the NER and the elk reduction program in GRTE, brucellosis vaccination options, restoring habitat, improving forage, and decreasing or phasing out supplemental winter feeding.

The final BEMP (USFWS 2007; www.fws.gov/bisonandelkplan) which set management direction for 15 years or until a subsequent plan is developed, proposed to maintain the state's elk herd objective of 11,000, establish a bison population objective of 500, restore habitat in the NER and GRTE, continue hunting bison and elk on the NER, continue the elk reduction program in GRTE in concert with the parks enabling legislation, allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available, and develop a dynamic framework of management actions which adaptively decrease the need for supplemental feeding on the NER. ***This Bison and Elk Management MSP was developed to address the latter and specifically addresses the criteria for a structured framework listed on page 5 of the Record of Decision*** **(Fig. 4).** It does not address other on-going bison and elk management actions already prescribed by the BEMP.

The BEMP scheduled the completion of the MSP for 2008. However, litigation challenging the BEMP in 2008 led to the decision to postpone its development until litigation was resolved. As of March 2015, two court rulings have upheld the 2007 BEMP and ROD. In a lawsuit against the BEMP and its author agencies (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2010), plaintiffs argued that the BEMP violated the National Wildlife Refuge System Improvement Act (National Wildlife Refuge System Improvement Act 1997) by disrupting the biological integrity of the Refuge, and that the plan and the accompanying EIS violated NEPA because they were insufficiently detailed to allow a reasonably complete discussion of mitigation. The crux of the plaintiff's argument was that the plan did not set a specific date for the cessation of supplemental feeding. In response, the agencies argued that the plan constituted a valid exercise of discretion and that it and the EIS were sufficiently detailed to satisfy the requirements of NEPA. In March 2010, the United States District Court for the District of Columbia sided in favor of the agencies in this case. In 2011, the plaintiffs appealed this ruling to the United States Court of Appeals for the District of Columbia Circuit. This Court affirmed the District Court ruling (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2011).

National Environmental Protection Act Compliance

The 2007 BEMP/EIS and ROD satisfied NEPA requirements for current bison and elk management through a detailed analysis of alternative management actions and their likely effect on the environment, and substantial involvement of the public in the process. This MSP does not duplicate or add to this process. It is designed to tier off of the BEMP as a dynamic implementation guide to one part of the preferred alternative outlined in the BEMP ROD. As such, references to NEPA covered in the BEMP

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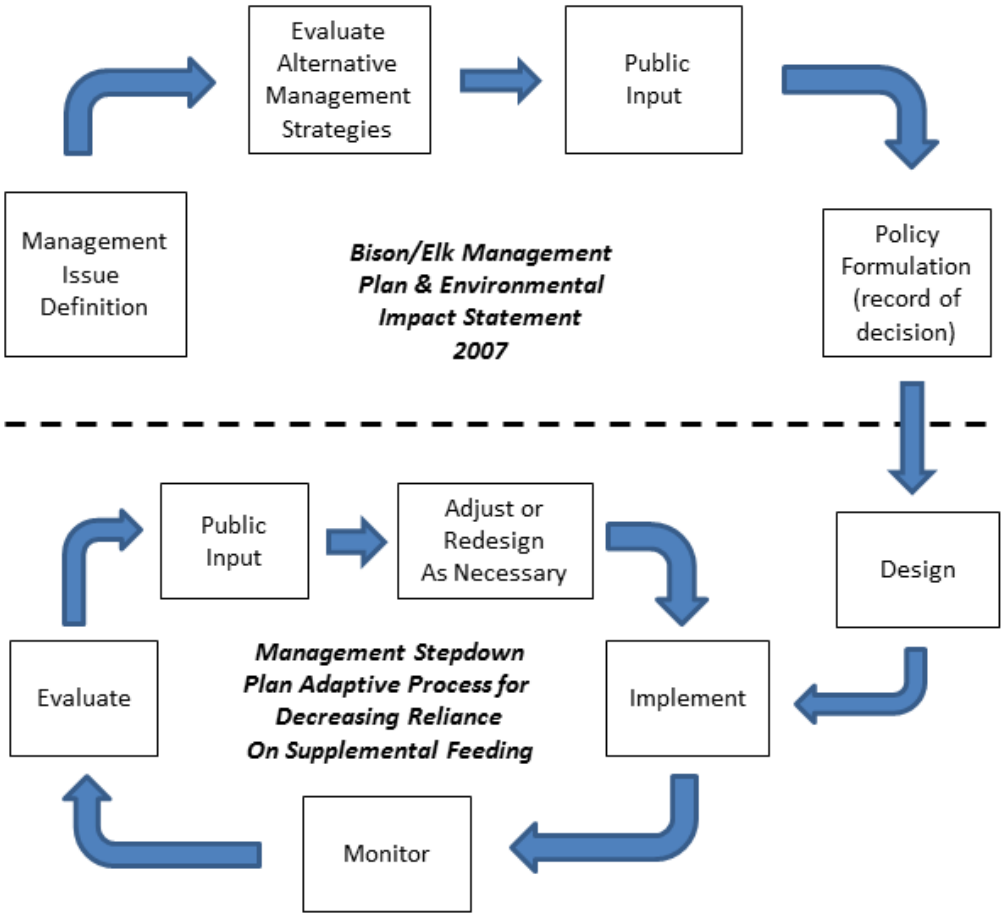


Figure 4. Management step down planning for supplemental feeding on the National Elk Refuge and its relationship to the 2007 Bison/Elk Management Plan and Environmental Assessment.

will be included where necessary in this document, and the discussion of any action that would require additional NEPA compliance will be explicitly stated as such in that context.

Management Step Down Planning

The use of adaptive management plans has gained popularity in natural resource management planning because, by definition, they allow modifications of strategy based on monitoring results and outcomes toward reaching specific goals or objectives. Four elements generally included in an adaptive management approach include: 1) well defined and mutually agreed upon objectives; 2) knowledge (including descriptive models) of the dynamics of the system being managed; 3) clearly articulated management actions and strategies; and 4) a monitoring program to evaluate responses of the system to management actions (Walters 1986).

This MSP utilizes adaptive management planning principles but is not intended to include all of the adaptive management planning elements outlined in the Department of Interior Adaptive Management Technical Guide (2007). This MSP is more accurately described as a "structured framework" of adaptive management actions that progressively transitions from supplemental winter feeding to greater reliance on free-standing forage (BEMP ROD p.5).

Table 1. 2007 Bison/Elk Management Plan Goals and Objectives (Step Down Plan objectives shaded)

Goal: Habitat Conservation

Objectives:

- Conserve important private lands.
- Increase forage production.
- Minimize non-native plants.
- Protect sagebrush grasslands.
- Restore willow, aspen, and cottonwood.
- Perpetuate natural mosaic of plant communities.

Goal: Sustainable Populations

Objectives (BEMP pages 135-136):

- Develop structured framework for reducing NER supplemental feeding.
- Phase reduction of animals on feed: 1) to 5,000 elk and 500 bison, and 2) elk and bison rely predominantly on native habitat.
- Maintain 35:100bull-to-cow ratios in park summer elk herd.
- Ensure a genetically viable bison herd with close to an even sex ratio.
- Enhance public outreach/education.

Goal: Elk and Bison Numbers

Objectives:

- Maintain state elk herd objective of 11,000.
- Maintain a genetically viable bison population of about 500 animals.

Goal: Disease Management

Objectives:

- Manage brucellosis transmission risk from elk and bison to livestock.
- Manage feeding to reduce brucellosis transmission among bison and elk.
- Educate hunters about wildlife disease human health hazards.

OBJECTIVES

The management direction and desired conditions stated in the BEMP called for the NER and GRTE staffs to work with others (agencies, partners, etc.) to "adaptively manage elk and bison in a manner that contributes to the State's herd objectives yet allows for the biotic integrity and environmental health of the resources to be sustained," so that the public can enjoy a variety of compatible wildlife-dependent recreational opportunities. Under the BEMP's 4 primary goals, 20 associated objectives were identified (Table 1). This MSP addresses four objectives under the goal of sustainable populations (Fig. 5).

The reduction of animals on feed at the NER was proposed to be spread over two phases. In Phase 1, the aim is to reduce the average number of elk on feed to 5,000 (while maintaining WGFD's 11,000 elk herd objective), and reduce the winter

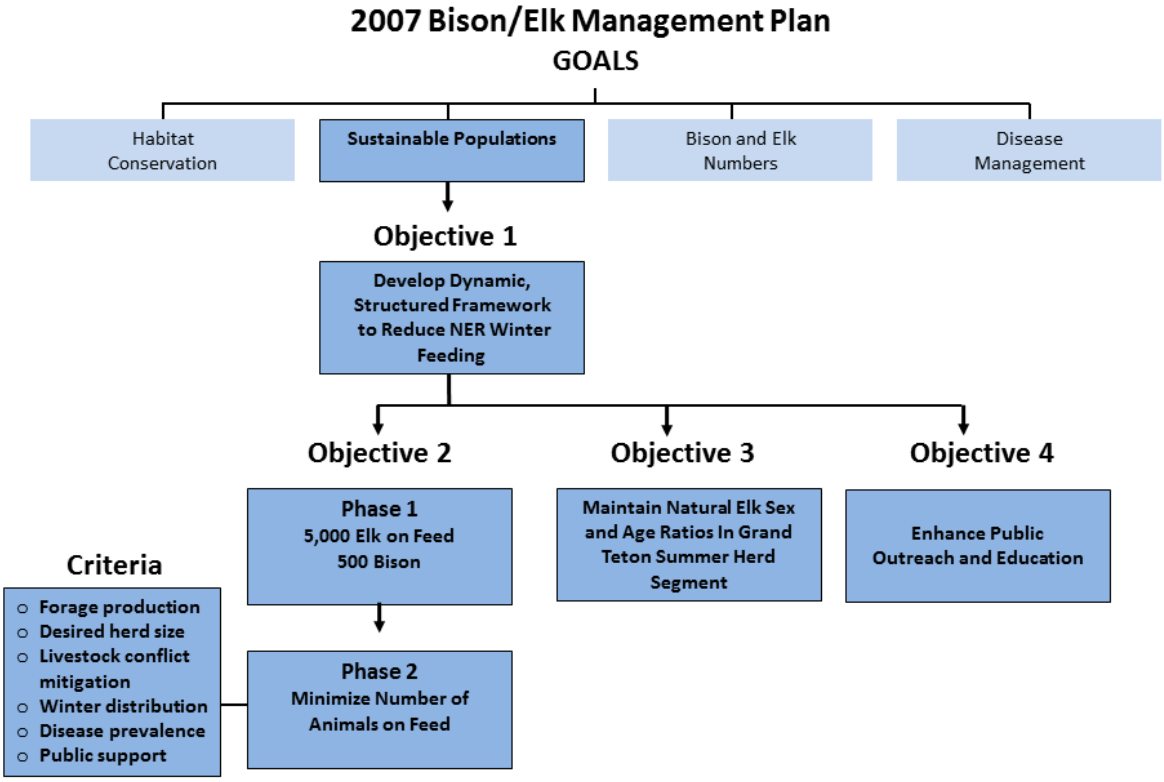


Figure 5. Relationship of MSP to the 2007 Bison/Elk Management plan goals, phasing of objectives, and consideration criteria for reducing the reliance of elk and bison on supplemental feed during Phase 2.

population of bison to the BEMP recommended, and WGFD adopted, objective of 500. In Phase 2, the overall objective is to reduce the reliance of bison and elk on supplemental feed (USFWS and USNPS 2007a). Desired conditions include animals relying predominantly on native habitat and cultivated forage on NER. Important consideration criteria for implementing Phase 2 will include: 1) the level of forage production and availability on the NER and adjacent winter ranges; 2) maintenance of desired herd sizes and age/sex ratios; 3) the ability to effectively mitigate bison and elk livestock conflicts; such as co-mingling on private lands during high risk disease transmission periods; 4) maintaining desirable winter distribution patterns of elk and bison; 5) the prevalence of brucellosis, chronic wasting disease, and other wildlife diseases; and 6) public support. In short, the overall objective of this plan is to outline a framework for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on free-standing forage, while maintaining population and herd ratio objectives.

This Plan focuses on management actions to initially achieve Phase 1 objectives. However, if successful, these actions will continue to be used to achieve the Phase 2 objective of reducing reliance on supplemental feeding while considering the six criteria listed above.

MANAGEMENT ACTIONS AND STRATEGIES

Background

The principal goal of reducing reliance on

supplemental feeding is to limit transmission of density dependent diseases in elk and bison while simultaneously minimizing winter mortality in elk. We will attempt to achieve this goal by experimentally reducing feed season length and closely monitoring elk and bison distribution and winter mortality.

Elk have been fed on the NER each year in all but 9 winters since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during winter months is powerful to both species, and their knowledge of NER feed grounds has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Because use of feed grounds is a learned behavior, decreasing feed season length will potentially reduce the likelihood of elk that winter on native range finding NER feed grounds. Over time this could result in a greater percentage of elk using native winter range relative to NER feed grounds. Because it is largely unprecedented, the concept of modifying this behavior on such a large scale is daunting and poses questions for which there are no immediate answers. In some cases, the likelihood a specific management strategy's success will only be able to be roughly estimated, and unanticipated results are likely. Closely monitoring forage availability, elk and bison distribution, and elk mortality will allow us to evaluate the effectiveness of management actions and adjust management actions as needed should unintended negative consequences arise.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with land owners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into 3 broad categories: 1) timing and duration of winter feeding; 2) timing and intensity of hunting; and 3) herd segment specific and overall harvest levels.

Important Changes Since 2007

The BEMP was developed based on data collected and knowledge that existed up until its ROD. Since then, important changes have taken place, some of which are advantageous to this effort and some of which are not.

A primary change that will facilitate meeting objectives under this plan is the reduction of the bison population from nearly 1,200 animals in 2007 to about 675 during winter 2015-2016 (Fig. 3) through hunting programs administered by WGFD. Licensing changes enacted in 2014 included a reduction in the bison cow/calf license fee (from $416 to $263 for residents and $2522 to $1022 for non-residents) and eliminating the once-in-a-lifetime restriction on a successful bison hunter to only those that successfully harvested a bull. Continued progress toward the 500 animal herd objective will require sustained harvest success.

During the same period, the Jackson Elk Herd has declined from nearly 13,000 to its objective of 11,000, but because the proportion of the JEH that winters on NER has increased dramatically (Fig. 6), this will make achieving the Phase I objective of 5,000 elk on feed and any future elk population reductions more difficult. Preliminary analysis suggests that the increasing proportion of the JEH wintering on NER has been associated with 1) Declines in elk use of native winter range and movements of elk from State feed-grounds in the Gros Ventre drainage to NER.and 2) increasing numbers of elk that summer immediately adjacent to NER (Cole and Foley et al. 2015).

Refuge-wide herbaceous forage production averaged 14,387 (SD = 4,125) tons during 1998–2013. In recent years irrigation of approximately 3,600 acres has increased refuge-wide forage production by approximately 10% compared to what would have been produced with

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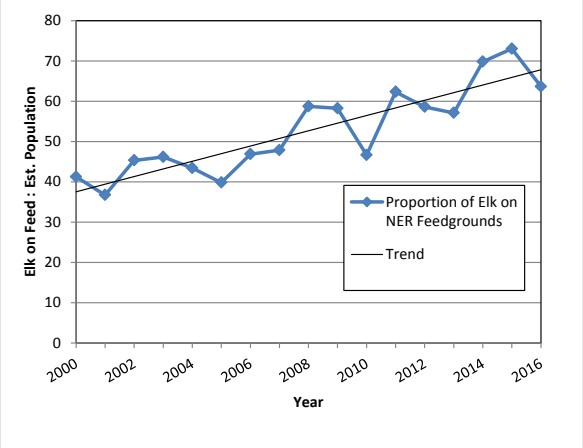


Figure 6. Increasing trend of National Elk Refuge elk on feed as a proportion of the Jackson Elk Herd estimated population size.

precipitation alone, and by 15% in the southern portion of NER which receives the greatest use by elk and bison.

Since 2007, the general awareness of climate change among the public has greatly increased. A strong, credible body of scientific evidence shows that climate change is occurring, is caused largely by human activities, and poses significant risks for a broad range of human and natural systems (National Academy of Science 2010). Ecological systems in the GYE are likely to be affected and associated changes may have implications for elk and bison management. Moderate term to long term effects of climate change in Jackson Hole will likely include increases in average temperature, a reduction in the duration and distribution of snow cover, an increase in the number of frost free days, increased wildfire frequency, and changes in plant community composition and structure including loss of forest and shrub cover and an increase in invasive plants (Riginos and Newcomb 2015). The net effect of these changes relative to the implementation of the MSP remains uncertain.

Current Management

Ongoing primary management actions on the NER include winter feeding, harvest, irrigation, and hazing. In GRTE, harvest of elk during the Elk Reduction Program takes place, when necessary, in collaboration with WGFD, and restoration of previously cultivated and irrigated sagebrush-grasslands is ongoing. Fundamental components of each of these will be briefly described below to provide a basis for comparison to MSP strategies that will follow.

Chronic Wasting Disease

Supplemental feeding has occurred in all but 9 winters on NER since 1912, and although this strategy minimizes winter elk mortality from starvation, contributes to Wyoming state elk herd objectives, eliminates commingling with livestock, and keep elk off adjacent roadways, elk occur at numbers and densities well in excess of carrying capacity (Smith et al. 2004, Lubow and Smith 2004). Considerable evidence suggests that Chronic Wasting Disease (CWD) transmission and prevalence are density dependent (Peters et al. 2000, Williams et al. 2002). Monello et al. (2014) found that elk densities of 15-110/km^2 (0.06 to 0.45/ac) in Rocky Mountain National Park were associated with 13% CWD prevalence, and they predicted elk population declines when CWD prevalence exceeded 13%. NER elk densities range from 77-16,850/km^2 (0.31-68/ac; NER unpublished data), which suggests that the introduction of CWD to NER elk would have significant negative population effects over time.

Winter Feeding

Initiation of feeding has the primary objectives of 1) minimizing elk winter mortality, focusing on calves since they are the most susceptible age class, and 2) minimizing comingling of elk with cattle on nearby adjacent private lands. Winter feeding begins when available forage reaches approximately 300 lbs/ac. Historic radio telemetry data and observations of elk movements indicate that when available forage declines below 300 lbs/ac., some elk leave NER for surrounding private lands. Therefore, the purpose of this feeding "trigger" is to keep elk on the NER and prevent them from searching for forage off the NER, which would increase the potential of comingling with cattle causing damage to private lands, and moving across

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Highway 89 where the risk of vehicles hitting elk is high. This trigger is not a warning that a significant nutritional deficit threshold has been reached. Available winter forage for elk and bison on the NER is largely determined by biomass of forage produced during the previous growing season, rate of forage consumption during fall and winter, and how snow conditions affect forage availability.

Index sites are used to sample forage biomass and determine when feeding should be initiated. These sites are selected annually to represent plant communities that are highly preferred by elk due to plant species composition and the persistence of green vegetation. Weekly sampling begins in late December to estimate available forage biomass at each index site. When average available forage across index sites is below 300 lbs/ac, biologists typically recommend that supplemental feeding be initiated.

During 1995–2013, the average initiation of winter feeding in NER occurred 28 January (range = 30 December–28 February), and feeding was terminated on 3 April (range = 20 March–20 April). Variation in feeding initiation and termination dates has been based on winter conditions and a desire to avoid elk-cattle comingling on nearby private lands. Coordination of winter feeding dates on the NER and WGFD-operated Gros Ventre drainage feedgrounds (Alkali, Patrol Cabin, and Fish Creek) occurs annually to help minimize movement of elk between these areas. This coordination will continue regardless of the management strategy employed. The relationship of recent elk numbers and objectives for NER and WGFD-operated feedgrounds and native range is shown in Table 2.

Bison discovered refuge feeding operations in 1980, and since that time they have been fed each year to help minimize disruption to elk feeding operations. Because bison displace elk from feedlines, NER staff attempt to feed most bison in the northernmost refuge feedground and provide a heavy feed ration, which helps keep them in this area. This strategy prevents bison from mingling with elk and also prevents bison from moving to areas where conflicts with humans are more likely.

Harvest

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Table 2. Annual distribution of wintering elk from the Jackson Elk Herd during February classification counts, 2011–2016, relative to the current objective.

	OBJECTIVE	2011	2012	2013	2014	2015	2016	mean
NER	5,000	7,746	7,360	6,285	8,296	8,390	7,290	7,561
Gros Ventre	3,500	2,775	3,265	2,982	2,326	1,162	1,667	2,362
Native Range[1]	2,500	982	894	1,784	801	913	1,711	1,180
Total	11,000	11,503	11,519	11,051	11,423	10,465	10,668	11,105

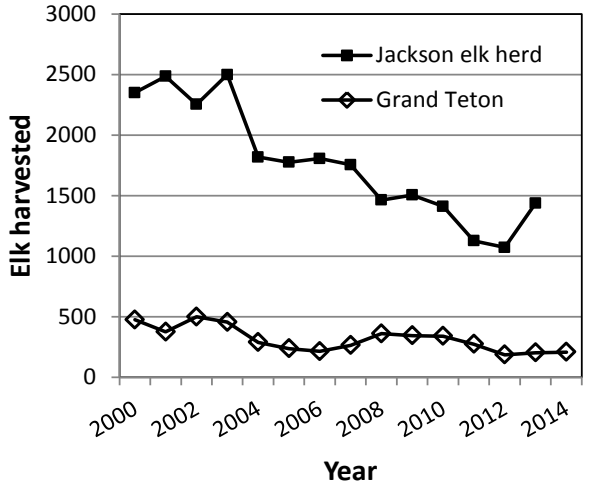


Figure 7. Estimated elk harvests for the Jackson Elk Herd and the amount of that harvest that occurs in Grand Teton National Park, 2000–2014.

Total hunter harvest of the JEH was gradually reduced over the last decade as the population neared objective (Fig. 7). Elk hunting on the NER (Hunt Area 77) typically begins in mid-October and ends in mid-December, with peak harvest in recent years occurring in late November to early December. From 2005 to 2015, 422 ± 102 (mean ± SD, range = 329-612) hunters harvested 196 ± 95 (range = 126-457) elk per year during the NER hunt.

The 1950 legislation that created GRTE provided for a controlled reduction of elk, when necessary, in specific portions of the park, primarily east of the Snake River. Elk reduction programs have taken place in the park each year since 1950 except two (1959 and 1960), when GRTE and WGFD officials agreed a reduction was not necessary (Figure 8). Season dates have varied over the years but recently have run from mid-October to early-December. The GRTE harvest accounts for about 25% of the JEH overall harvest, thus has been an important factor in regulating the population. Increased predation, likely a result of increases in grizzly bears and wolves over the last 20 years, has decreased the need for large harvests in GRTE.

Bison hunting begins 15 August and ends in early to mid-January. Most harvest occurs on the NER, with some additional harvest on private and BTNF lands. Since resuming the bison hunt in 2007, harvest has been 210 ± 45.5 (range 139-301) bison per year. This level of harvest has been sufficient to arrest the exponential growth of the population, reducing bison numbers from the peak in 2007 to about 700 animals in winter 2015 (Fig 3). Tribal bison harvest of up to 5 animals for ceremonial purposes was authorized in the BEMP. Translocation of wild bison to lands outside of Teton County is not currently permitted due to brucellosis concerns.

Bison hunting is not allowed in GRTE because of long standing NPS policy that prohibits most hunting in national parks. Bison quickly learned to take advantage of the safety of GRTE, which has made hunter harvest goals difficult to achieve. Many bison stay in GRTE during the hunting season, with only occasional short term movements to the NER, until severe winter conditions occur. In response, NER and WGFD managers have attempted to extend the hunt to late January while minimizing the conflict with the initiation of winter feeding. The unpredictable nature of winter conditions that time of year makes this challenging, and has (or could) result in the use of emergency season extensions or reductions.

Hazing

NER staff haze elk and bison to conserve winter forage, prevent year-round use of winter range, and in some cases to prevent elk and bison from moving to private lands or other areas where conflicts with humans are likely. Hazing using ATVs has proven most effective. The strategy is typically employed during 3 time periods: 1) in May to move elk and bison off NER that are lingering on NER winter range; 2) in July when some bison typically return to NER; and 3) in the period just prior to feeding initiation when elk and bison are most likely to leave NER for private lands. Hazing of elk and bison by WGFD staff also occurs on private lands adjacent to NER periodically throughout the year.

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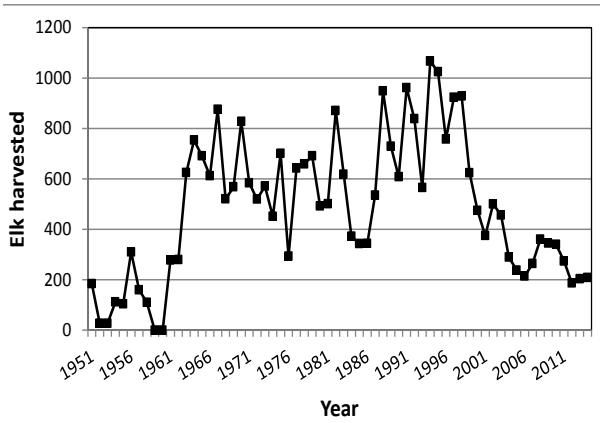


Figure 8. Elk harvest in Grand Teton National Park, 1950-2015.

Vegetation Restoration and Protection

The BEMP identified approximately 4,500 acres of previously irrigated and cultivated grasslands in GRTE in need of restoration to native sagebrush grasslands community. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. After 2 years of research and field studies, restoration efforts began in 2008. The restoration process involves several steps including: removal of non-native vegetation through repeated herbicide applications, collection and propagation of native grass, forb and shrub seeds and finally native seeding. Repeated herbicide treatments have been warranted prior to native seed planting as well as spot treatments of invasive weed species subsequent to native seeding. Substantial progress in this endeavor has been made since 2008, including 1,235 acres of previously cultivated lands under restoration treatment. Of the 1,235 acres undergoing treatment, 745 acres has been seeded with native grass, shrub, and select forb mixes, and 89 acres is considered fully restored. Two-hundred and seventy-five of these acres are currently fenced to reduce grazing pressure of early native vegetation establishment from bison and other ungulates. An additional 490 acres are targeted for native seeding in 2016 once removal of the invasive vegetation is successful. All treatments are monitored for native plant establishment and invasive plant infestations and treatments will be adjusted as necessary. Invasive plant treatments may have to continue indefinitely. GRTE will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Private Lands Mitigation

Fencing of hay stacks and livestock feedlines has been historically used to mitigate particularly difficult conflicts on private lands. Targeted fencing of golf course greens and sand traps fall through spring has also been successful in some situations for mitigating elk and bison presence and associated damage in these areas. It is important to note that the county has a "wildlife-friendly" fence policy and does not support extensive fencing that is impermeable to wildlife in residential areas.

Methods, Assumptions, and Constraints Common to All Strategies

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes, particularly population sizes. Measurements of the Jackson bison herd will be based on the annual mid-winter census and sex and age classification survey performed by NER, GRTE, and WGFD biologists. This survey occurs one day in February and includes ground counts of animals on feed at the NER and aerial counts of outlying bison across their winter ranges on the refuge, park, and Bridger-Teton National Forest.

Elk population estimates will also be based on mid-winter aerial and ground counts. However, the mid-winter counts are undertaken during a single survey period and do not necessarily represent either peak or cumulative abundance of elk on feed. Rather than basing progress toward the number of elk on feed for the entire season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in

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Table 3. Summary of potential Step Down Plan constraints.

Policy

- ESA[1] Lynx – limits on habitat impacts
- Greater Sage Grouse – core area protection
- 2007 BEMP/EIS (federal actions/lands)
  - No fertility control
  - No test and slaughter
  - Limited tribal ceremonial take
- Bison/elk hunt end date (Feb. 1st)
  - WGFD, brucellosis safety
- Carcass disposal (Feb. 15th)
  - WGFD, brucellosis safety
- Forest Service winter closure (Dec. 1st – April 30th)
- Easement limitation (NER boundary)

Winter Feeding

- Only during non-hunting periods

Harvest

- State regulations

Vegetation Restoration/Protection

- Bison/elk distribution
- Exotic plant species management

Private Lands

- Owner agreements

Social

- Hunter density (safety; hunt quality)
- Elk/bison winter mortality levels
- Public safety (ungulate/vehicle collisions)
- Disease
- Land-use conflicts (agricultural and residential)

Biological

- Disease (bison/elk/cattle commingling)
- Sage grouse habitat conflicts
- Fencing/wildlife conflicts
- Elk herd distribution
  - summer segment distribution goals

Funding

- Easement purchase
- Plan implementation

[1]Endangered Species Act

the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 elk were fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000.

We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both species on supplemental winter feeding.

Initial success of the MSP will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP does not provide specific measurement criteria to determine when the NER has successfully attained the objective of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage", we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. This level was chosen to define success because it indicates that elk and bison will predominately be foraging on free standing natural and cultivated plants on NER and adjacent winter ranges rather than on supplemental feed.

Several management constraints are common to the strategies discussed below (Table 3). Many law and policy constraints are applicable but we include here only those most pertinent. Endangered Species Act (16 USC 1531 et seq.) requirements for wolves, grizzly bears, lynx, and others apply. Lynx requirements for maintaining certain habitat types could limit methods used and areas considered for habitat improvements

in GRTE and the BTNF. Such improvements could increase elk and bison use of native winter range off the Refuge while simultaneously reducing use of feedlines. Similarly, compliance with the 2015 sage grouse amendment to the 1990 Bridger-Teton National Forest Land and Resource Management Plan and the Wyoming greater sage-grouse core area protection executive order (2011-5 and supplement 2013-3) could affect habitat manipulations. NEPA compliance conducted as part of the BEMP/EIS constrains what federal actions can be taken as a part of this plan. State regulations constrain late (winter) hunt and carcass disposal timing to protect against brucellosis contamination, since February-April represent the period bison and elk are most likely to transmit the disease. Restrictions on hunting timing also result from BTNF winter range closures, immediately east of the NER and elsewhere, December 1 to April 30. Additional details about these and other constraints will be included in discussions about specific strategies that follow.

Strategies

This section describes the management action this MSP proposes to implement. As such, it unveils the heart of management changes proposed to begin the process of transitioning to greater reliance of bison and elk on native forage during winter. Fundamentally, the strategies discussed in this plan represent an experiment designed to achieve Phase I objectives of 5,000 elk and 500 bison on NER and are a first step towards reducing reliance on supplemental feeding while meeting the sustainable population goals identified in the BEMP.

Initial strategies for achieving sustainable population goals identified in the BEMP (Table 1) are presented by the objectives below. The primary management actions available to the agencies to achieve Phase I objectives are modifications to winter feeding and hunting seasons. To a lesser extent, vegetation protection and restoration can be important, particularly for improving long-term ecological function and enhancing natural production of native forage. Private lands are also an integral component as changes in elk and bison distribution occur and new challenges develop. The likely consequences of implementing these strategies were evaluated in the BEMP. The most relevant of these are summarized in Appendix 1.

Objective: 1) *Implement a phased reduction of animals on NER feed to 5,000 elk and 500 bison, and, 2) influence elk and bison to rely predominantly on native habitat* (Table 1).

The first phase will be to reduce the number of elk on NER feed to approximately 5,000 and achieve a target population of about 500 bison. The second phase will be to adaptively manage bison and elk populations to achieve desired conditions, with animals relying predominately on available native habitat (NER, GRTE, and USFS lands) and cultivated forage (NER).

As previously mentioned, the concept of reducing winter feeding after more than 100 years of the practice, and the associated behavioral conditioning of elk and bison to its presence, represents a formidable challenge that must be approached cautiously and systematically. Efforts to scale back elk supplemental feeding operations in other parts of North America have been rare and fraught with controversy (Smith 2001). The strategies discussed below have been developed in this context, with appropriate feedback mechanisms through rigorous monitoring and frequent evaluation. Inability to meet this objective under the strategies presented here would trigger a thorough evaluation and consideration of more aggressive strategies when the BEMP is updated in 2022.

Chronic Wasting Disease

Since 1997, NER has cooperated with WGFD to conduct intensive surveillance for CWD in the JEH unit. GRTE has also collaborated with WGFD to collect samples from the ERP and from road-killed cervids. Although this effort indicates that CWD is not currently found in the JEH, continued surveillance at sample sizes sufficient to detect

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1% prevalence with 95% confidence annually will be critical to ensure a timely management response and limit the long-term population effects of the [USFWS and USNPS, 2007b]. Given that CWD has been detected within 40 miles of the JEH in moose, within 35 miles in deer, and within 175 miles in elk, this level of surveillance is warranted.

In 2016, the WGFD cooperated with federal agencies and other stakeholders to revise the 2006 Wyoming CWD Management Plan. The NER and USFWS Region 6 Wildlife Health Office staff participated in several meetings associated with this effort. The Wyoming CWD Plan lists several management responses for consideration if CWD be is detected on or adjacent to State or NER elk feedgrounds. Early detection of CWD in the JEH is essential to allow implementation of management responses.

The BEMP (2007) identifies the management response to the arrival of CWD as following the State of Wyoming CWD Plan in effect in 2007. The Wyoming CWD Plan was updated and significantly changed in 2016. In light of changes in the Wyoming State CWD Plan, and the results of CWD Studies completed since 2007, the NER management response to CWD will be reviewed and updated in a NER Disease Contingency Plan, as identified in the NER Comprehensive Conservation Plan (2016). The CWD section of the NER Disease Contingency Plan will remain consistent with the goals of the BEMP. The NER Disease Contingency Plan is scheduled to be completed in 2017.

Winter Feeding

Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the long run, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning animals to "expect" feed to be available later in the winter; this could build cohorts of animals that rely primarily on native winter range. To reduce supplemental feeding, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, which is the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding (Figure ?) and identify private land conflict areas that may require assistance with focused mitigation measures.

As bison and elk behavioral responses are better understood, and targeted mitigation on private lands is achieved as needed, feeding delays will be extended depending on several variables (Table 4, Fig. 9). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the MSP, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence on feeding initiation date, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Forage availability would also be affected by the numbers of elk and bison on the NER. And finally, the distribution of animals, particularly on private, livestock producing lands would be considered in determining feeding initiation date.
A primary concern of manipulating feeding is elk winter mortality, particularly among calves. For example, research on unfed elk populations in Yellowstone National Park suggested average winter elk calf mortality of 28%, with the majority of cases caused by malnutrition (Singer et al. 1997). Similarly Smith and Anderson (1998) found unfed winter elk calf mortality of 29% compared to 11% for elk calves using feedgrounds. As food becomes limited in winter, calves are usually the first to experience nutritional deficit and winter

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mortality because they are displaced by more dominant animals, they have limited fat reserves, and are more susceptible to cold temperatures than larger animals. Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If MSP implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years (Appendix 1).

In the early years of MSP implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date during the period of MSP implementation.

The MSP winter feeding strategy would include the establishment of additional key forage index sites and on-going measurements at those sites throughout the winter.

Harvest

Currently the JEH is at the Wyoming Game and Fish Commission established objective of 11,000 animals, which means there is less flexibility in manipulation of harvest regimes than there would be if the herd was above objective. Initially there would be little change in elk harvest programs on the NER, with the exception of allowing a limited number of any elk permits throughout the season, considering allowing bow hunting near developed areas (roads and buildings) and shifting the season about a week later (Table 4). Allowing a limited number of any elk permits would be consistent with providing sport hunting recreation on National Wildlife Refuges (NWRS Improvement Act; 1997) and the NER CCP [USFWS, 2015] and possibly encourage more hunters to participate in antlerless elk hunts. Monitoring programs and consideration of bull ratios in the GRTE summer segment (since most park bulls migrate to the NER) would help inform levels of proposed take. Bow hunting in areas currently closed to firearms will likely increase harvest by eliminating “no-hunt” areas which can become sanctuaries for large numbers of elk. Shifting the hunt one week later is consistent with later migrations and will improve harvest effectiveness (Fig. 9).

General elk harvest patterns in GRTE would continue to be based on need for harvest, summer segment population estimates, herd status relative to population objective, herd demographic parameters, herd-wide distribution of harvest, and mitigation for impacts on other resources and visitor activities.

Elk herd population objectives are reviewed every five years by the Wyoming Game and Fish Commission and adjusted as necessary. Agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future JEH population objective. Lowering the population would help compensate for reduced use of traditional native winter range and increased growth of short-distance migrants which has led to significant increases of winter elk concentrations on the NER.

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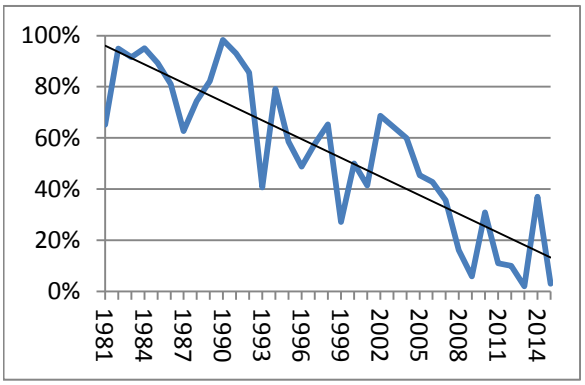


Figure 9. The percentage of elk that wintered on NER counted there on December 1, showing progressively later annual fall/winter arrival of elk to the NER during the past several decades.

The annual fall/winter arrival of elk to the NER during the past several decades has been occurring progressively later. This trend may necessitate extending the elk hunting season later into the year to achieve harvest objectives.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later end dates that are commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution. Special limited hunts designed to discourage bison from attempting to leave the NER via the south boundary into the town of Jackson will also be considered. If progress toward reaching the herd objective of 500 animals continues and the objective is reached, WGFD will adjust harvest quotas in the context of the objective, as necessary, to address population changes through time.

A cattle guard was installed on the Refuge Road near the east end of Broadway Avenue to help prevent bison and elk herds from entering the Town of Jackson. This will reduce the potential for dangerous human/wildlife interactions.

Currently, the effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives, but also that elk are sensitive to hunting pressure which can cause elk movements to areas that cause management issues for WGFD. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st in the future.

Annual herd-wide population estimates, elk summer herd segment estimates in GRTE and NER, temporal and spatial harvest patterns, and animal-fed-days would be monitored, and the resulting information would be used to inform ongoing evaluation of elk and bison management harvest programs (Figs. 9 and 10).

Hazing

No change in hazing practices is anticipated initially under this MSP framework.

Private Lands Mitigation

Delaying the onset of NER feeding is likely to result in changes in bison and elk distribution (Appendix 1). Some elk or bison may move to private lands in search of forage. Of greatest concern is the potential for elk or bison to commingle with cattle of cow/calf operations, where brucellosis transmission could have considerable consequences, such as requiring depopulation of the cattle herd.

Several strategies would be employed to mitigate potential problems (Table 4), including providing incentives for non-breeding cattle operations (because brucellosis transmission to slaughter-bound cattle is not economically important), increased fencing in some limited areas to separate elk/bison from livestock feed lines, haze elk/bison away from livestock feed lines and purchase private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal Wildlife Conflict Technician positions which are supervised by the

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WGFD. These Technicians are also critical to the success of an expanded monitoring program vital to the MSP (see Monitoring section below).

Vegetation Restoration/Protection

The varied approaches to restore the Kelly

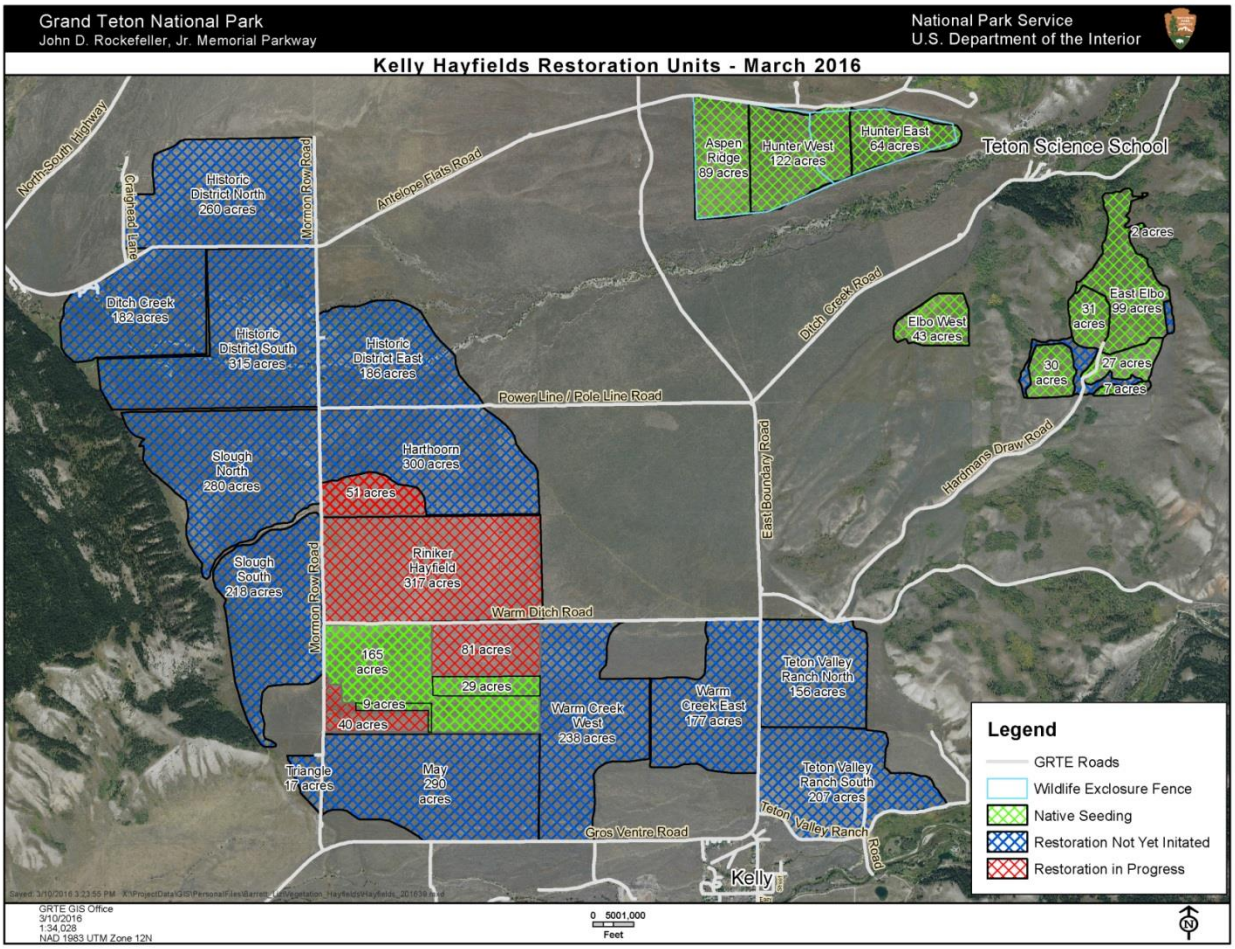


Figure 9. Units and status for the Kelly Hayfields ecological restoration effort in Grand Teton National Park, March 2016.

A database will be established to track non-agricultural conflicts on private lands to determine trends which will help evaluate the effectiveness of MSP mitigation efforts.

Preventing elk and especially bison from entering the Town of Jackson is essential in maximizing publicsafety and minimizing private property conflicts. Currently, bison are hazed northward when they drift south of Miller Butte. A cattle guard was installed on the Refuge Road just north of Broadway Avenue. This barrier is designed to prevent elk/bison from entering the Town of Jackson.

Hayfields in GRTE (4,500 acres) was initiated in 2008 following 2 years of research and field studies (Moeny 2008). The approach to ecological restoration includes serial treatments to 1) remove non-native species (e.g., herbicide application and prescribed burning); 2) seed native shrub, grass, and forb species; and 3) treat subsequent invasive plants by applying herbicides and, where appropriate, construct temporary fences to protect recently seeded pastures from colonization of non-native species and damage from large herbivores during early phases of restoration.

Of the 4,500 acres targeted for ecological

restoration in the Kelly Hayfields of GRTE, 1,235 acres within 7 pasture units are currently under restoration treatment and 3,265 acres remain non-native grass pasture (as of 2016; Figure 9). The non-native grass pastures are divided into 13 pasture treatment areas and are projected to be likely restored by 2035. As of 2016, approximately 745 acres are seeded with native vegetation, and 89 acres are considered fully restored. Maintenance of restored ecological conditions, however, will likely require management efforts in perpetuity to keep non-native species from colonizing restored areas. All 1,235 acres that are underway toward ecological restoration are being monitored for native plant establishment, invasive plant infestations, including cheatgrass spread. Park staff will continue to monitor and adaptively adjust treatments and restoration strategies according to our results.

Objective: *Maintain bull-to-cow ratios in park summer herd* (Table 1).

National Park Service management policy (NPS 2006) provides guidance for maintaining naturally regulated wildlife populations, free from the impacts of humans, to the greatest extent possible. The final BEMP identified a goal of maintaining park elk bull:cow ratios (a common way of expressing sex and age ratios in wild ungulate populations) near 35 adult bulls per 100 adult cows, based on estimates of what this ratio would be in a herd free from the effects of human harvest. The sex and age ratios of most North American elk populations are affected by sport hunting and herd managers generally maintain lower bull ratios.

Harvest

Based on summer bull ratios for elk in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded refuge hunting opportunities are considered.

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Table 4. Comparison of current and primary MSP components and parameters.

Action	Current Management	Management	Comment
Winter Feeding:			
Feed	Pelleted alfalfa	Pelleted alfalfa	No change
Ration	Full ration average: 8-12 lbs/day/elk	No Change	No change, to minimize calf mortality. Note average daily ration over the entire feed season is lower than a full ration because feed rate is gradually increased at the beginning of the feed season and gradually reduced at the end to facilitate rumen acclimation
	20-22 lbs/day/bison	20 lbs/day/bison	
Start criteria:			
Available standing forage	300 lbs/acre, as measured at traditional key index sites	Generally later; index sites to be increased in number and distribution	Influencing factors: -time of season -forage availability -number of elk/bison on NER -elk/bison distribution
End criteria:			
Available forage	Based on a snow cover index and subjective estimate of when residual or new forage is adequate	Generally 1 week earlier than current management	Ongoing development of more objective criteria for future implementation ongoing
Monitoring:			
Animals on feed	Mid-winter census	Elk/bison fed days[1]	
Proportion of JEH on NER	Mid-winter census	Mid-winter census	
feed			
Calf mortality	2008-2015 Average: 3.3% (range 1.1-9.0%)	Potentially higher than current levels but less than native winter range	
Elk/bison distribution – collars	Almost no documented use of private lands during feeding operations	Unknown, but likely higher use of private lands than current management	
Elk Winter mortality (all age classes)	2008-2015 Average:	<=3%	
	1.2% (range 0.6-1.9%)		

Table 4. Comparison of current and primary MSP components and parameters.

Action	Current Management	Management	Comment
Elk summer range segment Proportions for NER wintering elk	Approximately -40% GTNP North of Moose -35% South Snake River -10% Gros Ventre/Flat Creek -10% Teton Wilderness -5% Southern Yellowstone	Unknown, but will be monitored based on summer distribution of radio collared elk	Based on summer distribution of elk that were randomly radio collared on NER.
Harvest, National Elk Refuge elk:			
Frequency	Annual	Annual	
Begin Date	2nd week October	No Change	Modified as necessary
End Date	3nd week December	No Change	Modified as necessary
Structure	- 1 week initial drawing	- 1 week initial drawing	
	- 1 week left over 1st served	- 1 week left over 1st served	
	- partial week alternate	- partial week alternate	
	-daily 1st served alternates	- daily 1st served alternates	
Refuge permit types	- 1st week any elk	- Primarily antlerless only	
	- Antlerless only remainder of season	- limited any elk permits throughout season	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries		Consider expanding to allow bow hunting near developed areas	
Harvest, National Elk Refuge bison:			
Frequency	Annual	Annual	
Begin date	August 15th	August 15th	Modified as necessary
End date	2nd or 3rd week January	Consider later dates as appropriate	Modified as necessary
Hunting Season Structure	As per WGFD	As per WGFD	
Refuge permit types	Any bison or cow/calf per state license	Any bison or cow/calf per state license	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries	Limited to north of Nowlin Creek area	Consider escorted hunting in South Unit as needed	Guided hunts in South Unit when authorized
Harvest, Grand Teton NP elk:			
Frequency	As needed	As needed	
Begin Date	3rd week October	3rd week October	Modified as necessary
End Date	2nd week December	2nd week December	Modified as necessary
License types	Antlerless only	Antlerless only[2]	
Special regulations:	Cartridge limits	Cartridge limits	

Table 4. Comparison of current and primary MSP components and parameters.

Action	Current Management	Management	Comment
	Bear spray required	Bear spray required	
	Hunter safety card required	Hunter safety card required	
Harvest, Bridger-Teton NF, Elk Hunt Area 80:			
Begin Date			
End Date		15-Dec	Would require change in winter closure dates
Harvest, Elk Hunt Area 78			
Structure			Changes at discretion of WGFD
License Types			
Private Lands Mitigation:			
Cattle commingling		Incentives for non-breeding operation	
Hay depredation		Increased fencing	
Landscape damage			
Easement acquisition			
Vegetation Restoration/ Protection: Elk Refuge			
Vegetation Restoration/ Protection: Grand Teton	Herbicide treatments, prescribed burning, native seed propagation and planting, and protection and maintenance of restored pastures	Same as Current Management for remaining non-native grasslands in Kelly Hayfields	

[1]Number elk and bison on feed per day, totaled by feeding season.

[2]Any elk licenses could be offered if bull ratios in the park consistently exceed BEMP criteria.

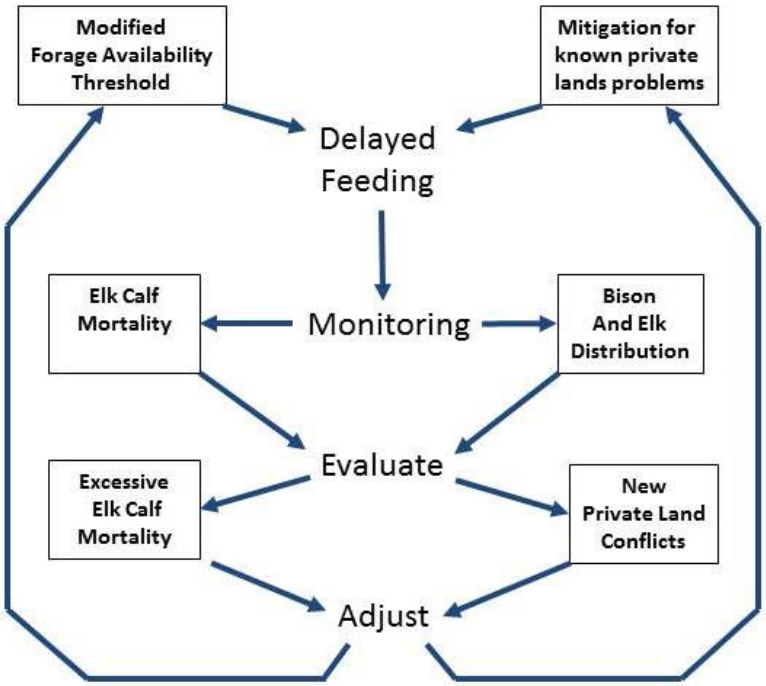


Figure 10. Framework for delayed feeding strategy under MSP.

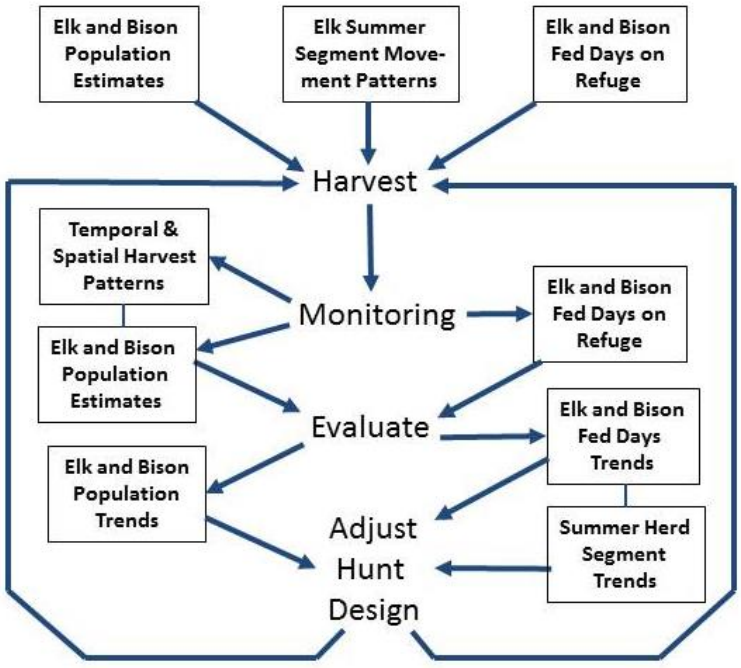


Figure 11. Framework for harvest strategy under MSP.

Strategies Considered But Rejected

The BEMP considered several additional strategies for elk and bison management that, for a variety of reasons, were not selected for implementation in the preferred alternative and Record of Decision. The agencies reconsidered a subset of these during the development of this MSP (Table 5). Since they were not part of the ROD, additional NEPA compliance would be necessary to incorporate any of them into this MSP, and thus they are not being considered at this time.

Table 5. Strategies considered but rejected.

Strategy Considered	Reason Rejected
Fertility control in elk	Judged not reasonable or feasible in BEMP, primarily due to major technical, social, and financial hurdles[1]. For MSP discussed primarily with regard to the difficult to harvest herd segment in Hunt Area 78 on private lands, where federal agencies have no jurisdiction.
Fertility control in bison	Impacts discussed at length in BEMP[2]. Not considered for MSP because current hunting programs appear effective at slowly moving the herd toward the 500 animal herd objective.
Agency reduction of bison or elk	Not considered necessary or desirable on federal lands because current hunting programs that utilize sport hunters are effective at meeting herd objectives.
Altering rations of supplemental feed	Rejected as a strategy because reducing daily feed ration below 8 lbs/elk would be enough feed to encourage elk to remain on NER but would result in unacceptably high elk calf mortality rates.
Private Lands Hunting Coordinator	The WGFD contacted private landowners and ranchers in the Spring Gulch area and discussed this concept to enhance elk harvest of short distance migrants. Generally, landowner interest was low.

MODELS OF SYSTEM DYNAMICS

Models provide a simplified representation of the biological system being managed. We will use modeling to quantify the effects of our management actions on 2 key responses of interest, elk distribution and winter elk calf mortality. There are a suite of possible factors that affect the proportion of elk on NER feedgrounds versus native winter range. Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix 3). Over time this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

An increase in calf elk winter mortality is a potential result of reduced feed season length. Several factors influence winter calf elk survival on NER (Fig. 13). Models will be used to assess the effects of available forage on winter calf elk survival (Appendix 4). Over time this will allow us to assess the effects of our principal management strategy (reducing feed season length) relative to winter elk calf survival.

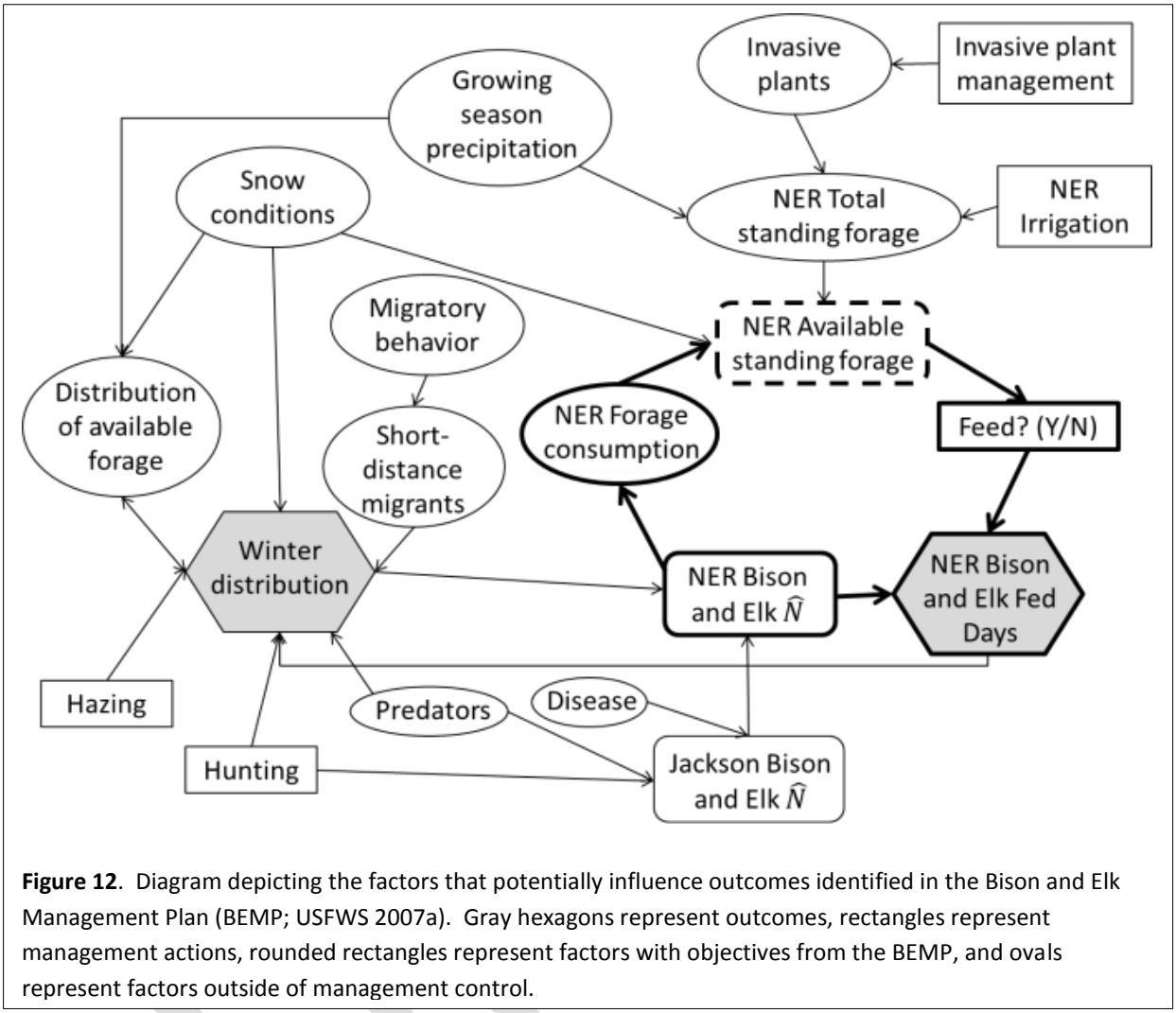


Figure 12. Diagram depicting the factors that potentially influence outcomes identified in the Bison and Elk Management Plan (BEMP; USFWS 2007a). Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

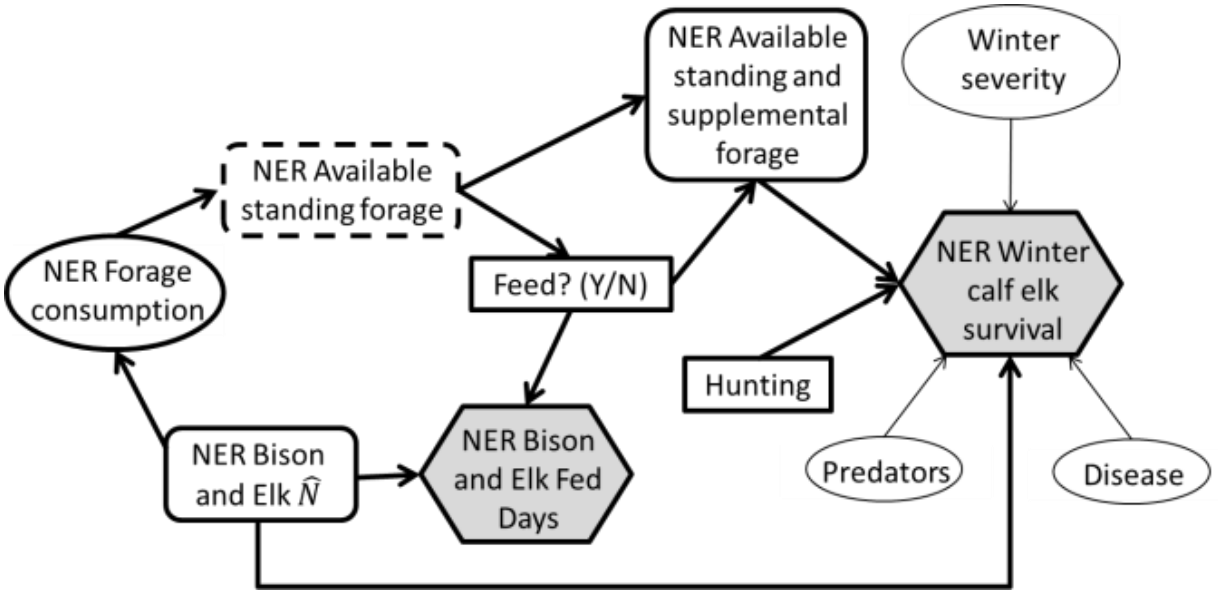


Figure 13. Diagram depicting the factors that potentially influence bison and elk fed days on the National Elk Refuge and winter calf elk survival. Gray hexagons represent outcomes, rectangles represent management actions, rounded rectangles represent factors with objectives from the BEMP, and ovals represent factors outside of management control.

MONITORING

Feeding Initiation Monitoring

NER uses weekly field estimates of the amount of forage available to elk to determine feeding initiation date. Currently measurements are taken at key index sites representing areas preferred by elk on NER (see supplemental materials at end of this section). These methods will be enhanced by 1) increasing the number of sampled sites to better represent the total amount of forage available to elk on the southern half of NER; 2) increasing the precision of estimates at each site by increasing the number of observers; and 3) extending the monitoring period later in the winter to assess the relationship between available forage and elk and bison distribution.

To better represent the total amount of forage available on the southern half of NER, a subsample of current key index sites will be retained to facilitate comparison with historic data, but additional random sample sites stratified by elk habitat preference will be added. Historic elk distribution mapping and elk GPS collar data (NER unpublished data) suggest that the areas most preferred by elk on southern NER are associated with moderate to high forage production and green vegetation. Because the distribution of forage production and greenness characteristics vary annually based on irrigation and precipitation patterns, we will annually map areas preferred and not preferred by elk and sample sites will be randomly selected within each of these mapped categories. At least 3 historic key index sites, 3 random sites in areas preferred by elk, and 3 sites in areas not preferred by elk will be sampled each week from late December through the initiation of supplemental feeding.

Currently the NER biologist is the only person trained in the techniques used to estimate available forage (see supplemental materials). At least 2 additional personnel will be trained in these techniques. This will provide a backup in the event of future personnel changes and will facilitate error estimates of the available forage measurements at each site.

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Currently NER and WYGFD biologists monitor available forage conditions at least weekly from late December until average available forage at key index sites nears the threshold level of 300 lbs. per acre and feeding is initiated. The principal MSP strategy is to delay the initiation of supplemental feeding after average forage production reaches the 300 lbs/ac level at key index sites. Therefore the monitoring period will be extended to include this period of delayed feeding.

Proportion of Elk Wintering on NER

A principal MSP goal is to reduce the number of elk wintering on NER. Our strategy will be to effect redistribution of elk to native winter range from NER over time via shortening the duration of the feed season, and thus slowly conditioning elk to seek food elsewhere. As feeding periods are shortened, the probability of younger elk age classes discovering NER feedgrounds will be reduced, and, hypothetically, that proportion of the JEH that utilizes NER feedgrounds will decline over time. We will measure this effect by examining changes in the winter distribution of the JEH. WGFD annual trend/classification count data provide a multi-year baseline data set to measure changes in the winter distribution of the JEH and categorizes observations by location. In each year, we will calculate the proportion of total classified elk in the JEH that are classified on NER feedgrounds. We will compare the 3-year running average post MSP implementation to the pre-implementation baseline. The pretreatment baseline will be comprised of data from 2008 2016, a time period that represents BEMP implementation prior to MSP actions (Figure 13).

Elk Fed Days and Bison Fed Days

The BEMP and MSP implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feedgrounds and the number of days they are fed. We further assume the variables elk-fed-days (EFD) and bison-fed-days (BFD) are a proxy for these conditions. EFD and BFD will be calculated annually for each species based on the following formulas:

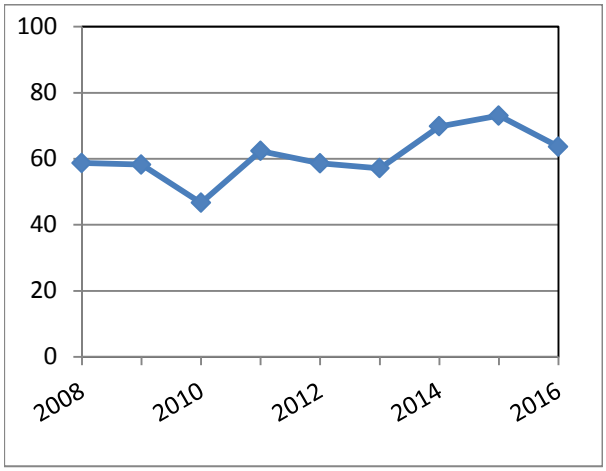


Figure 14. Proportion of the Jackson Elk Herd that was classified on NER feedgrounds in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

EFD= ∑ Total elk counted on feed during daily feedground counts for duration of feed season

BFD= ∑ Total bison counted on feed during daily feedground counts for duration of feed season

Because EFD and BFD are influenced by feed season length and the number of animals on feed, the MSP strategy of delaying the initiation of supplemental feeding will inherently reduce the number of EFD and BFD through a reduction in average feed season length. We believe that EFD will be further reduced by encouraging a greater proportion of the JEH to winter on native winter range, thereby reducing the number of elk occupying NER feedgrounds. We will evaluate changes in EFD and BFD by comparing the 3-year running average post MSP implementation compared to mean EFD and BFD from 2008–2015. The running average is an appropriate comparison because it will help

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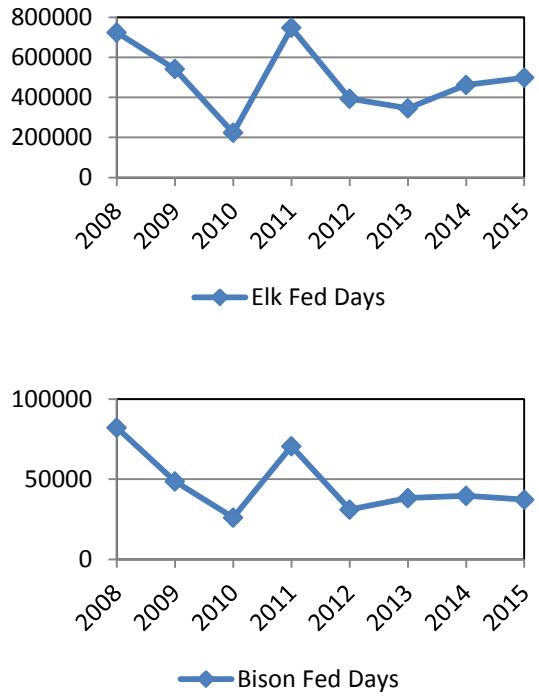


Figure 15. Elk Fed Days (EFD) and Bison Fed Days (BFD) in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the Management Step Down Plan (2008-2015). These values represent the pretreatment baseline which will be compared to the 3-year running average EFD and BFD post MSP implementation.

account for wide annual variation in EFD and BFD associated with winter severity (Figure 15)

Elk Winter Mortality Monitoring

NER has used consistent methods to monitor winter elk mortality since 1982. Each winter NER biologists and other refuge staff conduct a survey of all non-hunting related winter elk mortalities that occur on NER from November through April. Mortalities are tallied by age/sex class and percent mortality is calculated using the corresponding number of elk classified on NER feedgrounds as the denominator. We will continue to monitor elk winter mortality using the same methods post-MSP implementation, which will allow trend comparisons to the pre MSP baseline (Figure 15). Under the MSP framework, we believe the 3-year running averages for total and calf winter elk mortality will be within the range of variation exhibited by the pre MSP baseline. Historic monitoring suggests that calf and total mortality are sensitive to winter severity and disease outbreaks, and that winter mortality occasionally exceeds >3% total mortality and >10% calf mortality. Post-MSP mortality in excess of these levels may warrant shortening the feeding initiation delay in subsequent years.

Elk Collaring

One of the MSP's principal strategies is to shorten the length of the feed season to encourage elk use of native winter range, but we anticipate that this strategy will also result in an increase in elk conflicts on surrounding private land in the town of Jackson and the Spring Gulch areas, potentially including large groups of elk. To quantify this effect and provide real-time information to WGFD and NER managers to facilitate a response, we propose maintaining a sample of 50 GPS-collared elk that winter on NER throughout the MSP implementation period. Forty-five elk represents approximately 0.5% (1 in 200) of the NER winter elk population. This sample size will not be sufficient to detect all elk movements from NER to surrounding private lands, particularly movements by small groups of mature bull elk, but it will be sufficient to detect and quantify significant movements of cow/calf/yearling elk groups compared to pre-MSP baseline data.

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NER has elk GPS-collar data available from the 2008-2013, which represents the post-BEMP, pre-MSP baseline period. We hypothesize that elk movements from NER to surrounding private lands will increase during the MSP implementation period compared to the pre-treatment baseline. This will be tested by comparing the number of incidents that elk left NER for surrounding private lands (per elk/per year), and the proportion of elk GPS fixes on NER versus private lands during time periods of interest. The principal time period of interest is late December–March because this represents the period after the NER elk hunting season, and prior to, and during, NER feeding operations. This is the season when changes to the NER feeding program would be most likely to result in elk distribution changes.

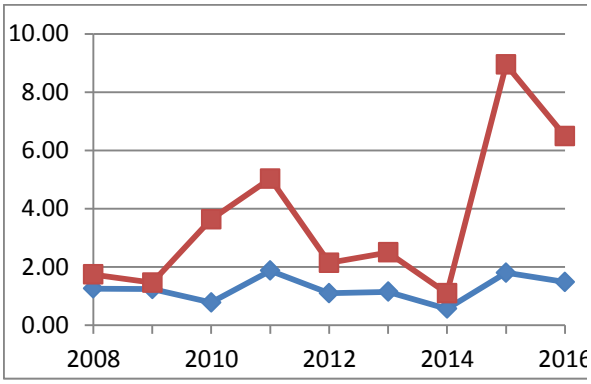


Figure 16. Total (blue) and calf (red) elk winter mortality (%) on NER in the period following implementation of the Bison and Elk Management Plan and prior to the implementation of the MSP (2008-2016). These values represent the pretreatment baseline which will be compared to the 3-year running average post MSP implementation.

Thirty adult cow elk were captured on NER feedgrounds in February 2016 and Telonics Iridium GPS collars were deployed with a 90 minute fix interval. Collars will be deployed on up to 50 additional adult cow elk in February-March 2017. Given 83% annual survival for adult cow elk in the JEH (Cole and Foley et al. 2015) and 3-year collar life, approximately 10 additional elk will need to be collared each year in winter 2018 and 2019 to maintain the 50 elk desired sample size over the life of the MSP implementation period.

Ancillary data that will be collected and analyzed during the elk capture and collar data analysis process includes brucellosis seroprevalence, pregnancy rate, and elk summer range determination for comparison to the findings of Cole and Foley et al. (2015).

Disease

The primary purpose of limiting reliance on supplemental feeding is to reduce the prevalence of endemic elk and bison diseases and mitigate transmission risk associated with the introduction of novel diseases. We hypothesize that brucellosis seroprevalence will decline post MSP implementation. There are no recent brucellosis seroprevalence data for elk on the NER, but >50 elk will be captured during elk collaring operations in winter 2016, and each elk will be tested for brucellosis exposure. The 2016 Brucellosis seroprevalence rate will be the pre-treatment baseline to evaluate post MSP change. Chronic wasting disease (CWD) has been monitored in the JEH since 1997, and since 2008 it has been monitored with sufficient sample size to detect 1% prevalence with 95% confidence. No CWD positive cases have been detected in the JEH, which given the long term persistence of the disease, provides overwhelming evidence that CWD is not currently endemic to the JEH. However, most evidence suggests that the distribution of CWD is increasing and that its introduction to the JEH is inevitable. Early detection is critical to ensure a management response, and therefore ongoing monitoring at sample sizes sufficient to detect 1% CWD prevalence with 95% confidence is necessary. CWD is sampled by testing tissues collected primarily from hunter harvested elk, and past experience suggests that 2 full time technicians working from September-December are necessary to ensure minimum sample size. Typical costs associated with 2 technicians are $32,000 per year.

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Data Collected for Modeling

Table 6. Variables to be used in models to explain elk winter distribution in the Jackson Elk Herd and elk calf mortality on NER.

VARIABLE	SOURCE	Elk Winter Distribution Model	Elk Calf Mortality Model
Proportion Jackson Elk Herd on NER Feedgrounds	WGFD/NER Jackson Elk Herd February Classification Count	Yes	No
Proportion Jackson Elk Herd from South Snake River summer segment	Determined from elk GPS collar data for elk captured on NER	Yes	No
Number of wolf packs in the Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated total wolf numbers in Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated number of wolves using NER in winter	NER observations	Yes	Yes
Total NER herbaceous forage biomass	NER forage production survey data	Yes	Yes
Snow Water Equivalent	NOAA snowtell site data	Yes	Yes
NER Winter elk Mortality (calf)	NER winter elk mortality survey	No	Yes
Snow Depth	NOAA Snowtell sites and NER measurements	Yes	Yes
Available Forage	NER and GTNP monitoring in winter months	Yes	Yes
NER Elk and Bison Fed Days	NER feeding records and daily feedground estimates of elk and bison	Yes	Yes
NER Feeding Start Date	NER feeding records	Yes	Yes
Gros Ventre Feeding Start date	WGFD feeding records	Yes	No
Elk Hunting Pressure by Hunt Area	Estimated number of hunter days from WGFD completion reports	Yes	Yes

To facilitate modeling, we will collect data on the following associated variables (Table 6). The table lists variables and how they relate to our efforts to use modeling to explain changes in elk distribution and elk calf mortality relative to our principal action of reducing feed season length.

EVALUATION/FUTURE MANAGEMENT

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Consequently, we anticipate that the strategies outlined in this plan will be in place for a minimum of 5 years, after which an initial evaluation of the program will be made. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented at an annual management MSP update/report, completed by NER staff by the end of March for the previous year.

Consistent with objectives outlined in the BEMP, the long-term goal of this plan is reduce the reliance of bison and elk on intensive supplemental feeding, using adaptive management principles through a structured framework of management actions, to achieve a desired condition of animals relying predominately on native habitat on NER, GRTE, and USFS lands, and on NER cultivated forage. But because there is no precedent for what this plan proposes, there are few responses to proposed management actions that can be predicted to a degree of certainty commensurate with establishing definable thresholds or other objective criteria for success in the short term.

Factors that will be considered in evaluating the success of the program will include the trend of EFD and BFD, type and frequency of private lands conflicts, the proportion of the JEH wintering on the NER, presence or absence of CWD and other infectious diseases, elk and bison population size and distribution, elk calf winter mortality, and public support. These are complex, dynamic, and interwoven components that, together with the MSP, make up the framework for decreasing reliance on supplemental feeding. As such, the effects of changing biological, social, and political conditions on these components will be part of the evaluation process.

In the context of this larger framework, however, we believe evaluation of the trend in EFD and BFD will be most important after the first 5 years of MSP implementation. The direction and magnitude of the trend observed will provide a preliminary basis for evaluation and decisions about continued management actions. Initial success with reduced feeding will be associated with a declining trend in EFD and BFD, with greater magnitudes indicating higher degrees of success. However, determinations of overall program success will necessarily include evaluation of all system components. For example, gains in reduced feeding come could be accompanied by an increase in private land conflicts, which would affect overall success determinations. While the overriding strategy will be to decrease feeding as aggressively as possible while gauging effects on other system components, overall measures of program success through time will necessarily involve evaluating a matrix of effects. These evaluations will be included in annual MSP reports.

As proposed and new management strategies are implemented and evaluated under this plan, at some point in the future it may become apparent that meeting reduced feeding goals will not possible without reducing elk and/or bison population objectives. Population objectives for both herds are set by Wyoming Game and Fish Commission and are evaluated regularly by WGFD personnel, including public review through annual season setting meetings. The BEMP supported the State herd objectives of 500 bison and 11,000 elk, and thus due to NEPA requirements any further consideration of reduced herd sizes by the NER or GRTE are beyond the scope of this plan. However, Wyoming Game and Fish Commission changes to Jackson bison or elk herd objectives are not constrained by the BEMP.

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Investigating the potential effects of climate change on elk and bison management will also be important in the long-term. During implementation of this plan, we will collect a variety of data that could be drawn upon for this purpose.

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PUBLIC OUTREACH AND EDUCATION

The practice of winter feeding is inexorably woven into the historic fabric of Jackson Hole. Elk are identified with the rich and unique legacy for which Jackson Hole is known around the world. De-emphasizing the supplemental feeding program will be a major paradigm shift for the residents of Jackson Hole, Teton County, and the State of Wyoming.

An effective Public Outreach and Education program is essential for effective MSP implementation. The practice of feeding elk evokes passionate responses from those that oppose and those that support this practice. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the MSP in order to gain general consent to modify longstanding elk/bison herd management methods.

A detailed communication plan to guide outreach and education efforts can be found in Appendix 3.

SCHEDULE

Table 7. Proposed implementation schedule for the MSP.

Action	Date
Public outreach and education	November 2016
Initiate private lands conflicts mitigation contacts/actions	January, 2017
Implement enhanced forage monitoring	January, 2017
Initiate changes in supplemental feeding protocol	January/February 2017
GPS Collar 30-40 elk (Iridium platform)	March 2017
Monitoring/Evaluation/Annual Report	June 2017

BUDGET

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year 1	2	3	4	5
National Elk Refuge:					
Monitoring:					
Seasonal Biological Technician (0.5 FTE, GS-7)	$24,000	$25,000	$26,000	$27,000	$28,000
Bison/elk fed days					
Mid-winter census					
Elk summer herd segment distribution[1]					
Expanded standing forage estimates[1]					
Chronic Wasting Disease, 2 seasonal bio.-techs	$32,000	$32,000	$32,000	$32,000	$32,000
Winter bison/elk distribution					
Irrigation					
50 Elk radio telemetry collars; Iridium Platform	$115,000	$25,000	$25,000	$25,000	$25,000
Bison barrier maintenance at NER south entrance	$500	$500	$500	$500	$500
Step Down Management Plan annual reporting	$2,000	$2,000	$2,000	$2,000	$2,000
Private lands:					
Easements / Leases (Private Foundations)	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000
Conflict mitigation technicians (WGFD)	$91,000	$91,000	$91,000	$91,000	$91,000
Hazing (helicopter)	$6,000	$6,000	$6,000	$6,000	$6,000
Vegetation restoration/protection[1]					
Public Outreach and Education	$11,000	$1,000	$1,000	$1,000	$1,000
Subtotal					
Grand Teton National Park:					
Monitoring:					
Summer elk classification/distribution	$10,000	$11,000	$12,000	$13,000	$14,000
Collaborative elk monitoring (GRTE portion)	$5,000	$5,000	$5,000	$5,000	$5,000
Vegetation Restoration/Protection					
Monitoring	$16,000	$16,000	$18,000	$18,000	$12,000
Temporary bison fencing	$24,000				
Temporary fence maintenance	$6,000	$8,000	$8,000	$4,000	
Hayfields restoration	$84,000	$70,000	$70,000	$31,000	
Exotic plant mitigation	$50,000	$52,000	$46,000	$32,000	$16,000
Elk Reduction Program (subject to annual review)					
Hunter harvest evaluation	$1,500	$1,500	$1,500	$1,500	$1,500
Harvest age distribution	$2,000	$2,000	$2,000	$2,000	$2,000
CWD monitoring (0.15 FTE, GS-6)	$7,000	$7,000	$7,000	$7,000	$7,000
Law Enforcement and Visitor Protection (0.15 FTE for 20 LE and support staff; supplies, and permitting)[3]	Unknown				

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.

Agency / Activity	Year				
	1	2	3	4	5
Subtotal					
Wyoming Game and Fish Department:[2]					
Subtotal					
Grand Total					

[1]See detail in Appendix

[2] Dependent on size of elk reduction program; current annual expenditures are approx. $295,000 for 0.15 FTE for 20 LE and support staff; supplies, and permitting.

[3]Through Interagency Agreement

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APPENDIX ?? Frequently Asked Questions

Q1: Why is the MSP vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?

A1: This is the first time that the strategy of delaying feed season initiation has been employed to reduce reliance on supplemental feeding. There is uncertainty regarding the effects of this strategy on elk and bison distribution and elk winter mortality, and therefore it is important to maintain flexibility in plan implementation to avoid significant unintended negative consequences. Unintended negative consequences the MSP seeks to avoid include 1) elk or bison moving to areas where they damage property, risk human safety, or commingle with livestock, and 2) elk winter mortality levels significantly higher than baseline levels.

Q2: Why were reductions to the Jackson Elk Herd and Jackson Bison Herd population objectives not considered as a strategy to reduce reliance on supplemental feeding?

A2: The BEMP has clear population objectives of 5,000 elk wintering on NER and 500 wintering bison. Modifying those population objectives would require additional NEPA analysis. The BEMP also agreed to support State elk herd objectives. The WGFD completed a public process in 2016 to set the population objective for the overall Jackson Elk Herd, and that objective remains unchanged at 11,000 elk.

Q3: The BEMP has an objective of 5,000 elk wintering on NER. Why has that objective not been achieved through increased elk harvest?

A3: The overall Jackson Elk Herd population has declined and is currently close to the 11,000 elk objective, but the number of elk wintering on NER has been well above the 5,000 elk objective since implementation of the BEMP in 2007 (Mean =7,100 elk). When the analysis was conducted for the BEMP, elk winter distribution data suggested that 5,000 elk could winter on NER while still maintaining 11,000 elk in the Jackson Elk Herd overall. However, the proportion of the Jackson Elk Herd that winters on NER has increased significantly over time, and based on current elk distribution it is no longer possible to winter 5,000 elk on NER and maintain 11,000 elk in the overall Jackson Elk Herd. Although increasing elk harvest above current levels would likely allow us to achieve the 5,000 elk objective for NER, it would also reduce the overall Jackson Elk Herd population below the 11,000 objective. If increasing elk harvest in not plausible, the only other option to meet the 5,000 elk objective on NER is to change winter elk distribution, which is the principal strategy of the MSP.

Q4: Why is your principal strategy to delay the start of the feed season?

A4: By delaying the start of the supplemental feed season we decrease the probability that elk that use native winter range or state feed grounds will discover NER feed grounds. Because elk use of feed grounds is a learned behavior, over time this could increase the proportion of elk that winter on native winter range, reduce the number of elk that move from the Gros Ventre drainage to NER, and decrease the NER wintering elk population. The resulting shift in elk distribution would allow us to achieve the

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5,000 elk objective for NER. Because 5,000 elk and 500 bison is close to the estimated carrying capacity of NER habitat, less feeding will be necessary at these population levels.

Q5: Will delaying the start of the feed season result in elk starvation?

A5: Our goal is to delay elk feeding a sufficient amount of time to affect elk distribution without causing an increase in elk mortality.

APPENDIX 1. Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007).

Populations

- Jackson elk herd objective of 11,000 would be maintained.
- New Jackson bison herd objective of 500 established.

Winter Feeding

- Supplemental feeding could be delayed or could occur earlier compared to current practices.
- Changes [to feeding program could] include alterations in the timing of feeding and providing supplemental feed in fewer years.
- Ration or pellet composition might need to be changed.
- Supplemental feeding would be initiated according to established criteria, including pre-winter forage production, assessments of forage utilization (done jointly by WGFD and NER personnel), elk condition and movements, and potentially on the January 1 index of winter severity calculations for elk (Farnes, Heydon, and Hansen 1999).
- Mechanical means could be used to increase forage access for elk after snow crusting events.
- Changes in the refuge supplemental feeding program could begin to affect elk nutrition (negligible adverse effect on NER elk from lower nutrition).
- Displacement of elk by bison during competition for standing forage would decrease as the bison herd is reduced.
- Aggressive social interactions involving competition for food among elk and bison would increase overall as feeding periods are reduced.

Winter Distribution

- Elk densities on the NER would decline due to more reliance on standing forage and wider distribution.
- Elk use of lands surrounding the NER would increase, including:
    - USFS lands east of the NER
    - Gros Ventre feedgrounds possibly
    - Southern GRTE
    - State feedgrounds south of the NER
- Most of winter distribution shift would involve elk in the Yellowstone, Teton Wilderness, and Gros Ventre segments.
- As ungulate numbers decreased and supplemental feeding was reduced, competition and aggressive social interactions on the refuge would also be reduced.
- Elk and bison distribution would increase as the animals relied more on native winter range.
- Fewer animals would be present on the refuge.

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Mortality

- As supplemental feeding is reduced, natural factors such as climate and native forage availability would have a greater influence on numbers, movements, distribution, and mortality.
- More elk would be subject to natural factors affecting mortality, including loss of body condition, predation, and starvation.
- Increased mortality on and off the refuge would mainly affect older elk and calves, and some prime bulls entering the winter energetically stressed due to rut activities.
- Late winter calf ratios could decrease as a result of higher winter calf mortality
- Average winter mortality on the refuge would increase from 1%–2% annually to an estimated 1%–5%.
- Overall, a higher total winter mortality rate of approximately 5% could be expected.

Disease

- Reductions in supplemental feeding or elk numbers would reduce the potential for impacts due to tuberculosis, septicemic pasturelosis, and CWD.
- The health and sustainability of the Jackson elk herd would be increased gradually as supplemental feeding was reduced and there was greater reliance on standing forage and wider ungulate distribution.
- Health and sustainability of the Jackson elk herd would be enhanced in the long term.
- Wider distribution of elk would result in moderate reductions in both the prevalence and potential transmission of brucellosis, as well as potential for spread of diseases not yet in the population.

Private Lands

- The agencies would work closely with the WGFD and landowners, including livestock producers, to coordinate actions that would prevent conflicts due to elk dispersal and to defray costs of managing potential conflicts. Preventing access to food/hay rewards on private lands would be vital for effective management.
- Private land conservation easements within NER boundaries would promote wider distribution.

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APPENDIX 2. Monitoring Supplemental Materials: Feeding Initiation Methods

At each sample site, 10 subplots will be measured at every 5 steps along the random bearing determined for each site. At each subplot a 13.27" diameter metal sampling ring will be placed on the ground. The amount of forage available to elk within the sampling ring (dry weight in grams) will be visually estimated. The 13.27" diameter subplot allows easy conversion from grams to lbs. per acre (each gram is equivalent to 100 lbs. per acre). During annual forage production sampling, refuge biologist Eric Cole has made approximately 1,000 of these visual estimates per year for 17 years, and 33% of Cole's estimates have been verified by clipping and weighing. Therefore, Cole will be the principal estimator, but additional personnel will be trained in these techniques to provide redundancy in the event of personnel changes, and to increase the number of observers to facilitate estimation of error.

Estimating available forage within the sample ring at each subplot is relatively straightforward when snow cover is limited, but estimating how much of the forage is accessible to elk when snow is dense, deep and crusted can be subjective. To decrease the subjectivity of the estimation process, if the area under the sample ring is covered with snow, only forage that can be exposed with a gloved hand will be included in the estimate of available forage. Forage that is fouled with manure and/or flush with the ground due to trampling and/or encrusted in ice will not be included in the estimate of available forage. At each subplot the estimate of available forage (dry weight g) will be converted to an equivalent lbs./acre value (1 gram=100 lbs./acre). The arithmetic mean of available forage (lbs./acre) for the 10 subplots provides an estimate of available forage for each index site. There are 3 sample site categories: 1) Historic Key Index Sites that have been used since 2007, 2) New randomly selected sites within areas preferred by elk, and 3) New randomly selected sites in areas not preferred by elk. Historic key index sites were not randomly selected, but were instead selected to represent areas most preferred by elk on the south end of NER. These were the sites used to determine when supplemental feeding would be initiated from 2007 until the implementation of the MSP. To facilitate comparison with pre-MSP data, we will continue to use mean lbs. per acre across historic key index sites to determine the 300 lbs. per acre threshold. However, post MSP implementation we will delay feeding initiation by 2 weeks once the 300 lbs./acre level has been reached. We will concurrently sample at randomly selected sites stratified on an annual basis between areas highly preferred and not highly preferred by elk. This will enable us to quantify the relationship between mean forage availability at historic key index sites and random sites over time.

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APPENDIX 3. Communication Plan

Communication Goals

Prior to the MSP's Implementation

- Utilize a variety of outreach methods to inform the public on the goals and timing of the MSP implementation and possible effects on wintering herds.
- Utilize a variety of outreach methods to inform the public on public comment opportunities.
- Identify and coordinate key messages and outreach with USFWS regional and national offices, State and federal agency partners, non-profits, elected officials, and other identified audiences.

During the MSP's Implementation

- Continue to utilize a variety of outreach methods to describe current management actions as well as measurable and noticeable changes on the landscape, in animal behavior, or in animal health.
- Provide a comprehensive overview of the MSP by providing links and references to previous outreach and background information.

Communication Objectives

- Work with current media contacts to promote news of the MSP via print, radio, Web, and social media platforms.
- Utilize new media and social media tools to provide information on why the MSP was developed, what public comment opportunities exist, and how the plan is being implemented.
- Plan, coordinate, and execute public meetings to allow for public comment and questions on the plan.
- Develop and provide methods for the public to submit written comments on the MSP.
- Monitor print media on Refuge elk and bison management to see how the Step own Plan objectives and reactions are being portrayed to the public.

Current Outreach Resources

- National Elk Refuge web site
- National Elk Refuge news release list
- (approximately 300 contacts)
- National Elk Refuge Twitter site (1,039 followers)
- Bison and Elk Management Plan web site (http://www.fws.gov/bisonandelkplan/)
- Space for an 11" x 17" poster in the Visitor Center on Refuge management topics
- Display panels in the Visitor Center theater for temporary displays

Available Supporting Outreach Resources

- USFWS Mountain–Prairie External Affairs staff
- USFWS Mountain–Prairie web site, including the
- "Top Stories" feature
- USFWS Mountain–Prairie Twitter site USFWS Mountain-Prairie Region Facebook page
- USFWS National Wildlife Refuge System

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- Facebook page
- USFWS Facebook page

Previous Outreach Efforts

- NER routinely writes and disseminates news releases on Refuge management activities, including the Comprehensive Conservation Plan, supplemental feeding, herd health monitoring, and forage production.
- Post the above news stories as Content.
- Management System (CMS) articles.
- Post CMS news story promos so they prominently appear on the home page, linking readers to the articles.
- Send out Twitter messages linking viewers back to the news stories.
- Prepare, upload and provide links to Adobe PDF versions of news stories with additional photos where additional images are available and/or help understand or visualize the content.
- Utilized the Conservation link on the web Content
- Management System to post information about the Bison and Elk Management Plan and the draft Comprehensive Conservation Plan.
- Retained and provided a link to the original Bison and Elk Management web page (http://www.fws.gov/bisonandelkplan/) that was developed during the planning process. The web site includes links to the Final Plan/EIS, Record of Decision, Federal Register Notice of Availability for both the Record of Decision and Final Plan/EIS, associated news releases, public meeting highlights, and other related documents. Note: the National Elk Refuge does not manage the site.

Additional Outreach Opportunities

- Public meetings in Jackson and other identified locations.
- Service produced video; video could be posted to the National Elk Refuge's multimedia web page, or USFWS Mountain–Prairie home page "Top Video" feature.
- Live radio interview on KHOL (Jackson, WY radio)
- Wyoming Public Radio interview with Refuge management staff
- Interviews with local print media sources
- Updates at community leader meetings such as Rotary Club, Jackson Hole Chamber of Commerce board meetings, and interagency breakfast meetings (with Federal agencies and local elected officials).

Target Audiences

Internal

- Regional and National USFWS Leadership
- Refuge permanent staff
- Refuge seasonal staff
- Refuge volunteers

External

- Congressional representatives
- State of Wyoming leadership
- Federal agency partners, particularly Grand Teton National Park and the Bridger–Teton National

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Forest
- Wyoming Game & Fish Department
- Other NER partners, including county and town agencies and local nonprofit organizations
- Local elected officials
- Private landowners in proximity to the National
- Elk Refuge or neighboring Federal lands
- Tribes
- Local and state media
- Local public

Key Outreach Topics

- Overview of BEMP objectives
- Strategy to change elk/bison behavior
- Threat of disease
- Natural mortality rates
- Anticipated winter distribution changes for bison/elk
- Mitigate negative effects on private lands
- Change elk behavior and distribution while avoiding increased mortality.
- Explain the historic reasons a supplemental feeding program began and why it was continued.
- Explain the NER's limited large ungulate carrying capacity and the disproportionate impact of bison on available forage; 3 elk = 1 bison.

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APPENDIX 4. Models

Elk winter distribution model

The proportion of the JEH that winter on the NER will be linked to factors hypothesized to influence elk winter distribution using a generalized linear mixed effects model (GLMM). A GLMM can account for a proportional response variable (i.e., constrained to the interval 0–1) using a log link and binomially-distributed errors. A GLMM also includes fixed and random effects, with the latter capturing residual model variance otherwise not explained by fixed effects. Year will be including as a random effect, providing several benefits. First, we don't assume years are independent and comprise all of the factor levels of interest. Instead, the effect of year is treated as a random variable, with individual year effects realizations of that distribution. This allows inference to non-sampled factor levels, i.e. years, by estimating a latent population-level proportion of elk expected to winter on the NER regardless of fixed effect influences. Thus, the random year effect can be considered a latent variable describing elk behavior manifested as observed winter distribution. Second, because year effects are not treated as independent, estimated effects of year on the proportion of JEH elk wintering on the NER are dependent on all factor levels, leading to greater precision when estimating individual year effects (Kéry 2010).

The full GLMM incorporating fixed effects for each factor identified as influencing elk winter distribution is:

$$P_t = \beta_{0(t)} + \beta_1 * AFI_t + \beta_2 * SDM_t + \beta_3 * WP_t + \beta_4 * GSP_t + \beta_5 * SWE_t + \varepsilon_t$$

where the random intercept and residual model variance are

$B_{0(t)} \sim N(\mu_{\beta_0}, \sigma^2_{\beta_0})$, and

$\varepsilon_t \sim N(0, \sigma^2)$, respectively.

Fixed effects include 1) per capita available forage at initiation of winter feeding (*AFI*) , 2) proportion of the JEH that are short-distance migrants (*SDM*), 3) number of wolf packs present on JEH native winter range (*WP*), 4) growing season (May–August) precipitation for the Wyoming Snake Drainage climate division (*GSP*; a proxy for available forage on native winter range), and 5) snow water equivalent on 1 January at Thumb Divide (*SWE*; a proxy for early winter severity).

Elk calf winter survival and forage deficits

The Forage Accounting Model of Hobbs et al. (2003) has as an output weekly available forage biomass for the NER (sum of predictions for 30 × 30 m cells). These predictions account for snow conditions using a proxy of SWE and decrement total available biomass by 35% to account for unpalatable plants within the total estimate.

While calf survival is a function of multiple factors the primary management action influencing calf survival is supplemental winter feeding. Current winter feeding initiation criteria lead to calf survival generally higher than in unfed populations. Proposed feeding initiation criteria will result in later initiation of supplemental feed, which will be most influential to calf survival. There is currently little

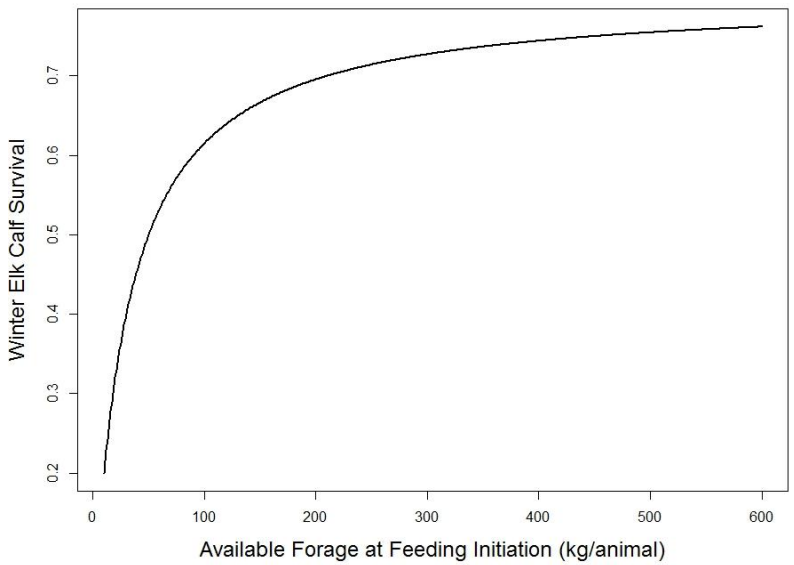
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understanding regarding the relationship between initiation of winter feeding and calf survival, except that current feeding initiation criteria result in high calf survival. We believe a threshold level of available forage at initiation of winter feeding exists such that winter calf survival reaches an asymptote. Below this threshold, calf survival is hypothesized to decline quickly with reductions in available forage at winter feeding initiation. Available forage at the initiation of winter feeding will be related to on elk calf winter survival using a saturating function (i.e., Holling type-II functional response; Fig. 6) by

$$S_t = \frac{aAFI_t}{b + AFI_t}.$$

The parameters *a* and *b* determine how calf survival is related to available forage. Maximum calf survival is *a*, and *b* represents the value of available forage to an individual when survival is 50% of *a* (Hilborn and Mangel 1997).

Although this approach doesn't capture forage deficits *per se*, it does provide a potentially sensitive proxy for this concept. It is assumed that a forage deficit for calves would occur at a point on the curve of the relationship between calf survival and available forage at initiation of supplemental feeding. Modeling the response of winter calf elk survival to changes in feeding initiation criteria facilitates our ability to maximize the influence of feeding initiation criteria on winter distribution while minimizing the likelihood of a large mortality event.



Hypothesized relationship between winter survival of elk calves and per capita available forage at initiation of winter feeding on the National Elk Refuge.

BASIC COMMUNICATIONS STRATEGY

SECTION I: GENERAL INFORMATION

1. **Plan title:** Release of the National Elk Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA)

2. **DTS number: 44T**

3. **What is the action triggering this communications plan?** *(Please explain in no more than three sentences)*

The CCP and EA have been approved since September 2015, so this announcement is overdue. A separate engagement strategy for the Bison and Elk Management step-down plan is currently in development and will be available for leadership review soon.

4. **What is the proposed date to announce this action? Why has that date been selected?** *(Please note whether this date is flexible)*

We propose to release this CCP/EA as soon as possible and no later than September 2016.

SECTION II: GOALS AND MESSAGES

5. **What are our primary communications goals?**

Our primary communications goal is to inform our primary partners at the Wyoming Game and Fish Department, National Park Service, U.S. Forest Service, and the local public that the CCP/EA have been finalized and that certain activities under the CCP are underway. Our secondary communications goal is to draw a clear line between the CCP/EA and the Bison and Elk Management Plan, separating those items in the minds of our constituents and indicating to interested stakeholders that information about the latter plan is forthcoming this Fall.

6. **What are our key messages?** *(List no more than four!)*

- The purpose of Comprehensive Conservation Plans is to guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will

implement to protect species, manage habitats, and support compatible, public recreational and other uses.

- A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).
- Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.
- The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the refuge, including supplemental feeding. A separate announcement and a series of meetings on the Bison and Elk Management Plan are forthcoming this Fall.

SECTION III: IMPLEMENTATION

7. Who is leading this communications effort? *(Check one. Note if the response is neither of these, you should be using either a Partnership, Full or Targeted plan)*

◉ **Region** ○ **HQ**

8. Which programs and/or regions does this issue involve?

The National Elk Refuge (R6)

Refuges (R6)

External Affairs (R6)

9. Implementation timeline:

Date	Time	Tactic	Responsible
August 12	COB	Draft news release and comms plan, submit to NER staff for review	Ryan Moehring
August 19	COB	Review outreach package and return any edits to Ryan Moehring	NER Staff
ASAP	COB	Refuges Planning re-submits *Federal Register* package to HQ for clearance.	Toni Griffin
Day before release	10:00 a.m. MDT	Contact Scott Talbot, Director WGFD	Steve Kallin
Day before release	10:00 a.m. MDT	Congressional notifications	Ryan Moehring
Day of release *(Day available in the Reading Room)*	10:00 a.m. MDT	Distribute press release	Ryan Moehring Lori Iverson will also forward the news release to the NER's news release list.
Day of release	10:00 a.m. MDT	Post Final CCP on Mountain-Prairie Refuge Planning website. Distribute Final CCP (electronic and hard copy) to individuals on the CCP mailing list.	Danielle Stevens will work with Rob Mansheim to post files on RO website. Toni Griffin will distribute the Final CCP to the mailing list.
Day of release	10:00 a.m. MDT	Post press release on R6 website and FWS homepage. Also, post link to press release on social media	Rob Mansheim Lori Iverson will send out a link on the NER's Twitter account.

Day of release	10:00 a.m. MDT	Email Dear Interested Party Letter to interested stakeholders.	Toni Griffin

10. Which communications tools are needed to support these strategies and tactics? *(Be as specific as possible about the products identified and who will produce them)*

Tool	Responsible	Due Date
News Release	Ryan Moehring	8/12/16
Communications Plan	Ryan Moehring	8/12/16
Dear Interested Party Letter	Toni Griffin	8/26/16

11. Which agencies, organizations and/or individuals should be notified?

Stakeholder Name	Contact Info	Pro/Anti/ Neutral	Contact By
Grand Teton National Park	David Vela, Superintendent; david_vela@nps.gov.	neutral	Day before announcement
National Park Service, Intermountain Region	James Doyle, Chief – Communication and Legislation; 303-969-2321; james_doyle@nps.gov	neutral	Day before announcement
Bridger-Teton National Forest	Patricia O'Connor, Supervisor; poconnor@fs.fed.us	neutral	Day before announcement
Wyoming Game and Fish Department	Brad Hovinga; brad.hovinga@wyo.gov	neutral	Day before announcement

12. Who are the primary points of contact for this action?

Media coordinators *(For national-level plans, list at least one person from HQ Public Affairs and others*

from region/program if appropriate. For regional-level plans, only regional coordinators are required. Enter name, email and phone)

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Congressional coordinators *(Optional. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Subject matter experts available for interview *(Must be approved by HQ Public Affairs for an HQ-led announcement or Regional Public Affairs for region-led announcement. Enter name, email and phone)*

- Steve Kallin, 307-201-5409; Steve_Kallin@fws.gov

Additional technical experts for reference *(Enter name, email and phone)*

- Eric Cole, 307-201-5432; Eric_Cole@fws.gov

SECTION IV: DOCUMENT INFO

13. Date Created **Created By**

8/12/2016	Ryan Moehring

14. Date last edited **Edited By**

1/25/2017	Ryan Moehring

SECTION V: CONGRESSIONAL CONTACT LISTS

Delegation Contacts

Member Title	State	Member Name	STAFF_EMAIL
Senator	Wyoming	John Barrasso	brian_clifford@barrasso.senate.gov; kaitlynn_glover@ba kristi_wallin@barrasso.senate.gov

Senator	Wyoming	Michael Enzi	alison_mcguire@enzi.senate.gov karen_mccreery@enzi.senate.gov
Representative	Wyoming	Cynthia Lummis	landon.stropko@mail.house.gov tucker.fagan@mail.house.gov

Committee Contacts

N/A

From: Cole, Eric
To: Gustine, David
Cc: Steve Kallin
Subject: Re: Map for Feeding Reduction Step Down Plan
Date: Sunday, September 18, 2016 2:08:06 PM

Hi Dave,

In general the map looks very good, thanks!

I noticed that you excluded the portion of my elk and bison no-go polygon in Grand Teton National Park west of highway 89 and east of the airport. Although I understand why you made this change from GTNP's perspective, I anticipate that WGFD would view elk and bison leaving NER during the winter to this area as a problem because of the vicinity of this area to private lands and the highway. I have cc'd Steve Kallin on this as well to see if he has any thoughts about which version of the polygon is included in the step down plan.

Eric Cole
Refuge Biologist
U.S. Fish & Wildlife Service, National Elk Refuge
Jackson, WY
307.201.5432

On Sat, Sep 17, 2016 at 12:08 PM, Gustine, David <dave_gustine@nps.gov> wrote:

> what do you think?
>
> I can also send to you in an ArcMap package if you have capability to tweak that way (e.g., add USFWS logos, etc). Let me know, but as off Monday, I'm out of office until Thurs (elk hunting).
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> > I have created a shapefile for elk and a shapefile for bison (see attached) The map should include these polygons and perhaps refuge, park, forest, and private land boundaries. I have not received any comments on the proposed polygons from other members of the inter-agency planning team, but I suspect that I will once they see the version in the document.
> >
> > **Eric Cole**

Refuge Biologist
U.S. Fish & Wildlife Service, National Elk Refuge
Jackson, WY
307.201.5432

--

Dave Gustine, PhD
Branch Chief, Fish and Wildlife Program
Grand Teton National Park
Moose, WY 83012
dave_gustine@nps.gov
307-739-3485

United States Department of the Interior

FISH AND WILDLIFE SERVICE
NATIONAL ELK REFUGE
675 E. Broadway
Jackson, WY 83001
(307) 201-5409
FAX (307) 733-9729

September 19, 2016

Teton County Conservation District (TCD) Board
420 W. Pearl Ave.
P.O. Box 1070
Jackson, WY 83001

Dear TCD Board:

Thank you for considering this proposal to work in partnership with the U.S. Fish and Wildlife Service (National Elk Refuge) to promote conservation practices and mitigation techniques designed to address wildlife and livestock conflicts in Teton County.

The attached Easement/Lease proposal will contribute to the preservation of Teton County's rich ranching heritage while safeguarding Jackson's signature wildlife species (elk) and the national mammal (bison). I believe this proposal will promote a healthy coexistence between ranching and these charismatic wildlife species and help preserve this rich heritage for the enjoyment of future generations of visitors to and residents of Teton County.

I look forward to providing additional information or discussing this proposal with you as necessary.

Thank you again for your consideration of this proposal.

Sincerely,

Steven W. Kallin
Refuge Manager

U.S. Fish & Wildlife Service

A Conservation Proposal to Assist Jackson Area Ranchers in the Prevention of Brucellosis Transmission from Elk and Bison to Domestic Livestock

September 19, 2016

Purpose of Program

The purpose of this proposed program is to provide area livestock producers assistance in mitigating a Human-Wildlife Conflict. Specifically, this program is designed to prevent the transmission of brucellosis from elk and bison to domestic livestock by eliminating co-mingling.

Background

History

The Jackson Hole area enjoys a rich ranching and wildlife heritage. In the 1880s, cattle ranching was first introduced to the valley and remains an important economic and social component of the Jackson Hole's character.

Elk figure prominently in Jackson Hole's history and culture. In the late 1800s, when elk populations all over North America were being extirpated, the residents of Jackson Hole protected elk from "tusk hunters" and from large-scale commercial hunting operations. Today, the Jackson Elk Herd is recognized world-wide and contributes significantly to the local economy.

A free-ranging bison herd was re-established in 1968 when 18 bison escaped from a wildlife park near Moran. Today this Jackson Hole bison herd, approximately 800 in size, resides primarily on the National Elk Refuge (NER) and the Grand Teton National Park (GTNP).

Ranching and wildlife are interwoven into the historic and cultural fabric of the Jackson Hole Area, and they continue to be vitally important components of Jackson Hole's identity. This proposal is designed to contribute to the healthy, long-term coexistence of both ranching and wildlife and the preservation of this heritage for future generations.

Bison and Elk Management Plan (BEMP)

Elk and bison contribute significantly to the ecology of the Greater Yellowstone Ecosystem. In 2007, the U.S. Fish and Wildlife Service and the National Park Service completed a 15 year plan for managing bison and elk on the National Elk Refuge and in Grand Teton National Park. The plan was developed in accordance with the National Environmental Policy Act and included extensive public input and close collaboration with several cooperative agencies and partners.

Since implementation of the BEMP, the percentage of the Jackson Elk Herd wintering on the NER has continued to increase. Up to 80% of the Jackson Elk Herd now winters on the NER, making the herd vulnerable to a catastrophic disease outbreak.

One of the key features of the BEMP is to support Wyoming elk and bison herd size objectives by minimizing the potential for significant disease outbreaks. This would be accomplished by decreasing winter herd concentrations through reducing reliance on the supplemental feeding program. Reducing elk use of the NER by encouraging the use of traditional native winter range would disperse the elk herd and reduce the concentration of and potential exposure to a catastrophic disease outbreak.

Brucellosis and Co-Mingling

Brucellosis and the high rates of infection in both the bison and elk herds is of concern because of the economic impact it could have on livestock producers if cattle contract the disease. Encouraging elk and bison to utilize native winter range will likely result in some of these animals dispersing to area cattle ranches. This proposed program will provide a tool to mitigate the potential conflict of co-mingling between these wildlife herds and domestic livestock.

Program Synopsis

This program would develop a conservation easement/lease program to assist Jackson Area ranchers in reducing Human-Wildlife Conflicts. It would provide payments to area ranchers through either a long-term easement (50 yrs.) or a shorter-term lease (5 yrs.). These payments would provide financial assistance and incentives to modify existing cattle operations to prevent co-mingling. Ranchers completing the 5 year lease program would also be eligible for the long-term easement, but not an additional 5 year lease.

This voluntary program would be available to Teton County livestock producers on a priority area basis.

Program Benefits

This program will contribute toward the long-term viability and sustainability of two of Jackson Hole's historic and currently important features influencing the county's character; ranching and the iconic Jackson Elk Herd.

This easement/lease program will provide financial

assistance and incentives to allow ranchers to make modest modifications to their ranch management and prevent Human-Wildlife Conflicts while preserving a viable livestock operation.

Preventing co-mingling conflicts with livestock will enable elk and bison, which have typically been concentrated on the NER, to disperse and reduce herd concentration and disease transmission potential.

This program will also contribute to the long-term health of the elk and bison herds, helping to ensure they continue to significantly contribute to the ecology of the Greater Yellowstone Ecosystem.

Co-mingling between elk and livestock is a concern for ranchers in other parts of Wyoming. This proposed conservation program could serve as a demonstration project providing benefits for other Conservation Districts attempting to address co-mingling conflicts.

A Public/Private Conservation Program

This program is proposed as a public private partnership to benefit the local economy and conservation practices in Teton County. It would involve the voluntary participation by ranchers, prioritization and document development by the U.S. Fish and Wildlife Service, private funding through the National Wildlife Refuge Association, and administration by the Teton County Conservation District.

Program Development and Partnership Commitments

Develop Conservation Documents

The U.S. Fish and Wildlife Service will provide draft conservation documents (Easement, 50 year; Lease, 5 year) for review and modification by the Teton County Conservation District (TCD). This collaboration will ensure these options include important conservation features and the legal requirements necessary for future administration by the TCD.

Funding

Although public conservation funding may become available in the future, this program would initially be funded by contributions from private conservation foundations through the National Wildlife Refuge Association. It is anticipated that approximately $10 million would initially be available to start this program.

Funds would be used for payments to area ranchers and for administrative overhead for the TCD.

Landowner Contracts

Approximately 17 ranches covering up to 13,000 acres could qualify for this conservation program. Initially, contacts and program enrollment would focus on the high priority area primarily in the Spring Gulch area. This priority area includes eight ranches covering up to 6,120 acres.

Landowner contacts can be made using a variety of approaches, consistent with the standard procedures followed by the TCD. All initial landowner contacts could be made by the TCD, the NER staff or a combination of both. The TCD will determine the standard process for reaching out to ranchers that qualify for this program.

Program Administration

The TCD would administer this program which would include document recording, payment to enrollees, compliance monitoring and enforcement. The TCD would also contact 5 year lease enrollees at the end of their program term to offer a long-term easement as funds permitted.

It is anticipated the number of landowners enrolled in this program would be relatively low, approximately 10 or fewer. The selection of enrollees would be coordinated with the NER.

Easement/Lease Description

Long-term Easement

- Length of Time: 50 years
- Livestock Management: Livestock (a domestic female cow or horse) would be prohibited on identified lands during the primary brucellosis transmission period from January 1 through April 15.
- Exemption: Livestock could occupy lands covered

by easement if confined within a high fence (minimum 7' tall) designed to exclude elk and bison from January 1 through April 15. Fencing for this exemption would be consistent with Teton County guidelines and limited in scope to prevent an impediment to wildlife movement.

- Hay Storage: Hay storage sites would be protected by a high fence (minimum 7' tall) designed to exclude elk and bison from January 1 through April 15.
- Hunting: Elk and bison hunting would be allowed during the State of Wyoming hunting seasons. Landowners would control access and determine who would be allowed to hunt. Landowners may charge fees for hunting and include a limited range weapons restriction as desired.

Short-term Lease

- Length of Time: 5 years
- Livestock Management: Same as long-term easement
- Exemption: Same as long-term easement
- Hay Storage: Same as long-term easement
- Hunting: Same as long-term easement

Additional Option

An additional option, at the landowner's request, can be to eliminate intensive forage production practices during the duration of the conservation agreement. This would include the exclusion of irrigation, fertilization, or the production of high quality forage to prevent attracting elk and bison. This option would include an additional payment. Few requests for this additional option are anticipated.

For More Information

Contact:
Steve Kallin
Refuge Manager
National Elk Refuge
307/201-5409
steve_kallin@fws.gov

From:	Steve Kallin
To:	Tom Segerstrom
Cc:	Mike Blenden
Subject:	Conservation Easement/Lease Program Proposal
Date:	Monday, September 19, 2016 2:22:27 PM
Attachments:	Easement Proposal Cover Letter to TCD 9-19-2016.pdf DraftConservationProposalToAssistRanchers 9-19-2016.pdf

---

Hi Tom:

Please see the attached updated Draft Conservation Easement Program Proposal and a cover letter for the upcoming Teton County Conservation District Meeting. The updated Conservation Proposal includes relatively minor changes to the version I sent you last week. Please present the Cover Letter and updated version of the Conservation Proposal to the TCD Board.

If you have an opportunity to review the attached Conservation Proposal prior to the Board Meeting, and have suggestions to add additional information, please let me know and I will modify as necessary.

Thank you again for your assistance,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Steve Kallin
To: Tom Segerstrom
Subject: RE: Conservation Easement/Lease Program Proposal
Date: Monday, September 19, 2016 2:27:45 PM

Tom:

Thank you again for all of your help!

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Tom Segerstrom [mailto:tom@tetonconservation.org]
Sent: Monday, September 19, 2016 2:26 PM
To: Steve Kallin
Subject: RE: Conservation Easement/Lease Program Proposal

Steve,

I will be presenting the information to the board during our executive session because it involves a real interest in property. Thank you for the update. I will let you know if there is some reason why you should attend the meeting, But I don't believe that is necessary at this time.

Tom Segerstrom
Executive Director
Teton Conservation District
P.O. Box 1070
Jackson, WY 83001
Phone: (307) 733-2110
Fax: (307) 733-8179
Cell: (307) 413-2704
Email: tom@tetonconservation.org

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Monday, September 19, 2016 2:22 PM
To: Tom Segerstrom <tom@tetonconservation.org>
Cc: Mike Blenden <mike_blenden@fws.gov>
Subject: Conservation Easement/Lease Program Proposal

Hi Tom:

Please see the attached updated Draft Conservation Easement Program Proposal and a cover letter for the upcoming Teton County Conservation District Meeting. The updated Conservation Proposal includes relatively minor changes to the version I sent you last week. Please present the Cover Letter and updated version of the Conservation Proposal to the TCD Board.

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Thank you again for your assistance,

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National Elk Refuge
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675 East Broadway
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Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Steve Kallin
To: Danielle Stevens
Subject: Re: NER Bison/Elk Step-Down Plan ... Draft Watermark
Date: Tuesday, September 20, 2016 3:26:43 PM

Danielle: sounds good, Steve

On Sep 20, 2016, at 11:53 AM, Danielle Stevens <danielle_stevens@fws.gov> wrote:

> Hi Steve,
>
> As I've been going through the formatting for the step-down plan, I have a suggestion – since we typically put Draft in the header with the document title (so on the left-hand page the header would read **<### Draft Step-Down Plan Bison and Elk Management**> and the right-had page header would be <**Section/Chapter—Name ###**>), I'd like to leave out the watermark.
>
> It will help with some of the formatting issues I am seeing. As I am proceeding with formatting, then my edits, I am going to leave out the draft watermark. I can always put it back in.
>
> Danielle
>
> Danielle Stevens, Writer-Editor
> "Whatever you are, be a good one." ~Abraham Lincoln
> "Every great dream begins with a dreamer." - Harriet Tubman
> Refuge Planning
> Division of Biological Resources
> Mountain-Prairie Region
> U.S. Fish & Wildlife Service
> 134 Union Blvd
> Lakewood, CO 80228
> Office Phone: 303-236-4317
> danielle_stevens@fws.gov

From: Cole, Eric
To: Steve Kallin
Subject: Summary of Matt Kauffman"s reviw of the step down plan
Date: Wednesday, September 21, 2016 4:27:20 PM
Attachments: Kauffman_PeerReview_NER_GTNP_StepDownPlan_21SEP16.docx

---

Matt made some good points that could be useful as we develop the final version of the Step Down Plan. I have attached his summary letter. He also sent a track changes version of the document, but I have not reviewed it yet.

Eric Cole
Refuge Biologist
U.S. Fish & Wildlife Service, National Elk Refuge
Jackson, WY
307.201.5432

Wyoming Cooperative Fish and
Wildlife Research Unit
Biological Sciences Building, Room 419
Dept. 3166 · 1000 E. University Avenue
Laramie, WY 82071
307.766.5415

21 September 2016
Laramie, Wyoming

RE: Peer Review of Bison and Elk Management Step Down Plan

In addition to the marked-up copy of the draft plan that I have submitted, here is a summary of my key comments.

Overall I find the plan to be fairly straightforward in how it is proposed to be implemented. I also find the metrics that will be monitored to evaluate management goals to be appropriate to the way in which we should expect elk and bison to respond to reduced feeding. The fact that NER and GTNP staff and their partners already have expertise in conducting this monitoring, and have done so to establish the baselines, provide confidence that the monitoring will be sufficient to detect changes and guide the decision process. I have a few broad suggestions.

1. **Assumption of no population-level effect.** The overarching premise of this plan is that feeding can be reduced while maintaining the herd-level objective of 11,000 elk in the Jackson Elk Herd. This assumption would seem to imply that there is no nutritional or demographic benefit of feeding. While it is true that the fitness effects of winter feeding have not been rigorously quantified (and sometimes animals do worse on supplemental feed), I think it is most appropriate to assume that a reduction in feeding will come at some cost to herd performance. I don't expect that cost will be substantial, but I do think it is likely to be detectable, and it will be negative. Because of this, I would suggest adoption of the view that for calf mortality, adult winter mortality, and overall population numbers that the numbers will be the same or lower under reduced feeding. This may also require explicit planning (with WGFD) to revisit the population objective should demographic rates and herd performance show reductions after feeding is reduced. Most importantly, I would not view a reduction in these demographic performance measures, as the plan is implemented, as an indication that the plan is not working. Rather, I would expect some small reduction in herd performance.

2. **Establishing target levels for reducing duration of feeding.** I struggled a little to determine by how much this plan would reduce feeding. I suggest that these targets be more clearly identified and described. For example, is the goal to reduce the length of feeding by some percentage each year, or some similar target? I realize that the decisions to start and end feeding are based on current conditions of snow and forage. But still, I think it would be useful and transparent if the target goal for feeding reduction in each year was more clearly identified. As it is, one gets the impression that much of the

decisions will be up to the judgment of managers as they integrate various trends and outcomes (including conflicts with landowners). Perhaps there is a clear rubric for making annual decisions on feeding start and end dates, but I couldn't quite parse it out of the document.

3. **Calculating and depicting the averages for baseline metrics.** As mentioned earlier, a strong point of this plan is that the monitoring metrics proposed have already been in place for 8-9 years, which provides confidence that they can be carried out annually as the plan is implemented. This past monitoring, however, shows how variable some of these metrics (such as elk-feed-days, adult and calf mortality) have been and could be. I would suggest calculating the historical average, 2008-2016, and being explicit about how the targets relate that average baseline. Also, for the elk-days-fed and bison-days-fed, I would suggest developing a graphic that depicts the historical data, the average, and the step down target, all in one graphic.

I hope these suggestions are useful in revising, and implementing, the step-down plan to reduce reliance of NER elk and bison on supplemental feed.

Submitted by:

Matthew Kauffman
Unit Leader and Associate Professor
Wyoming Cooperative Fish and Wildlife Research Unit
Department of Zoology and Physiology
University of Wyoming

From: Cole, Eric
To: Gustine, David
Cc: Steve Kallin
Subject: Re: Map for Feeding Reduction Step Down Plan
Date: Thursday, September 22, 2016 9:13:24 AM

Great, thanks! I appreciate your help with this and I think that the map will be very useful in the document.

Sorry to hear that you might have a vegetarian winter.

Eric Cole
Refuge Biologist
U.S. Fish & Wildlife Service, National Elk Refuge
Jackson, WY
307.201.5432

On Thu, Sep 22, 2016 at 9:10 AM, Gustine, David <dave_gustine@nps.gov> wrote:

> okay, I'll tweak that map I sent you with original bison-elk coverage with a potential name change. Sound good?
>
> On Thu, Sep 22, 2016 at 8:53 AM, Cole, Eric <eric_cole@fws.gov> wrote:
>
> > I agree with your plan to change the title of the map. "No-go" was just a label that I used for simplicity, but I like your idea to describe it as an area of potential conflict. This can easily be done in the the figure legend when we get to that point.
> >
> > **Eric Cole**
> > Refuge Biologist
> > U.S. Fish & Wildlife Service, National Elk Refuge
> > Jackson, WY
> > 307.201.5432
> >
> > On Thu, Sep 22, 2016 at 8:07 AM, Gustine, David <dave_gustine@nps.gov> wrote:
> >
> > > No problem, glad to help.
> > >
> > > Sorry on delay getting back to you, I was out scaring deer and elk away from my rifle the past couple of days.
> > >
> > > Perhaps this could be remedied with a name change? A "no go" zone implies animals wouldn't be tolerated there, however, it's movement to this area that signifies the potential (possibly high) for conflict. Areas with high potential for conflict? Not the best, but would damp down concerns from NPS leadership and stakeholders that might be in response to an incorrect interpretation of the "no go" zone.
> > >
> > > thoughts?
> > >
> > > dave
> > >
> > > On Sun, Sep 18, 2016 at 2:08 PM, Cole, Eric <eric_cole@fws.gov> wrote:

Hi Dave,

In general the map looks very good, thanks!

I noticed that you excluded the portion of my elk and bison no-go polygon in Grand Teton National Park west of highway 89 and east of the airport. Although I understand why you made this change from GTNP's perspective, I anticipate that WGFD would view elk and bison leaving NER during the winter to this area as a problem because of the vicinity of this area to private lands and the highway. I have cc'd Steve Kallin on this as well to see if he has any thoughts about which version of the polygon is included in the step down plan.

Eric Cole
Refuge Biologist
U.S. Fish & Wildlife Service, National Elk Refuge
Jackson, WY
307.201.5432

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> >
> > **Eric Cole**
> > Refuge Biologist
> > U.S. Fish & Wildlife Service, National Elk Refuge
> > Jackson, WY

307.201.5432

--

Dave Gustine, PhD
Branch Chief, Fish and Wildlife Program
Grand Teton National Park
Moose, WY 83012
dave_gustine@nps.gov
307-739-3485

--

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--

Dave Gustine, PhD
Branch Chief, Fish and Wildlife Program
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dave_gustine@nps.gov
307-739-3485

From:	Steve Kallin
To:	Eric Cole
Subject:	FW: Map for Feeding Reduction Step Down Plan
Date:	Thursday, September 22, 2016 10:39:29 AM
Attachments:	BEMP_MSP_draft_potential_conflict_zones_22-Sep-16.pdf

---

Please let me know when you believe this is ready to incorporate into the Step Down Plan, and whatever the caption should be. I will then forward to the editor.

Thanks,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Gustine, David [mailto:dave_gustine@nps.gov]
Sent: Thursday, September 22, 2016 9:42 AM
To: Cole, Eric
Cc: Steve Kallin
Subject: Re: Map for Feeding Reduction Step Down Plan

Ha, hunting season just started! I'm on it!

See attached. And if we call this something along the lines of "areas that may signify or represent increased conflicts when occupied by elk or bison" during Jan-Mar, GRTE is good with it.

Also, do you have a USWFS background or frame that you like to go around your maps? If so, send it my way.

dave

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Great, thanks! I appreciate your help with this and I think that the map will be very useful in the document.

Sorry to hear that you might have a vegetarian winter.

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From:	Steve Kallin
To:	Danielle Stevens
Cc:	Eric Cole
Subject:	FW: FW: Map for Feeding Reduction Step Down Plan
Date:	Thursday, September 22, 2016 1:31:06 PM
Attachments:	BEMP_MSP_draft_potential_conflict_zones_22-Sep-16.jpg BEMP_MSP_draft_potential_conflict_zones_22-Sep-16 (1).pdf

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Thank you again for your help!

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Fax: (307) 733-9729
steve_kallin@fws.gov

From: Cole, Eric [mailto:eric_cole@fws.gov]
Sent: Thursday, September 22, 2016 11:14 AM
To: Steve Kallin
Subject: Re: FW: Map for Feeding Reduction Step Down Plan

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To: Cole, Eric
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Subject: Re: Map for Feeding Reduction Step Down Plan

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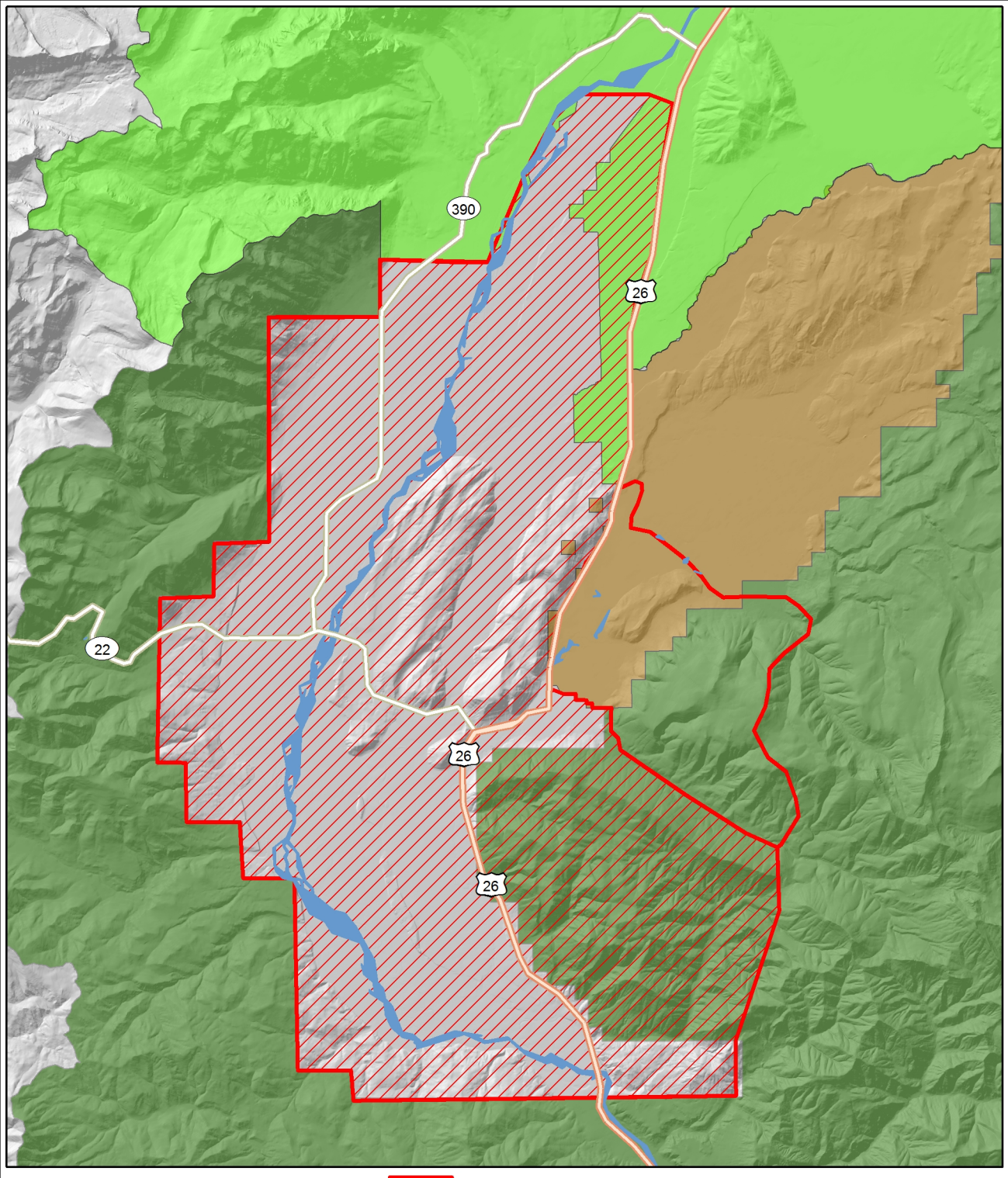
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390
26
22
26
26
Highways
Major Roads
Grand Teton National Park
Bridger-Teton National Forest
National Elk Refuge
Bison
Elk and Bison
N
Miles
0
1.5
3

From: Cole, Eric
To: Danielle Stevens
Cc: Steve Kallin
Subject: Re: FW: Map for Feeding Reduction Step Down Plan
Date: Thursday, September 22, 2016 1:52:16 PM

The new map will replace the current map portrayed in Figure 1. I have not heard when (or if) Grand Teton National Park staff will get to it, but I can say with certainty that it will not be completed by today.

Eric Cole
Refuge Biologist
U.S. Fish & Wildlife Service, National Elk Refuge
Jackson, WY
307.201.5432

On Thu, Sep 22, 2016 at 1:48 PM, Danielle Stevens <danielle_stevens@fws.gov> wrote:

> Thanks. I'll get it inserted.
>
> Here is the reference to the map (per comment from Eric)
>
> Winter Feeding
>
> Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the long run, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning animals to "expect" feed to be available later in the winter; this could build cohorts of animals that rely primarily on native winter range. To reduce supplemental feeding, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, which is the parameter we will use to measure progress toward reducing reliance on supplemental feeding.
>
> During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding (Figure ?) and[CE1] identify private land conflict areas that may require assistance with focused mitigation measures[CE2] .
>
> It's closer to page 28.
>
> Any chance of my getting that last map today? I am adding all the figures and tables in to the double column formatting and it's not so simple as just sticking a new figure in – the layout has to be adjusted to avoid excessive columnar white space.

Cheers!

Danielle Stevens, Writer-Editor

"Whatever you are, be a good one." ~Abraham Lincoln

"Every great dream begins with a dreamer." - Harriet Tubman

Refuge Planning
Office Phone: 303-236-4317

danielle_stevens@fws.gov

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[CE1]The map that shows where elk and bison should not be could be placed in this section. This would be figure number? And subsequent figure numbers will need to be adjusted accordingly. Also the text does not currently reference the map?

[CE2]Consider FAQ on principal strategy of delaying feeding initiation here

From: Steve Kallin
To: Danielle Stevens
Cc: Toni Griffin
Subject: RE: Step-Down Plan Bison and Elk Management
Date: Friday, September 23, 2016 9:53:25 AM

Hi Danielle:

Now, we have a bit of extra time. On Wednesday, I learned that we will be taking a "strategic pause" with rolling out the Step Down Plan. So October 7 should work. In fact, that may allow us to provide you the updated map with the "bison range" and perhaps some other comments.

Thank you for your help,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Danielle Stevens [mailto:danielle_stevens@fws.gov]
Sent: Friday, September 23, 2016 8:29 AM
To: Steve Kallin
Subject: Step-Down Plan Bison and Elk Management

Hi Steve,
As I am working through my edits, I would like to ask if there is any way I could have until October 7 to get the final Draft back to you.
I know there are some deadlines (not sure when those are), but I'd like the opportunity to re-read the document one more time (and add an Abbreviations list) before it gets sent out to the public.

Otherwise, I am aiming for early afternoon today to get you a PDF and the Word file.

Let me know.
Thanks,

Danielle Stevens, Writer-Editor
"Whatever you are, be a good one." ~Abraham Lincoln
"Every great dream begins with a dreamer." - Harriet Tubman
Refuge Planning
Division of Biological Resources
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
Lakewood, CO 80228
Office Phone: 303-236-4317
danielle_stevens@fws.gov

National Elk Refuge

Jackson, Wyoming

Nestled below the majestic Teton Range, adjacent to the historic gateway town of Jackson, the National Elk Refuge provides crucial big game wintering habitat in the Greater Yellowstone Ecosystem. Across the refuge's grassland, wetland, woodland, and sagebrush shrubland communities, visitors view wintering elk and other wildlife populations that are balanced with their habitats. The public enjoys quality hunting and fishing as well as year-round interpretative opportunities. Effective outreach and strong public and private partnerships ensure understanding and protection of refuge resources for future generations.



The final National Elk Refuge Comprehensive Conservation Plan is now available.

The U.S. Fish and Wildlife Service recently completed the National Elk Refuge's comprehensive conservation plan, a long-term planning effort that will guide management of the refuge over the next 15 years.

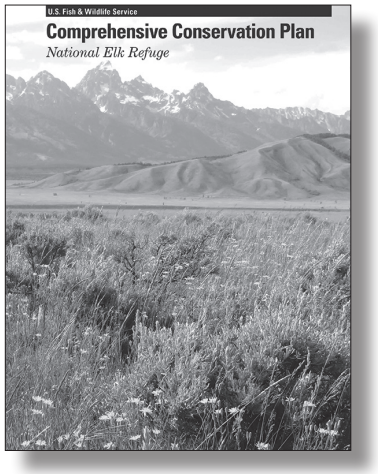
To learn more about the plan, please visit:

http://www.fws.gov/mountain-prairie/refuges/wy_ner.php

To receive a copy of the plan, please contact Toni Griffin, Acting Branch Chief, U.S. Fish and Wildlife Service, Region 6:

Email:
toni_griffin@fws.gov

Phone:
303 / 236 4378



News Release

U.S. FISH AND WILDLIFE SERVICE
Mountain-Prairie Region
134 Union Boulevard
Lakewood, Colorado 80228

For Immediate Release
September XX, 2016

Management Plan Completed for National Elk Refuge

Contact: Ryan Moehring, (303) 236-0345, Ryan_Moehring@fws.gov

LAKEWOOD, Colo. – The U.S. Fish and Wildlife Service (Service) has released a final Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) that will guide management of the National Elk Refuge in Jackson Hole, Wyoming for the next 15 years. The management decisions included in the CCP are a result of thorough environmental review and input from the local community and other stakeholders.

A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation, photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.

The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the refuge, including supplemental feeding. Instead, the CCP addresses all other aspects of refuge management including migratory birds, threatened and endangered species, habitat, visitor use, and cultural resources.

The final CCP/EA is available online here: https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. Hard copies are available at the refuge administrative offices located at 675 E. Broadway in Jackson. For questions about the CCP/EA, please call 307-733-9212.

Established in 1912, the National Elk Refuge spans approximately 25,000 acres and provides wildlife with a variety of habitat types, including grassy meadows, marshes, forest, sagebrush, and rock outcrops. Although the refuge is best known for the large herd of wintering elk in the world, nearly 175 species of birds and at least 47 mammal species have been observed on the refuge. In addition to the large herd of elk, a free-roaming bison herd also winters at the refuge. Each year, roughly 500,000 people visit the National Elk Refuge to enjoy the views and charismatic wildlife.

To learn more about the refuge,
visit: https://www.fws.gov/refuge/National_Elk_Refuge/about.html.

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. We are both a leader and trusted partner in fish and wildlife conservation, known for our scientific excellence, stewardship of lands and natural resources, dedicated professionals, and commitment to public service.

For more information on our work and the people who make it happen, visit http://www.fws.gov/mountain-prairie/. Connect with our Facebook page at http://www.facebook.com/USFWSMountainPrairie, follow our tweets at http://twitter.com/USFWSMtnPrairie, watch our YouTube Channel at http://www.youtube.com/usfws and download photos from our Flickr page at http://www.flickr.com/photos/usfwsmtnprairie/.

– FWS –

From: Ryan Moehring
To: Steve Kallin; Lori Iverson; Cris Dippel; Mike Blenden; Toni Griffin
Subject: FW: NER CCP
Date: Friday, September 23, 2016 11:26:00 AM
Attachments: NER CCP Comms Strategy.docx
NER CCP Dear Reader Letter.doc
NER CCP News Release.docx
NER CCP Postcard.pdf

All,

I'm slammed the next couple of days, but I want to keep the ball rolling on this. I see a couple of tiny changes I would like to make to the attached, but I'm on my way out the door for a site visit and in the meantime I wanted to get this package in front of you for one last review. Could you please take a final look for any fatal flaws and send your feedback to me ASAP? I would like to get this in to surname no later than next Tuesday, if possible.

Thanks, everyone!

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Will Meeks [mailto:Will_Meeks@fws.gov]
Sent: Thursday, September 22, 2016 12:35 PM
To: Mike Blenden; Steve Kallin; Toni Griffin; Ryan Moehring
Cc: Maureen Gallagher; Anna Munoz; Roya Mogadam
Subject: NER CCP

All –

I have the green light to complete any final edits to the comms plan and news release for the final signature of the CCP for NER.

Can you package and route the CCP with the Comms Plan and News Release for surname and signature. I think Toni was working with HQ on this as well.

Thanks.

Will Meeks
U.S. Fish and Wildlife Service
Mountain Prairie Region
Assistant Regional Director

National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

BASIC COMMUNICATIONS STRATEGY

SECTION I: GENERAL INFORMATION

1. **Plan title:** Release of the National Elk Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA)

2. **DTS number: 44T**

3. **What is the action triggering this communications plan?** *(Please explain in no more than three sentences)*

The CCP and EA have been approved since September 2015, so this announcement is overdue. A separate engagement strategy for the Bison and Elk Management step-down plan is currently in development and will be available for leadership review soon.

4. **What is the proposed date to announce this action? Why has that date been selected?** *(Please note whether this date is flexible)*

We propose to release this CCP/EA as soon as possible and no later than September 2016.

SECTION II: GOALS AND MESSAGES

5. **What are our primary communications goals?**

Our primary communications goal is to inform our primary partners at the Wyoming Game and Fish Department, National Park Service, U.S. Forest Service, and the local public that the CCP/EA have been finalized and that certain activities under the CCP are underway. Our secondary communications goal is to draw a clear line between the CCP/EA and the Bison and Elk Management Plan, separating those items in the minds of our constituents and indicating to interested stakeholders that information about the latter plan is forthcoming this Fall.

6. **What are our key messages?** *(List no more than four!)*

- The purpose of Comprehensive Conservation Plans is to guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will

implement to protect species, manage habitats, and support compatible, public recreational and other uses.

- A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).
- Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.
- The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the refuge, including supplemental feeding. A separate announcement and a series of meetings on the Bison and Elk Management Plan are forthcoming this Fall.

SECTION III: IMPLEMENTATION

7. Who is leading this communications effort? *(Check one. Note if the response is neither of these, you should be using either a Partnership, Full or Targeted plan)*

◉ **Region** ○ **HQ**

8. Which programs and/or regions does this issue involve?

The National Elk Refuge (R6)

Refuges (R6)

External Affairs (R6)

9. Implementation timeline:

Date	Time	Tactic	Responsible
August 12	COB	Draft news release and comms plan, submit to NER staff for review	Ryan Moehring
August 19	COB	Review outreach package and return any edits to Ryan Moehring	NER Staff
ASAP	COB	Refuges Planning re-submits *Federal Register* package to HQ for clearance.	Toni Griffin
Day before release	10:00 a.m. MDT	Contact Brad Hovinga, Regional Wildlife Supervisor, WGFD	Steve Kallin
Day before release	10:00 a.m. MDT	Congressional notifications	Ryan Moehring and Steve Kallin
Day of release *(Day available in the Reading Room)*	10:00 a.m. MDT	Distribute press release	Ryan Moehring Lori Iverson will also forward the news release to the NER's news release list.
Day of release	10:00 a.m. MDT	Post Final CCP on Mountain-Prairie Refuge Planning website. Distribute Final CCP (electronic and hard copy) to individuals on the CCP mailing list.	Danielle Stevens will work with Rob Mansheim to post files on RO website. Toni Griffin will distribute the Final CCP to the mailing list.
Day of release	10:00 a.m. MDT	Post press release on R6 website and FWS homepage. Also, post link to press release on social media	Rob Mansheim Lori Iverson will send out a link on the NER's Twitter

			account.
Day of release	10:00 a.m. MDT	Email Dear Interested Party Letter to interested stakeholders.	Toni Griffin

10. Which communications tools are needed to support these strategies and tactics? *(Be as specific as possible about the products identified and who will produce them)*

Tool	Responsible	Due Date
News Release	Ryan Moehring	8/12/16
Communications Plan	Ryan Moehring	8/12/16
Dear Interested Party Letter	Toni Griffin	8/26/16

11. Which agencies, organizations and/or individuals should be notified?

Stakeholder Name	Contact Info	Pro/Anti/ Neutral	Contact By
Grand Teton National Park	David Vela, Superintendent; david_vela@nps.gov.	neutral	Day before announcement
National Park Service, Intermountain Region	James Doyle, Chief – Communication and Legislation; 303-969-2321; james_doyle@nps.gov	neutral	Day before announcement
Bridger-Teton National Forest	Patricia O'Connor, Supervisor; poconnor@fs.fed.us	neutral	Day before announcement
Wyoming Game and Fish Department	Brad Hovinga; brad.hovinga@wyo.gov	neutral	Day before announcement

12. Who are the primary points of contact for this action?

Media coordinators *(For national-level plans, list at least one person from HQ Public Affairs and others from region/program if appropriate. For regional-level plans, only regional coordinators are required. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Congressional coordinators *(Optional. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Subject matter experts available for interview *(Must be approved by HQ Public Affairs for an HQ-led announcement or Regional Public Affairs for region-led announcement. Enter name, email and phone)*

- Steve Kallin, 307-201-5409; Steve_Kallin@fws.gov

Additional technical experts for reference *(Enter name, email and phone)*

- Eric Cole, 307-201-5432; Eric_Cole@fws.gov

SECTION IV: DOCUMENT INFO

13. Date Created **Created By**

8/12/2016	Ryan Moehring

14. Date last edited **Edited By**

3/7/2017	Ryan Moehring

SECTION V: CONGRESSIONAL CONTACT LISTS

Delegation Contacts

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			kristi_wallin@barrasso.senate.gov
Senator	Wyoming	Michael Enzi	alison_mcguire@enzi.senate.gov karen_mccreery@enzi.senate.gov
Representative	Wyoming	Cynthia Lummis	landon.stropko@mail.house.gov tucker.fagan@mail.house.gov

Committee Contacts

N/A

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:
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Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Boulevard
Lakewood, Colorado 80228-1807

Dear Reader:

We, the U.S. Fish and Wildlife Service, are pleased to provide you with a copy of the comprehensive conservation plan (CCP) for the National Elk Refuge. The CCP will guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will implement to protect species, manage habitats, and support compatible, public recreational and other uses. During the planning process, we worked closely with representatives from the National Park Service, the Wyoming Game and Fish Department, and the Teton County Planning Department. A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected Alternative D as the preferred management alternative.

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem. We will work closely with Wyoming Game and Fish Department and other Federal, State, and local partners to evaluate and manage habitats for the benefit of bison, elk, migratory birds, and other native species. An emphasis on adaptive management, including monitoring the effects of habitat management practices and use of research results to direct ongoing management, will be a priority.

We will use this plan, along with the Bison and Elk Management Plan (2007), as guidance for managing the refuge over the next 15 years. This comprehensive conservation plan will complement, not replace, the Bison and Elk Management Plan. A stepdown management plan is currently being drafted for the Bison and Elk Management Plan. This plan will outline, consistent with the Bison and Elk Management Plan, guidance to adaptively manage bison and elk herds to meet the goals and objectives outlined in the Bison and Elk Management Plan. Public comments will be solicited before the stepdown management plan is finalized.

The CCP document can be viewed online at https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. For more information about the CCP, please contact Steve Kallin, Project Leader at (307) 733-9212, or Steve_kallin@fws.gov.

Thank you for your continued interest in this planning process.

Sincerely,

Will Meeks
Assistant Regional Director
National Wildlife Refuge System

Draft Step-Down Plan
Bison and Elk Management

A Structured Framework for Reducing Reliance on Supplemental Winter Feeding
National Elk Refuge
Grand Teton National Park

Wyoming

September 2016

Prepared by

National Elk Refuge
675 E. Broadway
Jackson, WY 83001
307/733 9212

CITATION

U.S. Fish and Wildlife Service. 2015. Bison and Elk Management Step-down Plan. National Elk Refuge, Grand Teton National Park, Wyoming. Lakewood, CO: U.S. Department of the Interior, U.S. Fish and Wildlife Service. National Park Service. 66 p.

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Summary

Overview

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and NPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP) (USFWS and NPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands, focused on four broad goals:

1) habitat conservation;
2) sustainable populations;
3) numbers of elk and bison; and
4) disease management.

The final Bison and Elk Management Plan directed the NER and GRTE (in conjunction with the Wyoming Game and Fish Department [WGFD]) to maintain the state's elk herd objective of 11,000; establish a bison population objective of 500; restore habitat on the NER and in GRTE; continue hunting bison and elk on the NER; continue the elk reduction program, when necessary, in GRTE; allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available; and develop a dynamic, structured framework and Step-Down Plan for decreasing the need for supplemental feeding on the NER. This Step-Down Plan for Bison and Elk Management was developed specifically to address the criteria for a structured framework referenced in the Record of Decision.

Background

Winter feeding of elk in Jackson was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. The loss of available winter range in Jackson Hole due to new ranching operations and a growing town resulted in significant numbers of elk dying during several severe winters in the late 1800s and early 1900s. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, established the National Elk Refuge. Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding.

Bison were hunted to near-extinction outside Yellowstone National Park (YNP) by the mid-1880s but in 1948 were reintroduced to Jackson Hole when 20 bison from YNP were released near Moran, Wyoming. The herd remained small until discovering elk feedlines in 1980, when the population began sustained population growth. Bison and elk that winter on the NER are migratory and occupy summer ranges predominantly to the north.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER (Boyce 1989), high animal concentrations have created an unnatural situation that has contributed to an increased risk for major outbreaks of exotic diseases (Murie 1951, Franson and Smith 1988, Samuel et al. 1991), currently demonstrated by the high level of brucellosis in the elk and bison herds (Cross et al. 2010, Kamath et al. 2016). It has also resulted in damage to and loss of habitat due to browsing of willow,

cottonwood, and aspen stands (Smith et al. 2004), thereby reducing other wildlife associated with woody vegetation.

The BEMP and this step-down plan implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feeding grounds and the number of days they are fed. The potential risk of catastrophic disease outbreaks and the need to mitigate this threat is a vital component in achieving the BEMP Sustainable Populations Goal.

Objectives

This Step-Down Plan addresses several objectives under a broader BEMP goal of sustainable populations, which directed the agencies to: 1) develop a dynamic, structured framework for reducing NER supplemental feeding; 2) implement a phased reduction of animals on feed: a) Phase 1, to 5,000 elk and 500 bison, and b) Phase 2, elk and bison rely predominantly on native habitat; 3) maintain natural elk bull-to-cow ratios in park summer herd; and 4) enhance public outreach/education. The BEMP further stated that consideration criteria for implementing the 2nd phase of reduced feeding would include some or all of:

1) the level of forage production and availability on the National Elk Refuge;
2) desired herd sizes and age/sex ratios,
3) effective mitigation of bison and elk co-mingling with livestock on private lands;
4) winter distribution patterns of elk and bison;
5) prevalence of brucellosis, chronic wasting disease, and other wildlife diseases; and
6) public support.

In short, the overall objective of this plan is to provide a path for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on freestanding forage, while maintaining population and herd ratio objectives and public support.

Strategies

Elk have been fed for some period during nearly every winter on the National Elk Refuge since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during a time of year when natural forage is typically most limited is powerful to both species, and their knowledge of its existence has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Attempting to modify this behavior on a large scale is unprecedented and will necessarily require investigation; constant evaluation; and adaptive modifications to the approach; and repeated trials.

The Step-Down Plan's primary focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with landowners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into the three broad categories of

1) timing and intensity of winter feeding,
2) timing and intensity of hunting, and
3) overall and herd segment specific harvest levels.

Measuring the success of Step-Down Plan strategies will require knowledge of several bison and elk herd attributes. Because we are interested in reducing the intensity of elk and bison feeding throughout the entire winter season, which includes both the number of animals on feed and the duration of feeding, we will use measurements of elk-fed-days (EFD; the total number of elk fed per day per season derived from daily feeding ground estimates) and bison-fed-days (BFD; the total number of bison fed per day derived from daily feeding ground estimates) to evaluate feeding

intensity. For example, if 5,000 elk were fed for 100 days during a given winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD. Average baseline feeding intensity during the post-BEMP to pre-Step-Down Plan period from 2008-2016 was 487,838 EFD (range = 223,614-746,800), and 45,224 BFD (range = 26,035-82,124). Reductions in EFD and BFD compared to these baselines will represent progress in meeting feeding reduction objectives under the Step-Down Plan. Reductions in EFD and BFD could be achieved by reducing the length of the feed season, reducing the number of elk and bison on feed, or some combination of both factors.

Initial success of Step-Down Plan implementation will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP did not provide specific measurement criteria for the definition of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage" we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. These levels of reduction are consistent with elk and bison predominantly relying on freestanding forage rather than supplemental feed.

Similarly, there are population-specific objectives derived from the BEMP and Phase 1 of the Step-Down Plan for 5,000 elk wintering on NER and 500 bison wintering in the Jackson Hole area. Progress towards these objectives will be measured using annual classification counts and the average number of elk and bison counted during daily feeding ground estimates.

Chronic Wasting Disease

As of 2016, chronic wasting disease (CWD) has been detected within 40 miles of the Jackson Elk Herd (Jackson elk herd) in moose, within 35 miles in deer, and within 175 miles in elk. Continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence will take place. Some aspects of CWD response planning could change based on implementation of WGFD's CWD management plan (WGFD 2016).

Winter Feeding

Currently, the initiation of supplemental winter feeding occurs when available forage drops to 300 lbs./acre along transects in areas with highly preferred grasses. This protocol will change to delay the initiation of feeding.

The strategy of delaying the start of supplemental feeding is to encourage elk and bison to use native winter range, especially those individuals that have not previously received a food reward on the Refuge. Over time, it is anticipated a cohort of animals will develop that are not conditioned to the Refuge supplemental feeding program, which will reduce herd concentrations and the risk of disease transmission.

To reduce supplemental feeding overall, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk and bison fed days, the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years of Step-Down Plan implementation, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require focused mitigation measures.

As bison and elk behavioral responses are better understood, feeding delays will be extended to encourage a redistribution of elk and bison to native winter range. However, other factors outside of the scope of this plan such as wolf numbers and distribution could reduce the effectiveness of this strategy.

Variables that influence feeding initiation date will be considered (Table 4, Figure 9). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the Step-Down Plan, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in

January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Finally, the distribution of animals, particularly on private, livestock producing lands, would be considered prior to delaying feeding initiation date.

Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If Step-Down Plan implementation results in elk winter mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years.

In the early years of Step-Down Plan implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management, feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date as the Step-Down Plan is implemented.

HARVEST/HUNTING

Few options for manipulating elk hunting are currently available because the Jackson elk herd is at or near the 11,000 WGFD objective. Proposed changes include allowing limited any elk permits; allowing a bow season near developments on the NER; delaying the elk hunting season to coincide with migration timing; and alternating open and closed areas to encourage animal movements or facilitate harvest.

Based on summer bull ratios in GRTE that were chronically below 35 bulls : 100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded hunting opportunities is considered.

The proportion of the Jackson Elk Herd that winters on NER has increased in the past 2 decades. This trend is correlated with a decline in elk use of native winter range and an increase in the proportion of NER elk that occupy winter ranges immediately adjacent to the Refuge. If efforts to encourage increased use of native winter range are unsuccessful, agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future Jackson elk herd population objective. This will provide a level of harvest flexibility more commensurate with addressing changes in herd distribution.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution or discouraging bison from attempting to leave the NER via the south boundary into the town of Jackson.

The effectiveness of NER late-season harvest regimes is influenced by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could help reduce winter elk numbers on the Refuge. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st.

PRIVATE LANDS MITIGATION

Several strategies would be employed to mitigate likely changes in bison and elk distribution, including providing incentives for non-breeding cattle operations, increased fencing in limited areas to separate elk and bison from livestock feed lines, hazing elk and bison away from livestock feed lines, and

purchasing private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal wildlife conflict technician positions supervised by WGFD.

VEGETATION RESTORATION

Various approaches to restore the Kelly Hayfields in GRTE (4,500 acres) were initiated in 2008. Work will likely be complete in 2035. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and providing visitor opportunities to enjoy wildlife viewing within a natural setting. The restoration process involves removal of non-native vegetation, collecting and propagating native seeds and plants, as well as the seeding of native plants.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres are currently under restoration treatment and 3,265 acres remain non-native pasture. Maintenance of restored ecological conditions will require management efforts in perpetuity to keep non-native species from colonizing restored areas. The park will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Strategies Considered but Rejected

Strategies considered but rejected include fertility control in elk and bison, agency reduction of either elk or bison, and altering rations of supplemental feed. These strategies were rejected because they were not included in the BEMP preferred alternative and/or because they were not supported by cooperating agencies.

Models and Monitoring

Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix C). Over time, this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

A robust monitoring program will be necessary to track the effects of actions implemented under this plan. Critical monitoring components will include: 1) enhanced forage production and availability sampling; 2) measuring animal abundance and distribution including differences in some sex and age classes; 3) determining elk and bison fed days each feeding season; 4) estimating winter mortality; 5) brucellosis seroprevalence rates; and 6) CWD surveillance. In many cases, attribute baselines for the period preceding implementation of this plan have been developed for comparison after the plan is implemented.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Actions completed each year, the results of monitoring programs, and any proposed changes in management direction will be presented in an annual Step-Down Plan update/report, completed by NER staff by the end of June.

Public Outreach / Education

De-emphasizing the supplemental feeding program will be a major paradigm shift especially for the residents of Jackson Hole and Teton County, but will also be of interest to others in Wyoming and across the nation

familiar with the long history of feeding elk on the National Elk Refuge. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the Step-Down Plan in order to gain general consent to modify longstanding elk and bison herd management methods. A detailed communication plan has been developed that identifies key messages and utilizes a variety of outreach methods, including print, video, and voice material, utilizing social media, and meetings with elected officials, state and local governments, agency and tribal partners, community organizations, stakeholders, and the general public.

Schedule

GPS collars were deployed on 30 adult cow elk in February 2016. Assuming adequate funding, additional GPS collars will be deployed in winter 2017. Public outreach, private lands conflict mitigation and contacts, and enhanced forage monitoring will occur in fall 2016 through January 2017. Reductions in feed season length will begin in winter 2017.

Introduction

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and NPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and NPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands. It included directives for forthcoming development of adaptive management practices to address several objectives in the plan, including a desired future condition of elk and bison relying predominantly on native forage. This Step-Down Plan has been developed expressly for that purpose.

Bison and Elk Populations

While Jackson Hole is probably best known for the splendor and ruggedness of the Teton Range, the Jackson bison and elk herds rank among the top characterizing features of the valley. Both figure prominently in Jackson Hole's history and culture, although bison were absent from the valley for about 100 years between the mid-1800s and mid-1900s.

The Jackson elk herd occupies approximately 8,000 km^2 in the upper Snake River watershed north of the town of Jackson (see Figure 1). Much of the herd is migratory, moving between distinct wintering and summer ranges. Primary wintering areas include the Buffalo Valley, lower elevations of the Gros Ventre River drainage, the NER, and areas adjacent to the NER on Bridger-Teton National Forest (BTNF) lands. Summering areas occur throughout the herd's range and for convenience are divided into five geographic regions that include GRTE, Yellowstone National Park (YNP), the Gros Ventre drainage, Teton Wilderness, and Southwest Boundary area, which includes private and public lands in the vicinity of GRTE's southwest boundary.

In the late 1800s, when elk populations all over North America were being hunted to near-extinction, the residents of Jackson Hole protected elk from "tusk hunters" and large-scale commercial hunting operations. Elk are just as important to today's residents of the valley. Thousands of people each year have the opportunity to see elk at close range on the refuge while riding on horse-drawn sleighs. Thousands of pounds of shed elk antlers are sold at an annual antler auction each spring in the town square. Elk are important to backcountry users as well as to people that never leave the road. Jackson Hole is a popular destination for instate and out-of-state elk hunters. The draw of elk to visitors contributes significantly to the local economy.

Winter feeding of elk in Jackson Hole began in 1910 and was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. According to historical reports, before Euro-American settlement some Jackson elk wintered in the southern portion of Jackson Hole (present location of the NER town of Jackson) and may have used areas outside Jackson Hole, including the Green River and Wind River basins to the south and east, respectively, and the Snake River basin to the southwest in what is now eastern Idaho (Allred 1950; Anderson 1958; Blair 1987; Barnes 1912; Sheldon 1927). Radio-collar studies have documented small numbers of Jackson elk wintering in each of these areas in recent times as well (NER and GRTE, unpublished data). Over time, changes in land use and development in these areas, over hunting, and establishment of feeding grounds probably reduced the use of these areas by Jackson elk.

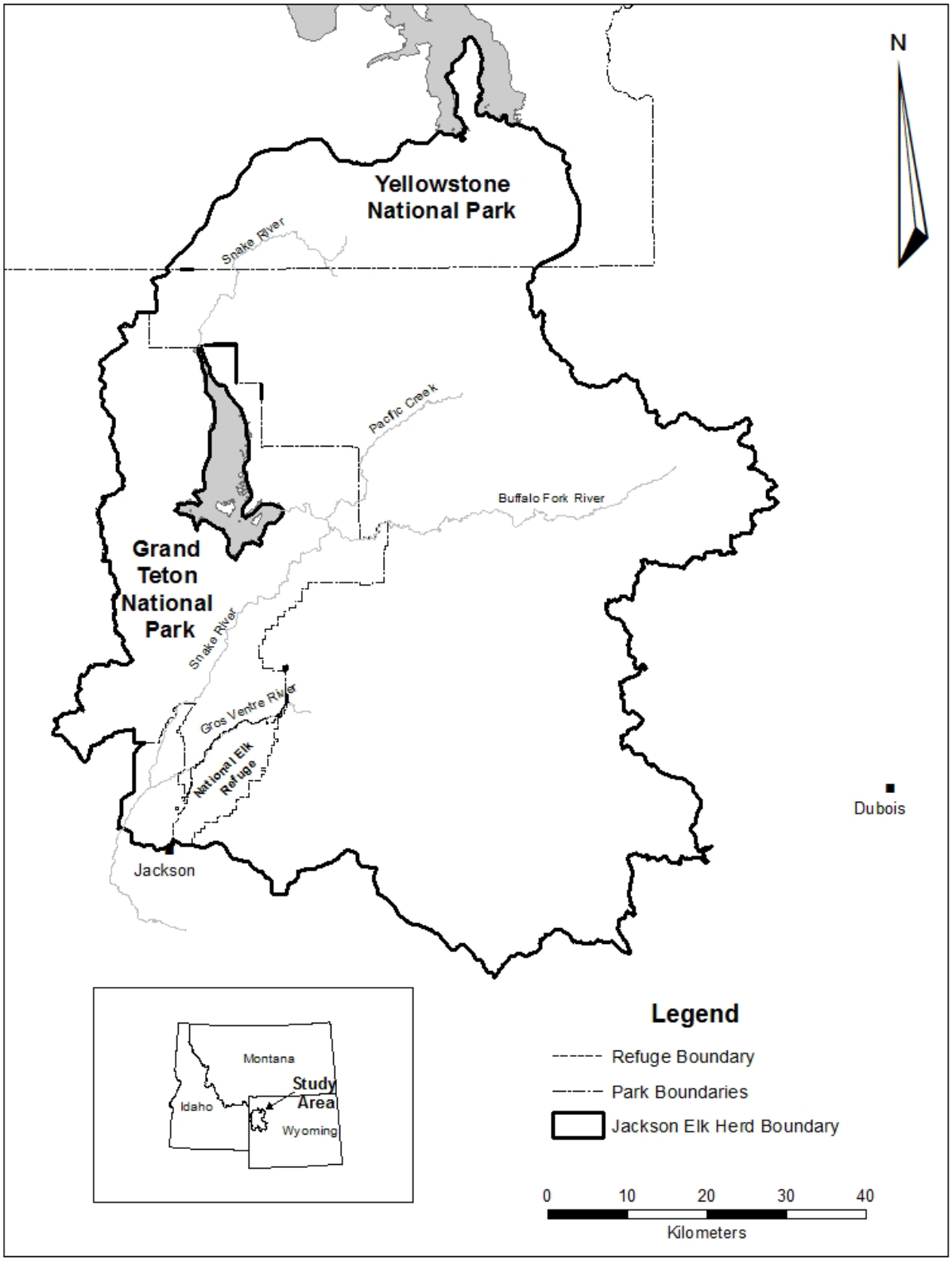


Figure 1. Jackson elk and bison herd ranges, including teh National Elk Refuge, Grand Teton and Yellowstone National Parks, and Bridger-Teton National Forest.

By the end of the 19th century, the Jackson elk herd was believed to be largely confined to Jackson Hole and the immediately surrounding area, where wintering conditions are often harsh. Significant numbers of elk died during several severe winters in the late 1800s and early 1900s> Primary reasons for these mortality events included the loss of available winter range in Jackson Hole from new ranching operations and an expansion of Jackson. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, appropriated $45,000 for the purchase of lands and maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first winter census in the area was conducted in 1912 and showed about 20,000 elk residing in Jackson Hole and the Hoback River drainage (the latter is not within the Jackson elk herd's range).

Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding. In recent times, the population has fluctuated near the herd objective of 11,000 that was adopted by the WGFD (see Figure 2).

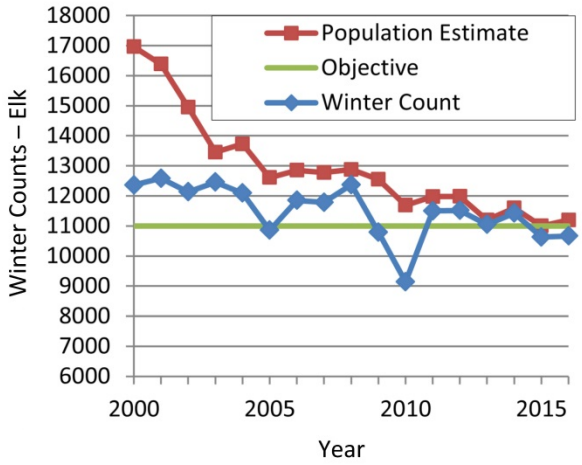


Figure 2. Winter Counts, population estimates, and herd objective for the Jackson elk herd, 2000-2016.

An iconic symbol of the American West, bison are also popular with visitors and residents. Because so few opportunities remain to see bison in the wild, viewing and photographing them in GRTE with the Teton Range in the background is a treasured opportunity for many of the valley's visitors. Similar to elk, there is also a high level of interest in bison hunting. Bison are of particular interest to nearby American Indian tribes and tribes in other parts of the United States because the animals are central to their culture and tradition.

Bison are native to Jackson Hole, as evidenced by the presence of prehistoric bison remains throughout the valley, but were hunted to near-extinction outside Yellowstone National Park by the mid-1880s. In 1948, 20 bison from YNP were reintroduced to the 1,500-acre Jackson Hole Wildlife Park near Moran. The Jackson Hole Wildlife Park was a private, non-profit organization sponsored by the New York Zoological Society, the Jackson Hole Preserve, Inc., and the WGFD. A population of 15–30 bison was maintained in a large enclosure there until 1963, when brucellosis was discovered in the herd (likely transferred with the original 20 animals from YNP). At that time, all the adult animals were destroyed, but four vaccinated yearlings and five vaccinated calves were retained. In 1964, twelve certified brucellosis free bison from Theodore Roosevelt National Park were added to the herd. In 1968, the herd (down to 11 animals) escaped the confines of the wildlife park, and a year later, the decision was made to allow them to range freely. The expansion of GRTE in 1950 had enveloped the Wildlife Park, and this allowed the bison to range freely and was consistent with National Park Service wildlife management policy. The herd remained small and wintered mostly in the Snake River bottoms in GRTE until 1975, when it followed the winter environmental gradient to the NER and began wintering there. The use of standing forage by bison on the NER was viewed as natural behavior thus acceptable to managers. In 1980, however, bison discovered and utilized supplemental feed provided to elk in winter, and they have continued to do so ever since.

The discovery of supplemental feed by bison has had several consequences, including a significant increase in the population's growth rate (see Figure 3). Bison on the elk feedlines have at times disrupted feeding operations and displaced and injured elk. To minimize conflicts between bison and elk, managers have provided separate feedlines for bison since 1984. As the population has grown, separating elk and bison on feedlines has become increasingly difficult, and a variety of feeding strategies are employed to help reduce displacement of elk.

As the herd has grown it has maintained stable movement patterns, wintering almost entirely on the NER and summering within GRTE and adjacent lands on the BTNF (see figure 1).

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands and thereby reducing availability of these habitats to other wildlife as well as unusually low winter mortality, which has affected predators and other species and has required intensive hunting programs.

PLANNING HISTORY

Jackson's bison and elk populations have been the subject of previous planning efforts. Elk management and research has been guided by the Jackson Hole Cooperative Elk Studies Group since it was established in 1958. The group consists of biologists and agency administrators from the NER, GRTE, YNP, BTNF, and WGFD, who meet at least annually to coordinate management of the population and its habitat. Coordination of bison management began soon after they started frequenting the NER in 1976 and using supplemental feed provided to elk in 1980 (Fig. 3). Release of an "Interim" plan that called for maintaining a herd of 90-110 bison while data were gathered for a long-term plan occurred in 1988. It was followed by implementation of a sport hunt outside GRTE, administered by WGFD. This plan was halted after litigation in which the plan's violation of NEPA was successfully argued by plaintiffs.

In 1996, after considerable herd growth, a new long-term management plan and environmental assessment for the Jackson bison herd was released (Fig 3). This plan had strong support and called for maintaining a herd size of 350-400 bison, but it was shelved a year later when plaintiffs from the earlier litigation successfully argued that, because the plan failed to consider the effects of feeding elk on bison management, it also violated NEPA and was not sufficient. This led to development of the draft bison and elk management plan and environmental impact statement from 2000-2006 and release of the final plan in 2007 (see Figure 3).

The 2007 Bison and Elk Management Plan (BEMP; USFWS 2007) considered six alternatives for bison and elk management focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The primary management scenarios presented in the alternatives included the status quo, terminating elk and bison hunting on the NER and the elk reduction program in GRTE, brucellosis vaccination options, restoring habitat, improving forage, and decreasing or phasing out supplemental winter feeding.

The final BEMP (USFWS 2007; www.fws.gov/bisonandelkplan) which set management direction for 15 years or until a subsequent plan is developed, proposed to maintain the state's elk herd objective of 11,000, establish a bison population objective of 500, restore habitat in the NER and GRTE, continue hunting bison and elk on the NER, continue the elk reduction program in GRTE in concert with the parks enabling legislation, allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available, and develop a dynamic framework of management actions which adaptively decrease the need for supplemental feeding on the NER.

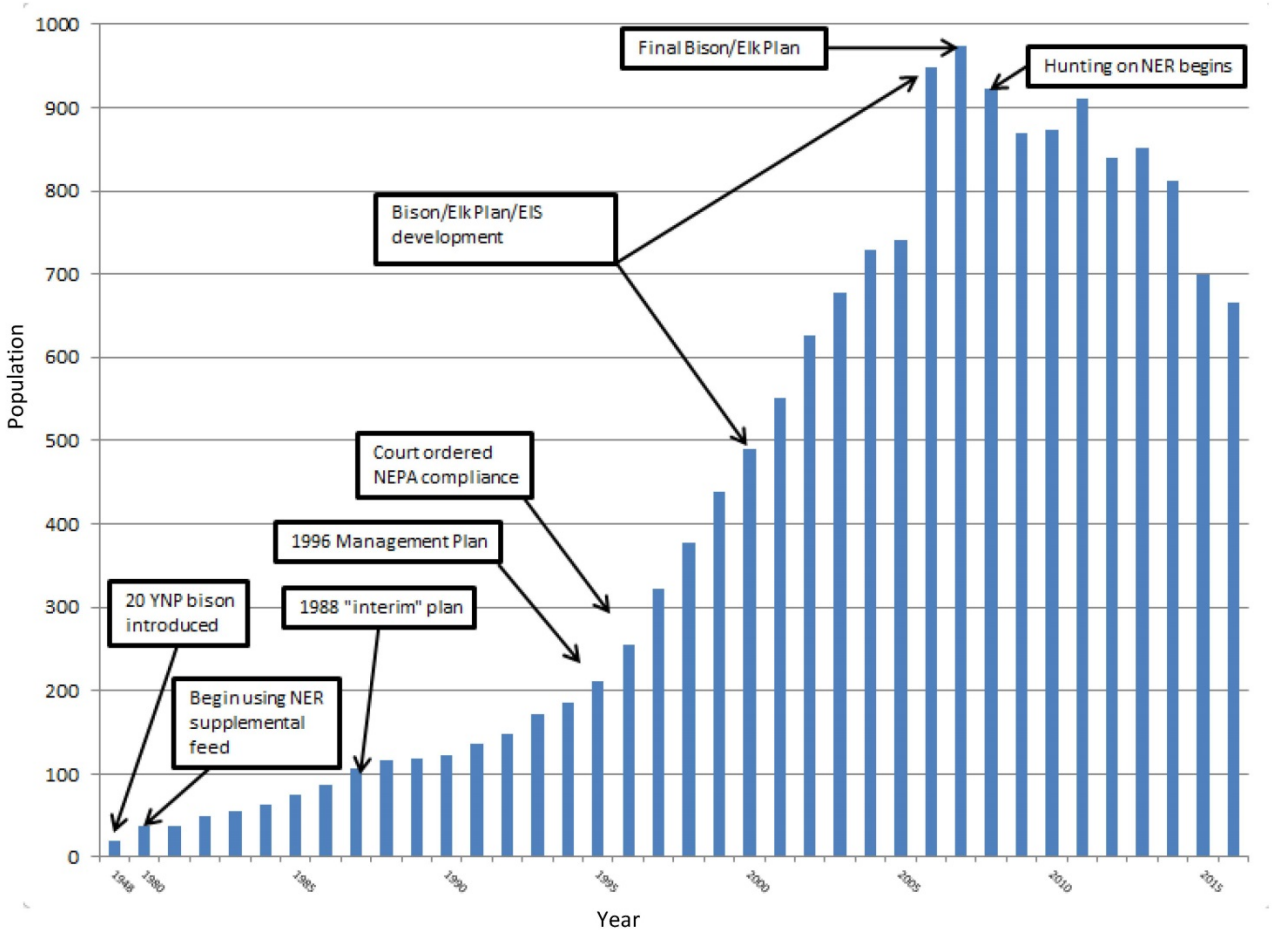


Figure 3. Population growth and planning history for the Jackson bison herd, 1948-2016

This Bison and Elk Management Step-Down Plan was developed to address the latter and specifically addresses the criteria for a structured framework listed on page 5 of the Record of Decision (see Figure 4). It does not address other on-going bison and elk management actions already prescribed by the BEMP.

The BEMP scheduled the completion of the Step-Down Plan for 2008. However, litigation challenging the BEMP in 2008 led to the decision to postpone its development until litigation was resolved. As of March 2015, two court rulings have upheld the 2007 BEMP and ROD. In a lawsuit against the BEMP and its author agencies (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2010), plaintiffs argued that the BEMP violated the National Wildlife Refuge System Improvement Act (National Wildlife Refuge System Improvement Act 1997) by disrupting the biological integrity of the Refuge, and that the plan and the accompanying EIS violated NEPA because they were insufficiently detailed to allow a reasonably complete discussion of mitigation. The crux of the plaintiff's argument was that the plan did not set a specific date for the cessation of supplemental feeding. In response, the agencies argued that the plan constituted a valid exercise of discretion and that it and the EIS were sufficiently detailed to satisfy the requirements of NEPA. In March 2010, the United States District Court for the District of Columbia sided in favor of the agencies in this case. In 2011, the plaintiffs appealed this ruling to the United States Court of Appeals for the District of Columbia Circuit. This Court affirmed the District Court ruling (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2011).

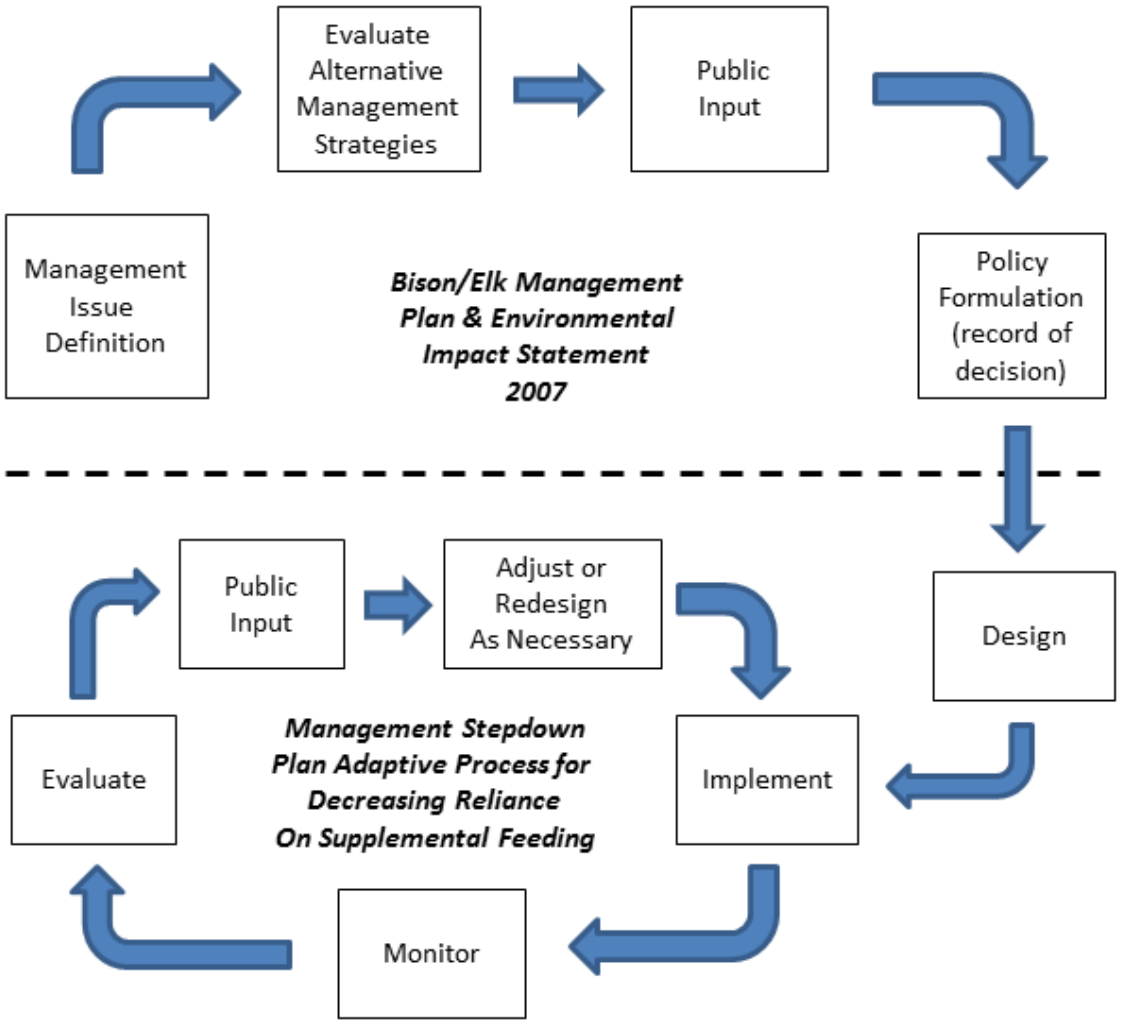


Figure 4. Step-down planning on the National Elk Refuge as it relates to the BEMP

National Environmental Protection Act Compliance

The 2007 BEMP/EIS and ROD satisfied NEPA requirements for current bison and elk management through a detailed analysis of alternative management actions and their likely effect on the environment, and substantial involvement of the public in the process. This step-down plan does not duplicate or add to this process. It is a tier of the BEMP to be used as a dynamic implementation guide to one part of the preferred alternative outlined in the BEMP ROD. As such, references to NEPA covered in the BEMP will be included where necessary in this document, and the discussion of any action that would require additional NEPA compliance will be explicitly stated as such in that context.

Step-Down Planning

The use of adaptive management plans has gained popularity in natural resource management planning because, by definition, they allow modifications of strategy based on

monitoring results and outcomes toward reaching specific goals or objectives. Four elements generally included in an adaptive management approach include:

1) well defined and mutually agreed upon objectives;
2) knowledge (including descriptive models) of the dynamics of the system being managed;
3) clearly articulated management actions and strategies; and
4) a monitoring program to evaluate responses of the system to management actions (Walters 1986).

This Step-Down Plan utilizes adaptive management planning principles but is not intended to include all of the adaptive management planning elements outlined in the Department of Interior Adaptive Management Technical Guide (2007). This Step-Down Plan is more accurately described as a "structured framework" of adaptive management actions that progressively transitions from supplemental winter feeding to greater reliance on freestanding forage (BEMP ROD p.5).

Table 1. 2007 Bison/Elk Management Plan Goals and Objectives
Goal: Habitat Conservation
Objectives:
• Conserve important private lands. • Increase forage production. • Minimize non-native plants. • Protect sagebrush grasslands. • Restore willow, aspen, and cottonwood. • Perpetuate natural mosaic of plant communities.
Goal: Sustainable Populations
Objectives (BEMP pages 135-136):
• Develop structured framework for reducing NER supplemental feeding.* • Phase reduction of animals on feed: 1) to 5,000 elk and 500 bison, and 2) elk and bison rely predominantly on native habitat.* • Maintain 35:100bull-to-cow ratios in park summer elk herd.* • Ensure a genetically viable bison herd with close to an even sex ratio. • Enhance public outreach/education.*
Goal: Elk and Bison Numbers
Objectives:
• Maintain state elk herd objective of 11,000. • Maintain a genetically viable bison population of about 500 animals.
Goal: Disease Management
Objectives:
• Manage brucellosis transmission risk from elk and bison to livestock. • Manage feeding to reduce brucellosis transmission among bison and elk. • Educate hunters about wildlife disease human health hazards.
Note: * Step-down plan objective

Objectives

The management direction and desired conditions stated in the BEMP called for the NER and GRTE staffs to work with others (agencies, partners, etc.) to "adaptively manage elk and bison in a manner that contributes to the State's herd objectives yet allows for the biotic integrity and environmental health of the resources to be sustained," so that the public can enjoy a variety of compatible wildlife-dependent recreational opportunities. Under the BEMP's four primary goals, 20 associated objectives were identified (see table 1). This Step-Down Plan addresses four objectives under the goal of sustainable populations (see Figure 5).

The reduction of animals on feed at the NER was proposed to be spread over two phases. In Phase 1, the aim is to reduce the average number of elk on feed to 5,000 (while maintaining WGFD's 11,000 elk herd objective), and reduce the winter population of bison to the BEMP recommended, and WGFD adopted, objective of 500. In Phase 2, the overall objective is to reduce the reliance of bison and elk on supplemental feed (USFWS and NPS 2007a). Desired conditions include animals relying predominantly on native habitat and cultivated forage on NER. Important consideration criteria for implementing Phase 2 will include: 1) the level of forage production and availability on the NER and adjacent winter ranges; 2) maintenance of desired herd sizes and age/sex ratios; 3) the ability to effectively mitigate bison and elk livestock conflicts; such as co-mingling on private lands during high risk disease transmission periods; 4) maintaining desirable winter distribution patterns of elk and bison; 5) the prevalence of brucellosis, chronic wasting disease, and other wildlife diseases; and 6) public support. In short, the overall objective of this plan is to outline a framework for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on freestanding forage, while maintaining population and herd ratio objectives.

This Plan focuses on management actions to achieve Phase 1 objectives. However, if successful, these actions will continue to be used to achieve the Phase 2 objective of reducing reliance on supplemental feeding while considering the six criteria listed above.

Management Actions and Strategies

Background

The principal goal of reducing reliance on supplemental feeding is to limit transmission of density dependent diseases in elk and bison while simultaneously minimizing winter mortality in elk. We will attempt to achieve this goal by experimentally reducing feed season length and closely monitoring elk and bison distribution and winter mortality.

Elk have been fed on the NER each year in all but 9 winters since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during winter months is powerful to both species, and their knowledge of NER feeding grounds has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Because use of feeding grounds is a learned behavior, decreasing feed season length will potentially reduce the likelihood of elk that winter on native range finding NER feeding grounds. Over time, this could result in a greater percentage of elk using native winter range

relative to NER feeding grounds. Because it is largely unprecedented,

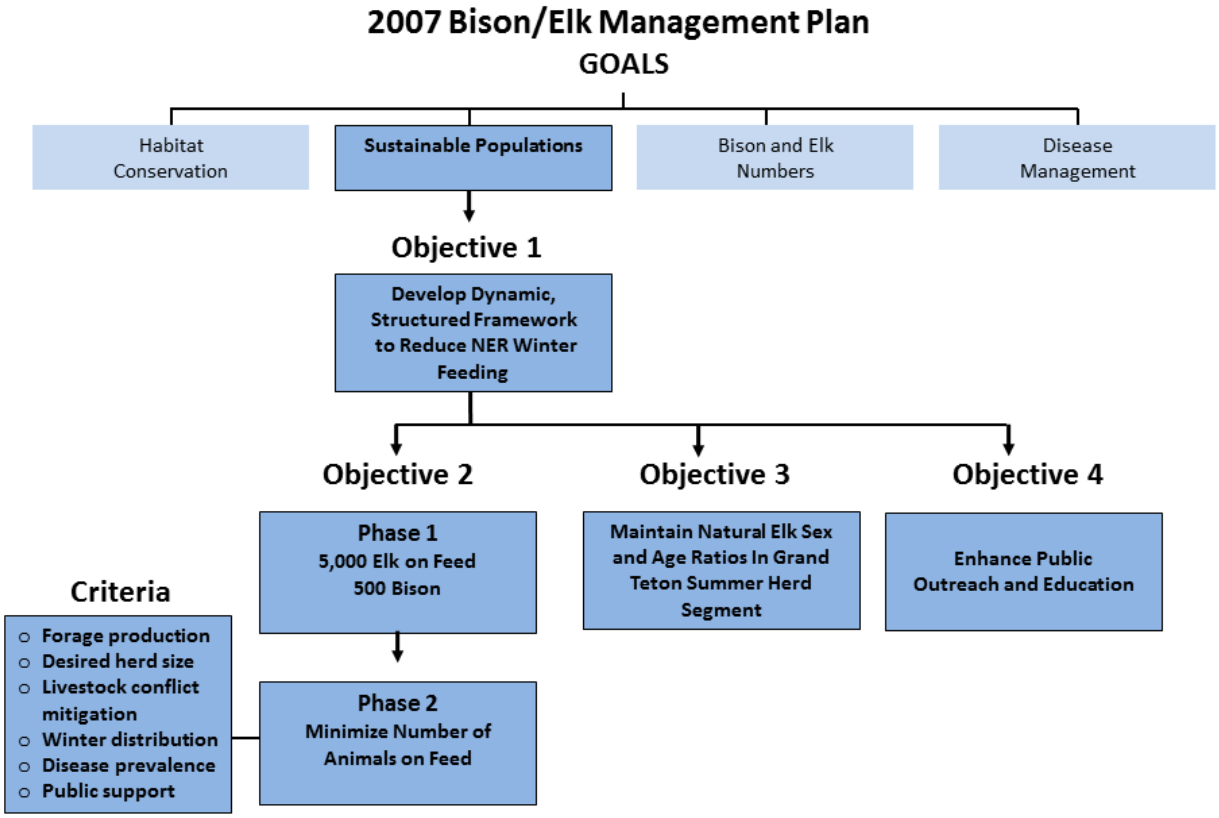


Figure 5. Relationship of the Step-Down Plan to the BEMP goals, phasing of objectives, and consideration criteria for Phase 2

the concept of modifying this behavior on such a large scale is daunting and poses questions for which there are no immediate answers. In some cases, the likelihood a specific management strategy's success will only be able to be roughly estimated, and unanticipated results are likely. Closely monitoring forage availability, elk and bison distribution, and elk mortality will allow us to evaluate the effectiveness of management actions and adjust management actions as needed should unintended negative consequences arise.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with landowners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into three broad categories: 1) timing and duration of winter feeding, 2) timing and intensity of hunting, and 3) overall and herd segment specific harvest levels.

Important Changes Since 2007

The BEMP was developed based on data collected and knowledge that existed up until its ROD. Since then, important changes have taken place, some of which are advantageous to this effort and some of which are not.

A primary change that will facilitate meeting objectives under this plan is the reduction of the bison population from nearly 1,200 animals in 2007 to about 675 during winter 2015-2016 (Fig. 3) through hunting programs administered by WGFD. Licensing changes enacted in 2014 included a reduction in the bison cow/calf license fee (from $416 to $263 for residents and $2522 to $1022 for non-residents) and eliminating the once-in-a-

lifetime restriction on a successful bison hunter to only those that successfully harvested a bull. Continued progress toward the 500 animal herd objective will require sustained harvest success.

During the same period, the Jackson Elk Herd has declined from nearly 13,000 to its objective of 11,000, but because the proportion of the Jackson elk herd that winters on NER has increased dramatically (see figure 6), this will make achieving the Phase I objective of 5,000 elk on feed and any future elk population reductions more difficult.

Frequently Asked Question

Question:

The BEMP has an objective of 5,000 elk wintering on NER. Why has that objective not been achieved through increased elk harvest/hunting?

Response

The overall Jackson Elk Herd population has declined and is currently close to the 11,000 elk objective, but the number of elk wintering on NER has been well above the 5,000 elk objective since implementation of the BEMP in 2007 (Mean =7,100 elk). When the analysis was conducted for the BEMP, elk winter distribution data suggested that 5,000 elk could winter on NER while still maintaining 11,000 elk in the Jackson Elk Herd overall. However, the proportion of the Jackson Elk Herd that winters on NER has increased significantly over time, and based on current elk distribution it is no longer possible to winter 5,000 elk on NER and maintain 11,000 elk in the overall Jackson Elk Herd. Although increasing elk harvest above current levels would likely allow us to achieve the 5,000 elk objective for NER, it would also reduce the overall Jackson Elk Herd population below the 11,000 objective. If increasing elk harvest is not plausible, the only other option to meet the 5,000 elk objective on NER is to change winter elk distribution, which is the principal strategy of the Step-down plan.

Preliminary analysis suggests that the increasing proportion of the Jackson elk herd wintering on NER has been associated with 1) Declines in elk use of native winter range and movements of elk from State feed-grounds in the Gros Ventre drainage to NER, and 2) increasing numbers of elk that summer immediately adjacent to NER (Cole and Foley et al. 2015).

Refuge-wide herbaceous forage production averaged 14,387 (SD = 4,125) tons during 1998–2013. In recent years, irrigation of approximately 3,600 acres has increased refuge-wide forage production by approximately 10% compared to what would have been produced with precipitation alone, and by 15% in the southern portion of NER that receives the greatest use by elk and bison.

Since 2007, the general awareness of climate change among the public has greatly increased. A strong, credible body of scientific evidence shows that climate change is occurring, is caused largely by human activities, and poses significant risks for a

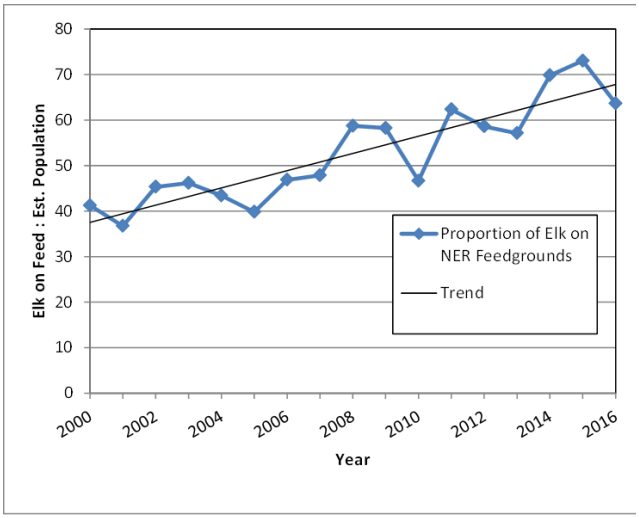


Figure 6. Trend of National Elk Refuge elk on supplemental feed as a proportion of the Jackson elk herd

broad range of human and natural systems (National Academy of Science 2010). Ecological systems in the GYE are likely to be affected and associated changes may have implications for elk and bison management. Moderate to long-term effects of climate change in Jackson Hole will likely include increases in average temperature, a reduction in the duration and distribution of snow cover, an increase in the number of frost free days, increased wildfire frequency, and changes in plant community composition and structure including loss of forest and shrub cover and an increase in invasive plants (Riginos and Newcomb 2015). The net effect of these changes relative to the

implementation of the Step-Down Plan remains uncertain.

CURRENT MANAGEMENT

Ongoing primary management actions on the NER include winter feeding, harvest, irrigation, and hazing. In GRTE, harvest of elk during the Elk Reduction Program takes place, when necessary, in collaboration with WGFD, and restoration of previously cultivated and irrigated sagebrush-grasslands is ongoing. Fundamental components of each of these will be briefly described below to provide a basis for comparison to Step-Down Plan strategies that will follow.

CHRONIC WASTING DISEASE

Supplemental feeding has occurred in all but 9 winters on NER since 1912, and although this strategy minimizes winter elk mortality from starvation, contributes to Wyoming state elk herd objectives, eliminates commingling with livestock, and keep elk off adjacent roadways, elk occur at numbers and densities well in excess of carrying capacity (Smith et al. 2004, Lubow and Smith 2004). Considerable evidence suggests that Chronic Wasting Disease (CWD) transmission and prevalence are density dependent (Peters et al. 2000, Williams et al. 2002). Monello et al. (2014) found that elk densities of 15-110/km2 (0.06 to 0.45/ac) in Rocky Mountain National Park were associated with 13% CWD prevalence, and they predicted elk population declines when CWD prevalence exceeded 13%. NER elk densities range from 77-16,850/km2 (0.31-68/ac; NER unpublished data), which suggests that the introduction of CWD to NER elk would have significant negative population effects over time.

WINTER FEEDING

Initiation of feeding has the primary objectives of 1) minimizing elk winter mortality, focusing on calves since they are the most susceptible age class, and 2) minimizing comingling of elk with cattle on nearby adjacent private lands. Winter feeding begins when available forage reaches approximately 300 lbs./ac. Historic radio telemetry data and observations of elk movements indicate that when available forage declines below 300 lbs./ac., some elk leave NER for surrounding private lands. Therefore, the purpose of this feeding "trigger" is to keep elk on the NER and prevent them from searching for forage off the NER, which would increase the potential of comingling with cattle causing damage to private lands, and moving across Highway 89 where the risk of vehicles hitting elk is high. This trigger is not a warning that a significant nutritional deficit threshold has been reached. Available winter forage for elk and bison on the NER is determined by biomass of forage produced during the previous growing season, rate of forage consumption during fall and winter, and snow conditions.

Index sites are used to sample forage biomass and determine when feeding should be initiated. These sites are selected annually to represent plant communities that are highly preferred by elk due to plant species composition and the persistence of green vegetation. Weekly sampling begins in late December to estimate available forage biomass at each index site. When average available forage across index sites is below 300 lbs./ac, biologists typically recommend that supplemental feeding be initiated.

During 1995–2013, the average initiation of winter feeding in NER occurred 28 January (range = 30 December–28 February), and feeding was terminated on 3 April (range = 20 March–20 April). Variation in feeding initiation and termination dates has been based on winter conditions and a desire to avoid elk-cattle comingling on nearby private lands. Coordination of winter feeding dates on the NER and WGFD-operated Gros Ventre drainage feeding grounds (Alkali, Patrol Cabin, and Fish Creek) occurs annually to help minimize movement of elk between these areas. This coordination will continue regardless of the management strategy employed. The relationship of recent elk numbers and objectives for NER and WGFD-operated feeding grounds and native range is shown in Table 2.

Table 2. Annual distribution of wintering elk from the Jackson elk herd during February classification counts relative to the current objective, 2011-2016

	Objective	2011	2012	2013	2014	2015	2016	Mean
NER	5,000	7,746	7,360	6,285	8,296	8,390	7,290	7,561
Gros Ventre	3,500	2,775	3,265	2,982	2,326	1,162	1,667	2,362
Native Range[1]	2,500	982	894	1,784	801	913	1,711	1,180
Total	11,000	11,503	11,519	11,051	11,423	10,465	10,668	11,105

[1]Excludes objectives for native range adjacent to Gros Ventre feeding grounds.

Bison discovered refuge feeding operations in 1980, and since that time, they have been fed each year to help minimize disruption to elk feeding operations. Because bison displace elk from feedlines, NER staff attempt to feed most bison in the northernmost refuge feeding ground and provide a heavy feed ration, which helps keep them in this area. This strategy prevents bison from mingling with elk and prevents bison from moving to areas where conflicts with humans are more likely.

HARVEST

Total hunter harvest of the Jackson elk herd was gradually reduced over the last decade as the population neared objective (see Figure 7). Elk hunting on the NER (Hunt Area 77) typically begins in mid-October and ends in mid-December, with peak harvest in recent years occurring in late November to early December. From 2005 to 2015, 422 ± 102 (mean ± SD, range = 329-612) hunters harvested 196 ± 95 (range = 126-457) elk per year during the NER hunt.

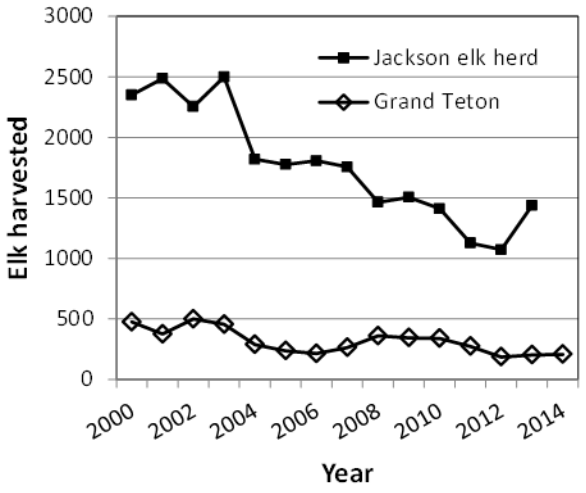


Figure 7. Estimated elk harvests for the whole Jackson elk herd and the portion that occurs in Grand Teton National Park, 2000-2014

The 1950 legislation that created GRTE provided for a controlled reduction of elk, when necessary, in specific portions of the park, primarily east of the Snake River. Elk reduction programs have taken place in the park each year since 1950 except two (1959 and 1960), when GRTE and WGFD officials agreed a reduction was not necessary (Figure 8). Season dates have varied over the years but recently have run from mid-October to early-December. The GRTE harvest accounts for about 25% of the Jackson elk herd overall harvest, thus has been an important factor in regulating the population. Increased predation, likely a result of increases in grizzly bears and wolves over the last 20 years, has decreased the need for large harvests in GRTE.

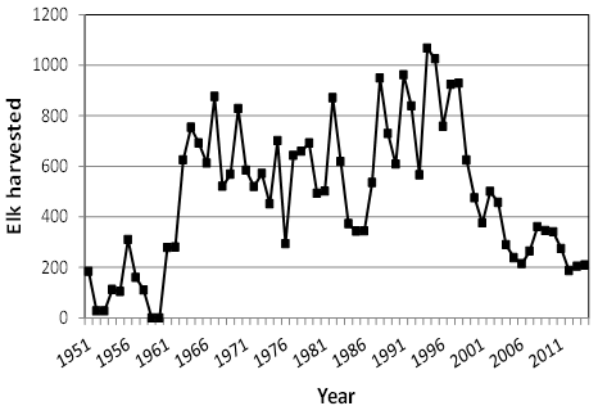


Figure 8. Elk harvest in Grand Teton National Park, 1950-2015

Bison hunting begins 15 August and ends in early to mid-January. Most harvest occurs on the NER, with some additional harvest on private and BTNF lands. Since resuming the bison hunt in 2007, harvest has been 210 ± 45.5 (range 139-301) bison per year. This level of

harvest has been sufficient to arrest the exponential growth of the population; reducing bison numbers from the peak in 2007 to about 700 animals in winter 2015 (see Figure 3). Tribal bison harvest of up to five animals for ceremonial purposes was authorized in the BEMP. Translocation of wild bison to lands outside of Teton County is not currently permitted due to brucellosis concerns.

Bison hunting is not allowed in GRTE because of long-standing NPS policy that prohibits most hunting in national parks. Bison quickly learned to take advantage of the safety of GRTE, which has made hunter harvest goals difficult to achieve. Many bison stay in GRTE during the hunting season, with only occasional short-term movements to the NER, until severe winter conditions occur. In response, NER and WGFD managers have attempted to extend the hunt to late January while minimizing the conflict with the initiation of winter feeding. The unpredictable nature of winter conditions that time of year makes this challenging, and has (or could) result in the use of emergency season extensions or reductions.

HAZING

NER staff haze elk and bison to conserve winter forage, prevent year-round use of winter range, and in some cases to prevent elk and bison from moving to private lands or other areas where conflicts with humans are likely. Hazing using ATVs has proven most effective. The strategy is typically employed during 3 time periods: 1) in May to move elk and bison off NER that are lingering on NER winter range; 2) in July when some bison typically return to NER; and 3) in the period just prior to feeding initiation when elk and bison are most likely to leave NER for private lands. Hazing of elk and bison by WGFD staff also occurs on private lands adjacent to NER periodically throughout the year.

VEGETATION RESTORATION AND PROTECTION

The BEMP identified approximately 4,500 acres of previously irrigated and cultivated grasslands in GRTE in need of restoration to native sagebrush grasslands community. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. After 2 years of research and field studies, restoration efforts began in 2008. The restoration process involves several steps including removal of non-native vegetation through repeated herbicide applications, collection, and propagation of native grass, forb and shrub seeds, and finally native seeding. Repeated herbicide treatments have been warranted prior to native seed planting as well as spot treatments of invasive weed species subsequent to native seeding. Substantial progress in this endeavor has been made since 2008, including 1,235 acres of previously cultivated lands under restoration treatment. Of the 1,235 acres undergoing treatment, 745 acres has been seeded with native grass, shrub, and select forb mixes, and 89 acres is considered fully restored. Two-hundred and seventy-five of these acres are currently fenced to reduce grazing pressure of early native vegetation establishment from bison and other ungulates. An additional 490 acres are targeted for native seeding in 2016 once removal of the invasive vegetation is successful. All treatments are monitored for native plant establishment and invasive plant infestations and treatments will be adjusted as necessary. Invasive plant treatments may have to continue indefinitely. GRTE will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

PRIVATE LANDS MITIGATION

Fencing of haystacks and livestock feedlines has been historically used to mitigate particularly difficult conflicts on private lands. Targeted fencing of golf course greens and sand traps fall through spring has also been successful in some situations for mitigating elk and bison presence and associated damage in these areas. It is important to note that the county has a “wildlife-friendly” fence policy and

does not support extensive fencing that is impermeable to wildlife in residential areas.

COMMON METHODS, ASSUMPTIONS, AND CONSTRAINTS

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes, particularly population sizes. Measurements of the Jackson bison herd will be based on the annual mid-winter census and sex and age classification survey performed by NER, GRTE, and WGFD biologists. This survey occurs one day in February and includes ground counts of animals on feed at the NER and aerial counts of outlying bison across their winter ranges on the refuge, park, and Bridger-Teton National Forest.

Elk population estimates will also be based on mid-winter aerial and ground counts. However, the mid-winter counts are undertaken during a single survey period and do not necessarily represent either peak or cumulative abundance of elk on feed. Rather than basing progress toward the number of elk on feed for the entire season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 elk were fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000.

We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both species on supplemental winter-feeding.

Initial success of the Step-Down Plan will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP does not provide specific measurement criteria to determine when the NER has successfully attained the objective of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage", we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. This level was chosen to define success because it indicates that elk and bison will predominately be foraging on freestanding natural and cultivated plants on NER and adjacent winter ranges rather than on supplemental feed.

Several management constraints are common to the strategies discussed below (Table 3). Many law and policy constraints are applicable but we include here only those most pertinent. Endangered Species Act (16 USC 1531 et seq.) requirements for wolves, grizzly bears, lynx, and others apply. Lynx requirements for maintaining certain habitat types could limit methods used and areas considered for habitat improvements in GRTE and the BTNF. Such improvements could increase elk and bison use of native winter range off the Refuge while simultaneously reducing use of feedlines. Similarly, compliance with the 2015 sage grouse amendment to the 1990 Bridger-Teton National Forest Land and Resource Management Plan and the Wyoming greater sage-grouse core area protection executive order (2011-5 and supplement 2013-3) could affect habitat manipulations. NEPA compliance conducted as part of the BEMP/EIS constrains what federal actions can be taken as a part of this plan. State regulations constrain late (winter) hunt and carcass disposal timing to protect against brucellosis contamination, since February-April represent the period bison and elk are most likely to transmit the disease. Restrictions on hunting timing also result from BTNF winter range closures, immediately east of the NER and elsewhere, December 1 to April 30. Additional details about these and other constraints will be included in discussions about specific strategies that follow.

Table 3. Summary of potential step-down plan constraints

Policy

- ESA[1] Lynx – limits on habitat impacts
- Greater Sage Grouse – core area protection
- 2007 BEMP/EIS (federal actions/lands)
    - No fertility control
    - No test and slaughter
    - Limited tribal ceremonial take
- Bison/elk hunt end date (Feb. 1st)
    - WGFD, brucellosis safety
- Carcass disposal (Feb. 15th)
    - WGFD, brucellosis safety
- Forest Service winter closure (Dec. 1st – April 30th)
- Easement limitation (NER boundary)

Winter Feeding

- Only during non-hunting periods

Harvest

- State regulations

Vegetation Restoration/Protection

- Bison/elk distribution
- Exotic plant species management

Private Lands

- Owner agreements

Social

- Hunter density (safety; hunt quality)
- Elk/bison winter mortality levels
- Public safety (ungulate/vehicle collisions)
- Disease
- Land-use conflicts (agricultural and residential)

Biological

- Disease (bison/elk/cattle commingling)
- Sage grouse habitat conflicts
- Fencing/wildlife conflicts
- Elk herd distribution
    - summer segment distribution goals

Funding

- Easement purchase
- Plan implementation

[1]Endangered Species Act

Strategies

This section describes the management action this Step-Down Plan proposes to implement. As such, it unveils the heart of management changes proposed to begin the process of transitioning to greater reliance of bison and elk on native forage during winter. Fundamentally, the strategies discussed in this plan represent an experiment designed to achieve Phase I objectives of 5,000 elk and 500 bison on NER and are a first step towards reducing reliance on supplemental feeding while meeting the sustainable population goals identified in the BEMP.

Initial strategies for achieving sustainable population goals identified in the BEMP (Table 1) are presented by the objectives below. The primary management actions available to the agencies to achieve Phase I objectives are modifications to winter feeding and hunting seasons. To a lesser extent, vegetation protection and restoration can be important, particularly for improving long-term ecological function and enhancing natural production of native forage. Private lands are also an integral component as changes in elk and bison distribution occur and new challenges develop. The likely consequences of implementing these strategies were evaluated in the BEMP. The most relevant of these are summarized in Appendix A.

OBJECTIVE

1) Implement a phased reduction of animals on NER feed to 5,000 elk and 500 bison, and,
2) influence elk and bison to rely predominantly on native habitat (Table 1).

The first phase will be to reduce the number of elk on NER feed to approximately 5,000 and achieve a target population of about 500 bison. The second phase will be to manage bison and elk populations to achieve desired conditions, with animals relying predominately on available native habitat (NER, GRTE, and USFS lands) and cultivated forage (NER).

As previously mentioned, reducing winter feeding after more than 100 years of the practice; and the associated behavioral conditioning of elk and bison to its presence; represents a formidable challenge that must be approached cautiously and systematically. Efforts to scale back elk supplemental feeding operations in other parts of North America have been rare and fraught with controversy (Smith 2001). The strategies discussed below have been developed in this context, with appropriate feedback mechanisms through rigorous monitoring and frequent evaluation. Inability to meet this objective under the strategies presented here would trigger a thorough evaluation and consideration of more aggressive strategies when the BEMP is updated in 2022.

Chronic Wasting Disease

Since 1997, NER has cooperated with WGFD to conduct intensive surveillance for CWD in the JACKSON ELK HERD unit. GRTE has also collaborated with WGFD to collect samples from the ERP and from road-killed cervids. Although this effort indicates that CWD is not currently found in the Jackson elk herd, continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence annually will be critical to ensure a timely management response and limit the long-term population effects of the [USFWS and NPS, 2007b]. Given that CWD has been detected within 40 miles of the Jackson elk herd in moose, within 35 miles in deer, and within 175 miles in elk, this level of surveillance is warranted.

In 2016, the WGFD cooperated with federal agencies and other stakeholders to revise the 2006 Wyoming CWD Management Plan. The NER and USFWS Region 6 Wildlife Health Office staff participated in several meetings associated with this effort. The Wyoming CWD Plan lists several management responses for consideration if CWD is detected on or adjacent to State or NER elk feeding grounds. Early detection of CWD in the Jackson elk herd is essential to allow implementation of management responses.

The BEMP (2007) identifies the management response to the arrival of CWD as

following the State of Wyoming CWD Plan in effect in 2007. The Wyoming CWD Plan was updated and significantly changed in 2016. In light of changes in the Wyoming State CWD Plan, and the results of CWD Studies completed since 2007, the NER management response to CWD will be reviewed and updated in a NER Disease Contingency Plan, as identified in the NER Comprehensive Conservation Plan (2016). The CWD section of the NER Disease Contingency Plan will remain consistent with the goals of the BEMP. The NER Disease Contingency Plan is scheduled to be completed in 2017.

Winter Feeding

Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the end, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning animals to "expect" feed to be available later in the winter; this could build cohorts of animals that rely primarily on native winter range. To reduce supplemental feeding, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, which is the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding (Figure 9) and identify private land conflict areas that may require assistance with focused mitigation measures.

As bison and elk behavioral responses are better understood, and targeted mitigation on private lands is achieved as needed, feeding delays will be extended depending on several variables (see Table 4, Figure 10). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the Step-Down Plan, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence on feeding initiation date, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Forage availability would also be affected by the numbers of elk and bison on the NER. Finally, the distribution of animals, particularly on private, livestock producing lands would be considered in determining feeding initiation date.

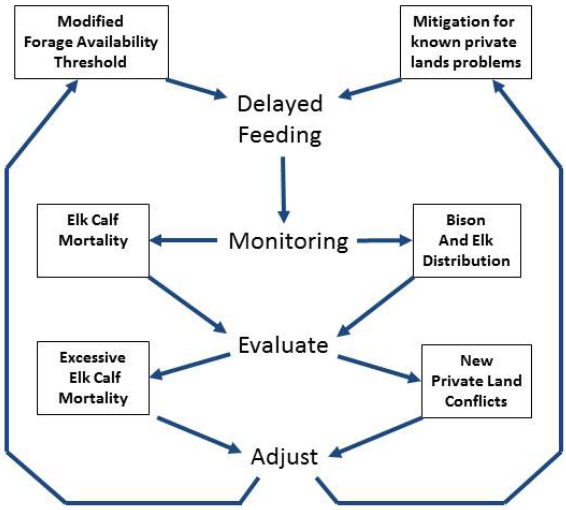


Figure 9. Framework for delayed feeding strategy under the step-down plan

Frequently Asked Question

Question:

Why is your principal strategy to delay the start of the feed season?

Response:

By delaying the start of the supplemental feed season, we decrease the probability that elk that use native winter range or state feeding grounds will discover NER feeding grounds. Because elk use of feeding grounds is a learned behavior, over time this could increase the proportion of elk that winter on native winter range, reduce the number of elk that move from the Gros Ventre drainage to NER, and decrease the NER wintering elk population. The resulting shift in elk distribution would allow us to achieve the 5,000 elk objective for NER. Because 5,000 elk and 500 bison is close to the estimated carrying capacity of NER habitat, less feeding will be necessary at these population levels.

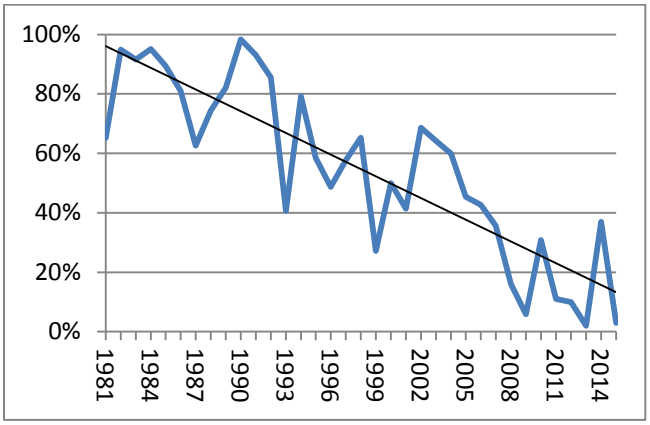


Figure 10. The percentage of elk that wintered on NER as of December 1; showing a progressively later annual fall/winter arrival over the past several decades

A primary concern of manipulating feeding is elk winter mortality, particularly among calves. For example, research on unfed elk populations in Yellowstone National Park suggested an average elk calf winter mortality of 28%, with the majority of cases caused by malnutrition (Singer et al. 1997). Similarly, Smith and Anderson (1998) found unfed winter elk calf mortality of 29% compared to 11% for elk calves using feeding grounds. As food becomes limited in winter, calves are usually the first to experience nutritional deficit and winter mortality because they are displaced by animals that are more dominant, they have limited fat reserves, and are more susceptible to cold temperatures than larger animals. Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If Step-Down Plan implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years (Appendix A).

In the early years of Step-Down Plan implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management, feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date during the period of Step-Down Plan implementation.

The Step-Down Plan winter feeding strategy would include the establishment of additional key forage index sites and on-going measurements at those sites throughout the winter.

Harvest

Currently the Jackson elk herd is at the Wyoming Game and Fish Commission established objective of 11,000 animals, which means there is less flexibility in manipulation of harvest regimes than there would be if the herd was above objective. Initially there would be little change in elk harvest programs on the NER, with the exception of allowing a limited number of any elk permits throughout the season, considering allowing bow hunting near developed areas (roads and buildings) and shifting the season about a week later (Table 4). Allowing a limited number of any elk permits would be consistent with providing sport hunting recreation on National Wildlife Refuges (NWRS Improvement Act; 1997) and the NER CCP [USFWS, 2015] and possibly encourage more hunters to participate in antlerless elk hunts. Monitoring programs and consideration of bull ratios in the GRTE summer segment (since most park bulls migrate to the NER) would help inform levels of proposed take. Bow hunting in areas currently closed to firearms will likely increase harvest by eliminating "no-hunt" areas, which can become sanctuaries for large numbers of elk. Shifting the hunt one week later is consistent with later migrations and will improve harvest effectiveness (see Figure 10).

General elk harvest patterns in GRTE would continue to be based on need for harvest, summer segment population estimates, herd status relative to population objective, herd demographic parameters, herd-wide distribution of harvest, and mitigation for impacts on other resources and visitor activities.

Elk herd population objectives are reviewed every five years by the Wyoming Game and Fish Commission and adjusted as necessary. Agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future Jackson elk herd population objective. Lowering the population would help compensate for reduced use of traditional native winter range and increased growth of short-distance migrants, which has led to significant increases of winter elk concentrations on the NER.

The annual fall/winter arrival of elk to the NER during the past several decades has been occurring progressively later. This trend may necessitate extending the elk-hunting season later into the year to achieve harvest objectives.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later end dates that are commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution. Special limited hunts designed to discourage bison from attempting to leave the NER via the south boundary into the town of Jackson will also be considered. If progress toward reaching the herd objective of 500 animals continues and the objective is reached, WGFD will adjust harvest quotas in the context of the objective, as necessary, to address population changes through time.

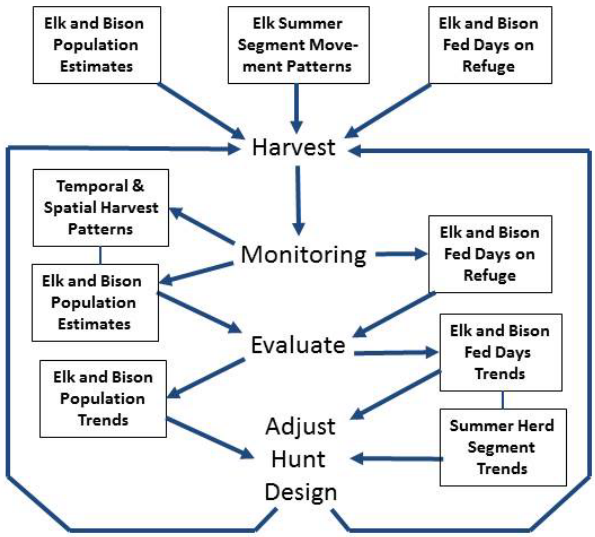


Figure 11. Framework for harvest strategy under the step-down plan

A cattle guard was installed on the Refuge Road near the east end of Broadway Avenue to help prevent bison and elk herds from entering the Town of Jackson. This will reduce the potential for dangerous human/wildlife interactions.

Currently, the effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives, but also that elk are sensitive to hunting pressure that can cause elk movements to areas that cause management issues for WGFD. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1 in the future.

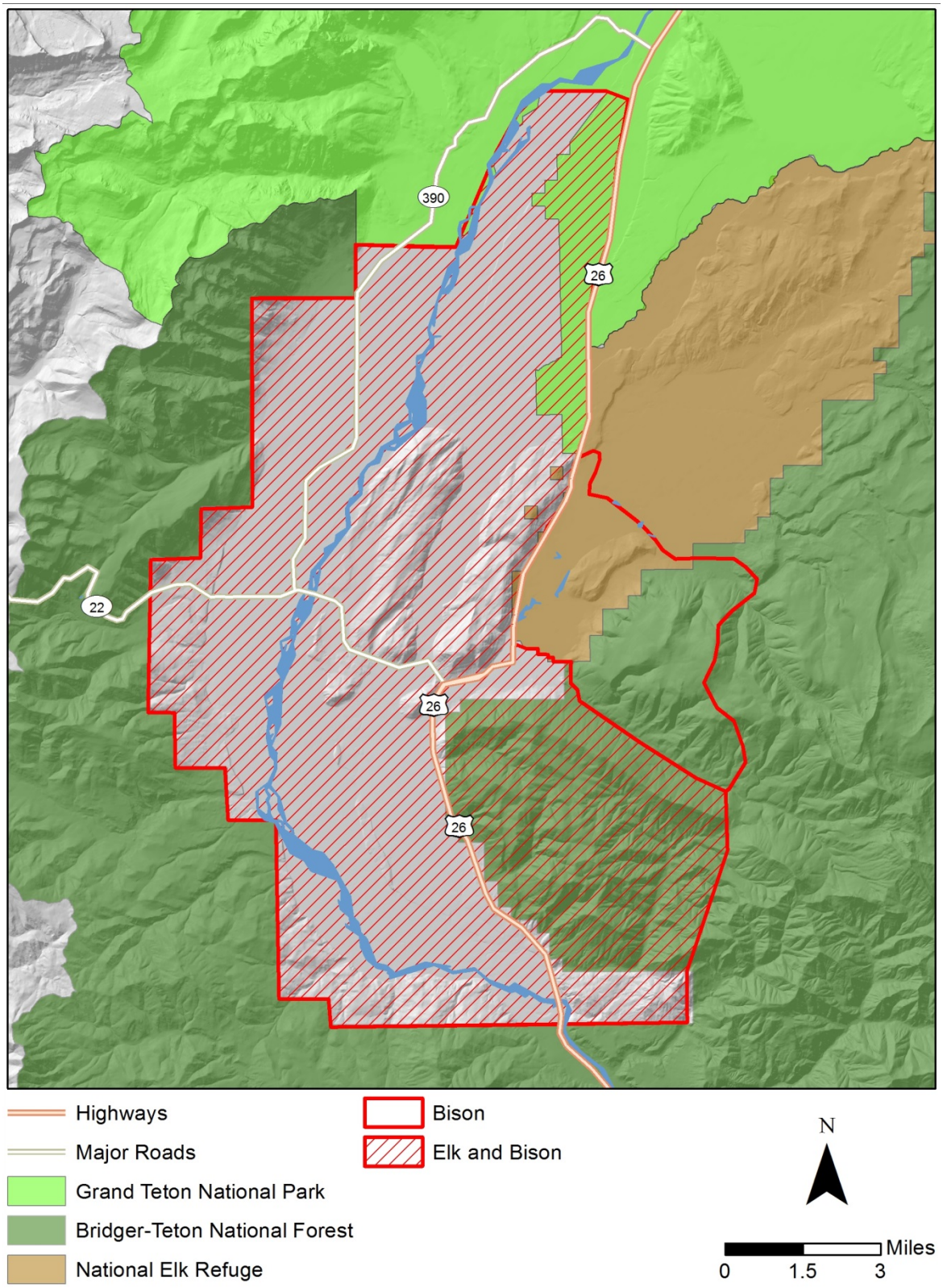


Figure 12. Areas with high potential for conflict of elk and bison with human activities. Significant elk or bison movements to these areas from NER during winter months could result in changes and/or review of the step-down plan.

Annual herd-wide population estimates, elk summer herd segment estimates in GRTE and NER, temporal and spatial harvest patterns, and animal-fed-days would be monitored, and the resulting information would be used to inform ongoing evaluation of elk and bison management harvest programs (Figs. 9 and 11).

Hazing

No change in hazing practices is anticipated initially under this Step-Down Plan framework.

Private Lands Mitigation

Delaying the onset of NER, feeding is likely to result in changes in bison and elk distribution (Appendix A). Some elk or bison may move to private lands in search of forage. Of greatest concern is the potential for elk or bison to commingle with cattle of cow/calf operations, where brucellosis transmission could have considerable consequences, such as requiring depopulation of the cattle herd.

Several strategies would be employed to mitigate potential problems (Table 4), including providing incentives for non-breeding cattle operations (because brucellosis transmission to slaughter-bound cattle is not economically important), increased fencing in some limited areas to separate elk/bison from livestock feed lines, haze elk/bison away from livestock feed lines and purchase private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal Wildlife Conflict Technician positions that are supervised by the WGFD. These Technicians are also critical to the success of an expanded monitoring program vital to the Step-Down Plan (see Monitoring section below).

A database will be established to track non-agricultural conflicts on private lands to determine trends that will help evaluate the effectiveness of Step-Down Plan mitigation efforts.

Preventing elk and especially bison from entering the Town of Jackson is essential in maximizing public safety and minimizing private property conflicts. Currently, bison are hazed northward when they drift south of Miller Butte. A cattle guard was installed on the Refuge Road just north of Broadway Avenue. This barrier is designed to prevent elk/bison from entering the Town of Jackson.

Vegetation Restoration/Protection

The varied approaches to restore the Kelly Hayfields in GRTE (4,500 acres) was initiated in 2008 following 2 years of research and field studies (Moeny 2008) (see Figure 13).

The approach to ecological restoration includes serial treatments to

1) remove non-native species (e.g., herbicide application and prescribed burning);
2) seed native shrub, grass, and forb species; and
3) treat subsequent invasive plants by applying herbicides and, where appropriate, construct temporary fences to protect recently seeded pastures from colonization of non-native species and damage from large herbivores during early phases of restoration.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres within 7 pasture units are currently under restoration treatment and 3,265 acres remain non-native grass pasture (as of 2016; Figure 13). The non-native grass pastures are divided into 13 pasture treatment areas and are projected to be restored by 2035. As of 2016, approximately 745 acres are seeded with native vegetation, and 89 acres are considered fully restored. Maintenance of restored ecological conditions, however, will likely require management efforts in perpetuity to keep non-native species from colonizing restored areas. All 1,235 acres that are underway toward ecological restoration are being monitored for native plant establishment, invasive plant infestations, including cheatgrass spread. Park staff will continue to monitor and adaptively adjust treatments and restoration strategies according to our results.

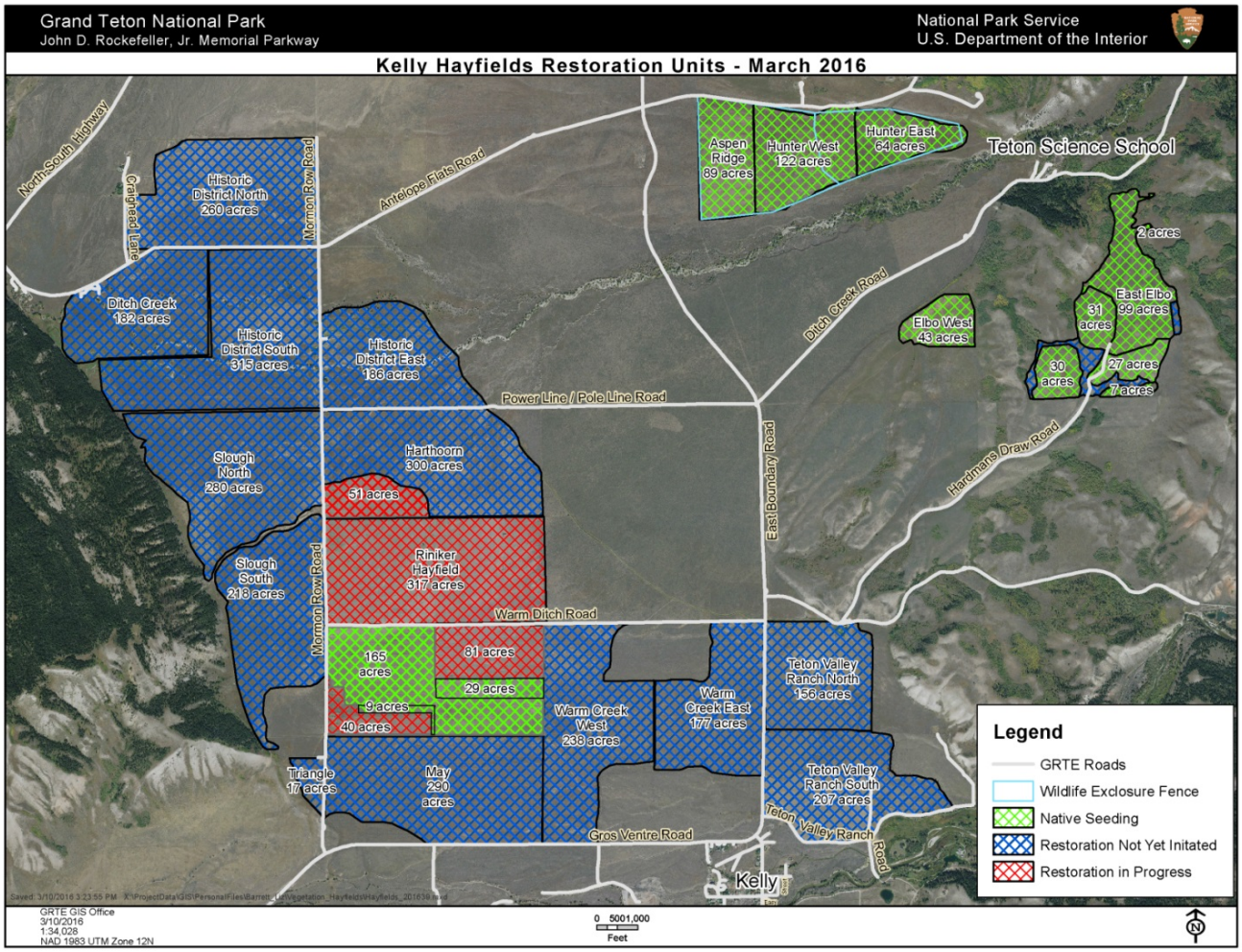


Figure 13. Units and status of the Kelly Hayfields ecological restoration effort in Grand Teton National Park, March 2016

OBJECTIVE

1) Maintain bull-to-cow ratios in park summer herd (Table 1).

National Park Service management policy (NPS 2006) provides guidance for maintaining naturally regulated wildlife populations, free from the impacts of humans, to the greatest extent possible. The final BEMP identified a goal of maintaining park elk bull:cow ratios (a common way of expressing sex and age ratios in wild ungulate populations) near 35 adult bulls per 100 adult cows, based on estimates of what this ratio would be in a herd free from the effects of human harvest. The sex and age ratios of most North American elk populations are affected by sport hunting and herd managers generally maintain lower bull ratios.

Harvest

Based on summer bull ratios for elk in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. Thus, ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded refuge hunting opportunities are considered.

Table 4. Comparison of current and primary step-down plan components and parameters			
Action	Current Management	Management	Comment
Winter Feeding:			
Feed	Pelleted alfalfa	Pelleted alfalfa	No change
Ration	Full ration average: 8-12 lbs./day/elk	No Change	No change, to minimize calf mortality. Note average daily ration over the entire feed season is lower than a full ration because feed rate is gradually increased at the beginning of the feed season and gradually reduced at the end to facilitate rumen acclimation
	20-22 lbs./day/bison	20 lbs./day/bison	
Start criteria:			
Available standing forage	300 lbs./acre, as measured at traditional key index sites	Generally later; index sites to be increased in number and distribution	Influencing factors: -time of season -forage availability -number of elk/bison on NER -elk/bison distribution
End criteria:			
Available forage	Based on a snow cover index and subjective estimate of when residual or new forage is adequate	Generally 1 week earlier than current management	Ongoing development of more objective criteria for future implementation ongoing
Monitoring:			
Animals on feed	Mid-winter census	Elk/bison fed days1	
Proportion of JEH on NER	Mid-winter census	Mid-winter census	
feed			
Calf mortality	2008-2015 Average: 3.3% (range 1.1-9.0%)	Potentially higher than current levels but less than native winter range	
Elk/bison distribution – collars	Almost no documented use of private lands during feeding operations	Unknown, but likely higher use of private lands than current management	
Elk Winter mortality (all age classes)	2008-2015 Average:	<=3%	
	1.2% (range 0.6-1.9%)		

Table 4. Comparison of current and primary step-down plan components and parameters			
Action	Current Management	Management	Comment
Elk summer range segment Proportions for NER wintering elk	Approximately -40% GTNP North of Moose -35% South Snake River -10% Gros Ventre/Flat Creek -10% Teton Wilderness -5% Southern Yellowstone	Unknown, but will be monitored based on summer distribution of radio collared elk	Based on summer distribution of elk that were randomly radio collared on NER.
Harvest, National Elk Refuge elk:			
Frequency	Annual	Annual	
Begin Date	2nd week October	No Change	Modified as necessary
End Date	3nd week December	No Change	Modified as necessary
Structure	- 1 week initial drawing	- 1 week initial drawing	
	- 1 week left over 1st served	- 1 week left over 1st served	
	- partial week alternate	- partial week alternate	
	-daily 1st served alternates	- daily 1st served alternates	
Refuge permit types	- 1st week any elk	- Primarily antlerless only	
	- Antlerless only remainder of season	- limited any elk permits throughout season	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries		Consider expanding to allow bow hunting near developed areas	
Harvest, National Elk Refuge bison:			
Frequency	Annual	Annual	
Begin date	August 15th	August 15th	Modified as necessary
End date	2nd or 3rd week January	Consider later dates as appropriate	Modified as necessary
Hunting Season Structure	As per WGFD	As per WGFD	
Refuge permit types	Any bison or cow/calf per state license	Any bison or cow/calf per state license	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries	Limited to north of Nowlin Creek area	Consider escorted hunting in South Unit as needed	Guided hunts in South Unit when authorized
Harvest, Grand Teton NP elk:			
Frequency	As needed	As needed	
Begin Date	3rd week October	3rd week October	Modified as necessary

Table 4. Comparison of current and primary step-down plan components and parameters			
Action	Current Management	Management	Comment
End Date	2nd week December	2nd week December	Modified as necessary
License types	Antlerless only	Antlerless only2	
Special regulations:	Cartridge limits	Cartridge limits	
	Bear spray required	Bear spray required	
	Hunter safety card required	Hunter safety card required	
Harvest, Bridger-Teton NF, Elk Hunt Area 80:			
Begin Date			
End Date		15-Dec	Would require change in winter closure dates
Harvest, Elk Hunt Area 78			
Structure			Changes at discretion of WGFD
License Types			
Private Lands Mitigation:			
Cattle commingling		Incentives for non-breeding operation	
Hay depredation		Increased fencing	
Landscape damage			
Easement acquisition			
Vegetation Restoration/ Protection: Elk Refuge			
Vegetation Restoration/ Protection: Grand Teton	Herbicide treatments, prescribed burning, native seed propagation and planting, and protection and maintenance of restored pastures	Same as Current Management for remaining non-native grasslands in Kelly Hayfields	
[1]Number elk and bison on feed per day, totaled by feeding season.			
[2]Any elk licenses could be offered if bull ratios in the park consistently exceed BEMP criteria.			

STRATEGIES CONSIDERED BUT REJECTED

The BEMP considered several additional strategies for elk and bison management that, for a variety of reasons, were not selected for implementation in the preferred alternative and Record of Decision. The agencies reconsidered a subset of these during the development of this Step-Down Plan (Table 5). Since they were not part of the ROD, additional NEPA compliance would be necessary to incorporate any of them into this Step-Down Plan, and thus they are not being considered at this time.

Models of System Dynamics

Models provide a simplified representation of the biological system being managed. We will use modeling to quantify the effects of our

management actions on two key responses of interest, elk distribution, and elk calf winter mortality. There are suites of possible factors that affect the proportion of elk on NER feeding grounds versus native winter range. Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix C). Over time, this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

An increase in elk calf winter mortality is a potential result of reduced feed season length. Several factors influence elk calf winter survival on NER (Figure 14). Models will be used to assess the effects of available forage on elk calf winter survival (Appendix D). Over time, this will allow us to assess the effects of our principal management strategy (reducing feed season length) relative to elk calf winter survival.

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Table 5. Strategies considered but rejected

Strategy Considered	Reason Rejected
Fertility control in elk	Judged not reasonable or feasible in BEMP, primarily due to major technical, social, and financial hurdles[1]. For Step-Down Plan discussed primarily with regard to the difficult to harvest herd segment in Hunt Area 78 on private lands, where federal agencies have no jurisdiction.
Fertility control in bison	Impacts discussed at length in BEMP[2]. Not considered for Step-Down Plan because current hunting programs appear effective at slowly moving the herd toward the 500 animal herd objective.
Agency reduction of bison or elk	Not considered necessary or desirable on federal lands because current hunting programs that utilize sport hunters are effective at meeting herd objectives.
Altering rations of supplemental feed	Rejected as a strategy because reducing daily feed ration below 8 lbs./elk would be enough feed to encourage elk to remain on NER but would result in unacceptably high elk calf mortality rates.
Private Lands Hunting Coordinator	The WGFD contacted private landowners and ranchers in the Spring Gulch area and discussed this concept to enhance elk harvest of short distance migrants. Generally, landowner interest was low.

[1] Page 77 at http://www.fws.gov/bisonandelkplan/Final%20EIS/Volume%201/4_Chapter_2_Alternatives.pdf

[2] USFWS and NPS 2007?

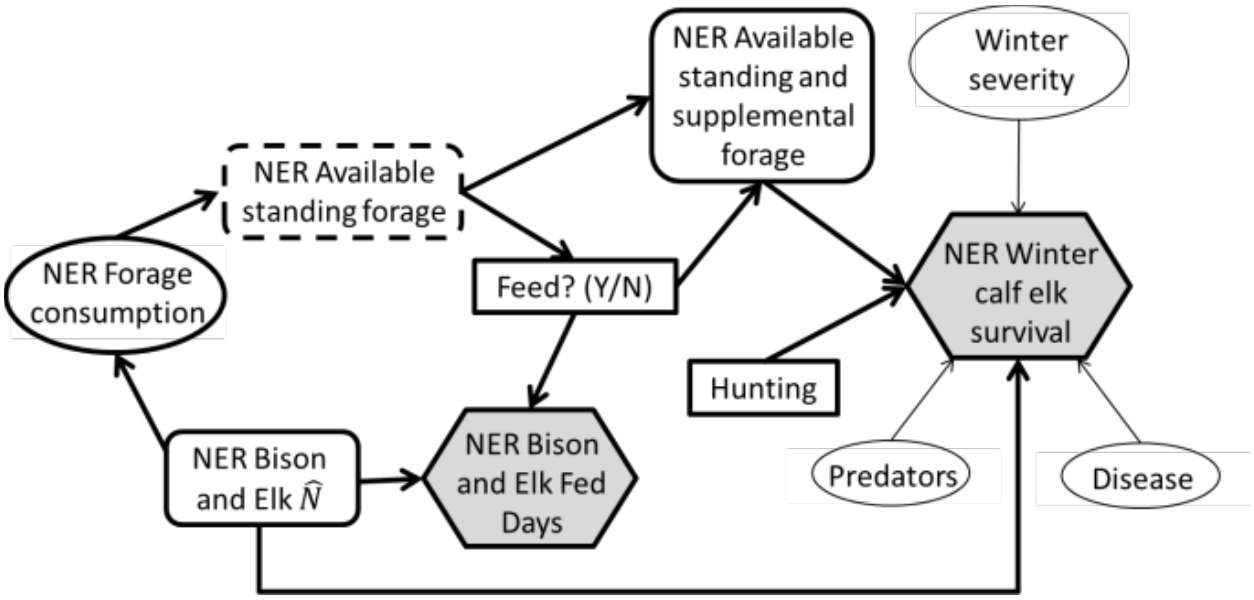


Figure 14. Diagram of factors influencing bison and elk-fed-days on the NER and elk calf winter survival

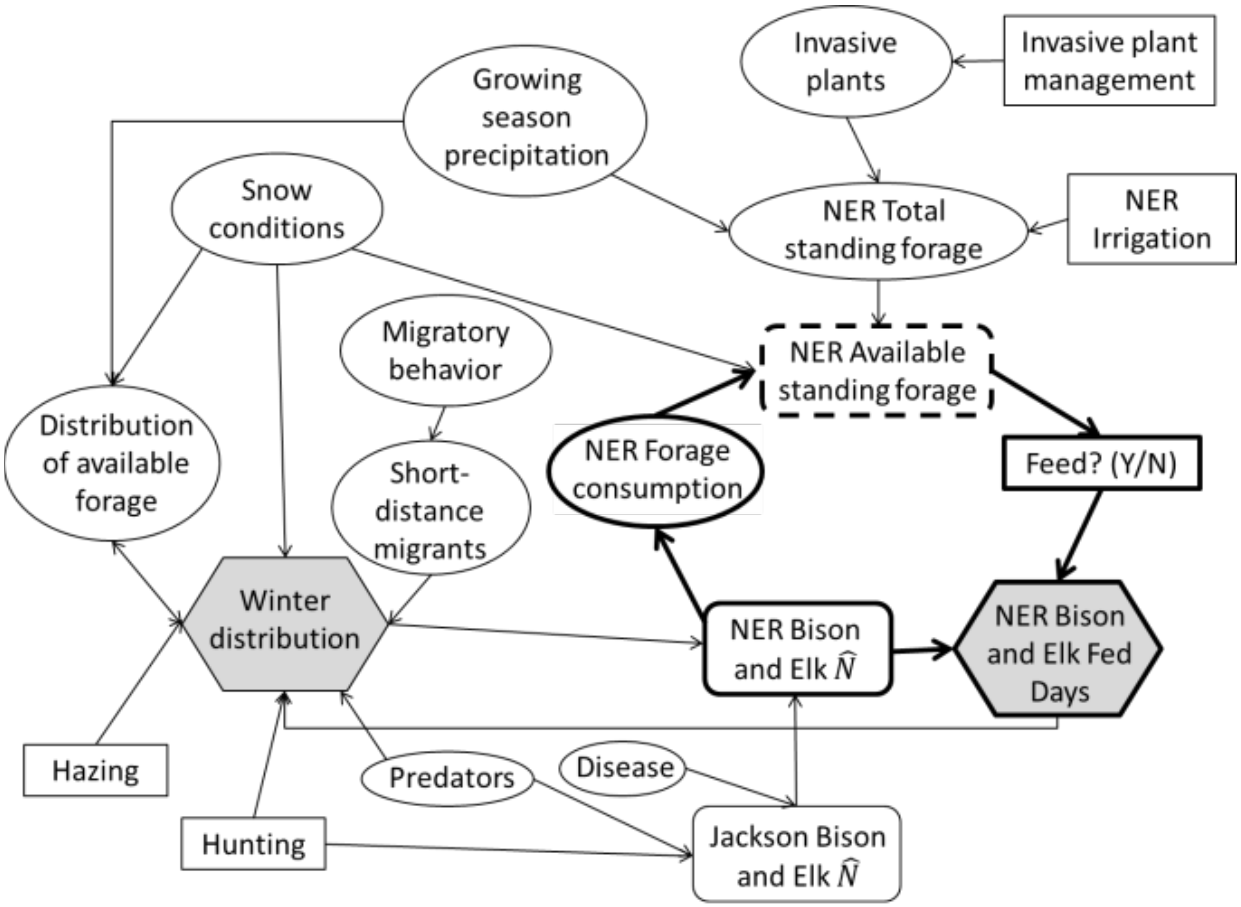


Figure 15. Diagram of outcome influences from BEMP (USFWS 2007a)

Monitoring

Feeding Initiation Monitoring

NER uses weekly field estimates of the amount of forage available to elk to determine feeding initiation date. Currently measurements are taken at key index sites representing areas preferred by elk on NER (see Appendix B). These methods will be enhanced by 1) increasing the number of sampled sites to better represent the total amount of forage available to elk on the southern half of NER; 2) increasing the precision of estimates at each site by increasing the number of observers; and 3) extending the monitoring period later in the winter to assess the relationship between available forage and elk and bison distribution.

To represent the total amount of forage available on the southern half of NER, a subsample of current key index sites will be retained to facilitate comparison with historic data, but additional random sample sites stratified by elk habitat preference will be added. Historic elk distribution mapping and elk GPS collar data (NER unpublished data) suggest that the areas most preferred by elk on southern NER are associated with moderate to high forage production and green vegetation. Because the distribution of forage production and greenness characteristics vary annually based on irrigation and precipitation patterns, we will annually map areas preferred and not preferred by elk and sample sites will be randomly selected within each of these mapped categories. At least three historic key index sites, three random sites in areas preferred by elk, and three sites in areas not preferred by elk will be sampled each week from late December through the initiation of supplemental feeding.

Currently the NER biologist is the only person trained in the techniques used to estimate available forage (see Appendix B). At least two additional personnel will be trained in these techniques. This will provide a backup in the event of future personnel changes and will facilitate error estimates of the available forage measurements at each site.

Currently NER and WYGFD biologists monitor available forage conditions at least weekly from late December until average available forage at key index sites nears the threshold level of 300 lbs. per acre and feeding is initiated. The principal Step-Down Plan strategy is to delay the initiation of supplemental feeding after average forage production reaches the 300 lbs./ac level at key index sites. Therefore, the monitoring period will be extended to include this period of delayed feeding.

Proportion of Elk Wintering on NER

A principal Step-Down Plan goal is to reduce the number of elk wintering on NER. Our strategy will be to effect redistribution of elk to native winter range from NER over time via shortening the duration of the feed season, and thus slowly conditioning elk to seek food elsewhere. As feeding periods are shortened, the probability of younger elk age classes discovering NER feeding grounds will be reduced, and, hypothetically, that proportion of the Jackson elk herd that utilizes NER feeding grounds will decline over time. We will measure this effect by examining changes in the winter distribution of the Jackson elk herd. WGFD annual trend/classification count data

provide a multi-year baseline data set to measure changes in the winter distribution of the Jackson elk herd and categorizes observations by location. In each year, we will calculate the proportion of total classified elk in the Jackson elk herd that are classified on NER feeding grounds. We will compare the 3-year running average post Step-Down Plan implementation to the pre-implementation baseline. The pretreatment baseline will be comprised of data from 2008 2016, a period that represents BEMP implementation prior to Step-Down Plan actions (Figure 16).

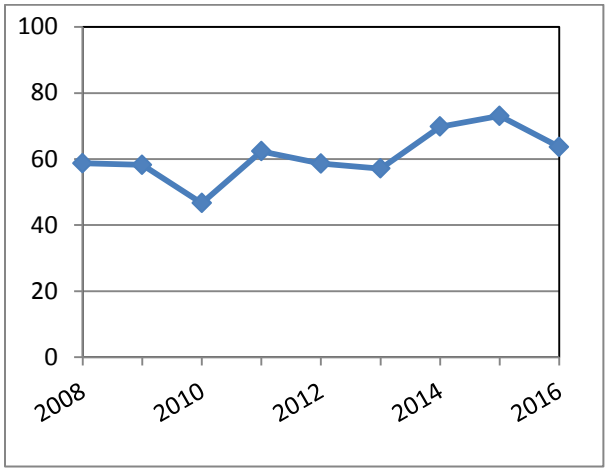


Figure 16. Proportion of Jackson elk herd on NER feeding grounds during BEMP implementation

Elk Fed Days and Bison Fed Days

The BEMP and Step-Down Plan implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feeding grounds and the number of days they are fed. We further assume the variables elk-fed-days (EFD) and bison-fed-days (BFD) are a proxy for these conditions. EFD and BFD will be calculated annually for each species based on the following formulas:

EFD= ∑ Total elk counted on feed during daily feeding ground counts for duration of feed season

BFD= ∑ Total bison counted on feed during daily feeding ground counts for duration of feed season

Because EFD and BFD are influenced by feed season length and the number of animals on feed, the Step-Down Plan strategy of delaying the initiation of supplemental feeding will inherently reduce the number of EFD and BFD through a reduction in average feed season length. We believe that EFD will be further reduced by encouraging a greater proportion of the Jackson elk herd to winter on native winter range, thereby reducing the number of elk occupying NER feeding grounds. We will evaluate changes in EFD and BFD by comparing the 3-year running average post Step-Down Plan implementation compared to mean EFD and BFD from 2008–2015. The running average is an appropriate comparison because it will help account for wide annual variation in EFD and BFD associated with winter severity (Figure 17).

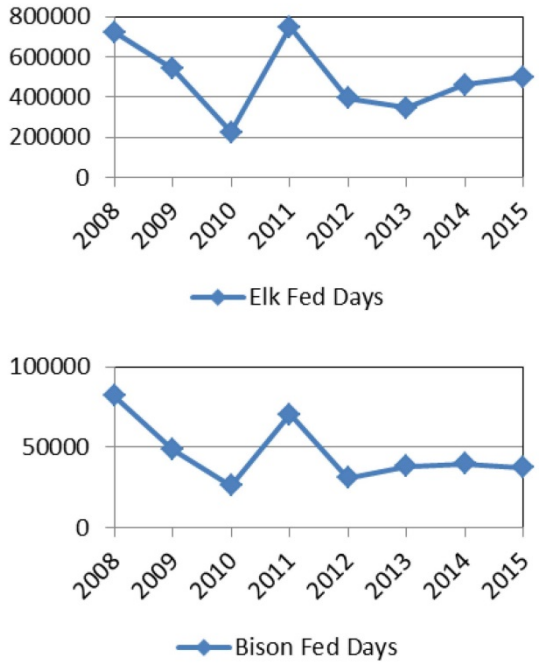


Figure 17. Elk-fed-days (EFD) and Bison-fed-days (BFD) after implementation of the BEMP but prior to the implementation of the Step-down plan

Elk Winter Mortality Monitoring

NER has used consistent methods to monitor winter elk mortality since 1982. Each winter NER biologists and other refuge staff conduct a survey of all non-hunting related winter elk mortalities that occur on NER from November through April. Mortalities are tallied by age/sex class and percent mortality is calculated using the corresponding number of elk classified on NER feeding grounds as the denominator. We will continue to monitor elk winter mortality using the same methods post-Step-Down Plan implementation, which will allow trend comparisons to the pre Step-Down Plan baseline (Figure 18). Under the Step-Down Plan framework, we believe the 3-year running averages for total and elk calf winter mortality will be within the range of variation exhibited by the pre Step-Down Plan baseline. Historic monitoring suggests that calf and total mortality are sensitive to winter severity and disease outbreaks, and that winter mortality occasionally exceeds >3% total mortality and >10% calf mortality. Post-Step-Down Plan mortality in excess of these levels may warrant shortening the feeding initiation delay in subsequent years.

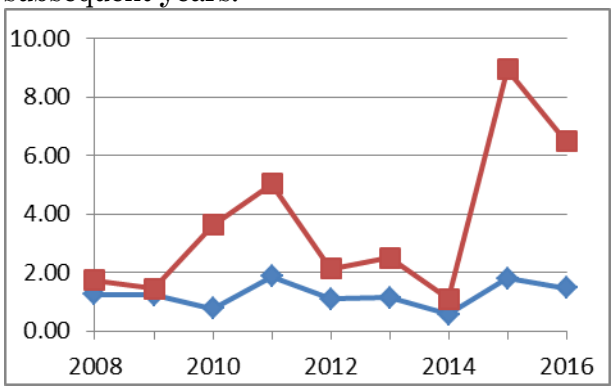


Figure 18. Total elk (blue) and calf (red) winter mortality, percent

Elk Collaring

One of the Step-Down Plan's principal strategies is to shorten the length of the feed season to encourage elk use of native winter range, but we anticipate that this strategy will also result in an increase in elk conflicts on surrounding private land in the town of Jackson and the Spring Gulch areas, potentially including large groups of elk. To quantify this effect and provide real-time information to WGFD and NER managers to facilitate a response, we propose maintaining a sample of 50 GPS-collared elk that winter on NER throughout the Step-Down Plan implementation period. Forty-five elk represents approximately 0.5% (1 in 200) of the NER winter elk population. This sample size will not be sufficient to detect all elk movements from NER to surrounding private lands, particularly movements by small groups of mature bull elk, but it will be sufficient to detect and quantify significant movements of cow/calf/yearling elk groups compared to pre-Step-Down Plan baseline data.

NER has elk GPS-collar data available from the 2008-2013, which represents the post-BEMP, pre-Step-Down Plan baseline period. We hypothesize that elk movements from NER to surrounding private lands will increase during the Step-Down Plan implementation period compared to the pre-treatment baseline. This will be tested by comparing the number of incidents that elk left NER for surrounding private lands (per elk/per year), and the proportion of elk GPS fixes on NER versus private lands during time periods of interest. The principal period of interest is late December–March because this represents the period after the NER elk hunting season, and prior to, and during, NER feeding operations. This is the season when changes to the NER feeding program would likely result in elk distribution changes.

Thirty adult cow elk were captured on NER feeding grounds in February 2016 and Telonics Iridium GPS collars were deployed with a 90-minute fix interval. Collars will be deployed on up to 50 additional adult cow elk in February-March 2017. Given 83% annual survival for adult cow elk in the Jackson elk herd (Cole and Foley et al. 2015) and 3-year collar life, approximately 10 additional elk will need to be collared each year in winter 2018 and 2019 to maintain the 50 elk desired sample size over the life of the Step-Down Plan implementation period.

Ancillary data that will be collected and analyzed during the elk capture and collar data analysis includes brucellosis seroprevalence, pregnancy rate, and elk summer range determination for comparison to the findings of Cole and Foley et al. (2015).

Disease

The primary purpose of limiting reliance on supplemental feeding is to reduce the prevalence of endemic elk and bison diseases and mitigate transmission risk associated with the introduction of novel diseases. We hypothesize that brucellosis seroprevalence will decline post Step-Down Plan implementation. There are no recent brucellosis seroprevalence data for elk on the NER, but >50 elk will be captured during elk collaring operations in winter 2016, and each elk will be tested for brucellosis exposure. The 2016 Brucellosis seroprevalence rate will be the pre-treatment baseline to evaluate post Step-Down Plan change. Chronic wasting disease (CWD) has been monitored in the Jackson elk herd since 1997, and since 2008, it has been monitored with sufficient sample size to detect 1% prevalence with 95% confidence. No CWD positive cases have been detected in the Jackson elk herd, which given the long term persistence of the disease, provides overwhelming evidence that CWD is not currently endemic to the Jackson elk herd. However, most evidence suggests that the distribution of CWD is increasing and that its introduction to the Jackson elk herd is inevitable. Early detection is critical to ensure a management response, and therefore ongoing monitoring at sample sizes sufficient to detect 1% CWD prevalence with 95% confidence is necessary. CWD is sampled by testing tissues collected primarily from hunter-harvested elk, and experience suggests that two full time technicians working from September-December are necessary to ensure minimum sample size. Typical costs associated with two technicians are $32,000 per year.

Data Collected for Modeling

To facilitate modeling, we will collect data on the following associated variables (Table 6). The table lists variables and how they relate to our efforts to use modeling to explain changes in elk distribution and elk calf mortality relative to our principal action of reducing feed season length.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Consequently, we anticipate that the strategies outlined in this plan will be in place for a minimum of 5 years, after which an initial evaluation of the program will be made. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented at an annual management Step-Down Plan update/report, completed by NER staff by the end of March for the previous year.

Consistent with objectives outlined in the BEMP, the long-term goal of this plan is reduce the reliance of bison and elk on intensive supplemental feeding, using adaptive management principles through a structured framework of management actions, to achieve a desired condition of animals relying predominately on native habitat on NER, GRTE, and USFS lands, and on NER cultivated forage. However, because there is no precedent for what this plan proposes, there are few responses to proposed management actions that can be predicted to a degree of certainty commensurate with establishing definable thresholds or other objective criteria for success in the short term.

Frequently Asked Question:
Question:
Why is the Step-Down Plan vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?
Response:
This is the first time that the strategy of delaying feed season initiation has been employed to reduce reliance on supplemental feeding. There is uncertainty regarding the effects of this strategy on elk and bison distribution and elk winter mortality, and therefore it is important to maintain flexibility in plan implementation to avoid significant unintended negative consequences. Unintended negative consequences the Step-Down Plan seeks to avoid include 1) elk or bison moving to areas where they damage property, risk human safety, or commingle with livestock, and 2) elk winter mortality levels significantly higher than baseline levels.

Factors that will be considered in evaluating the success of the program will include the trend of EFD and BFD, type and frequency of private lands conflicts, the proportion of the Jackson elk herd wintering on the NER, presence or absence of CWD and other infectious diseases, elk and bison population size and distribution, elk calf winter mortality, and public support. These complex, dynamic, and interwoven components make up the framework for decreasing reliance on supplemental feeding. As such, the effects of changing biological, social, and political conditions on these components will be part of the evaluation process.

In the context of this larger framework, however, we believe evaluation of the trend in EFD and BFD will be most important after the first 5 years of Step-Down Plan implementation. The direction and magnitude of the trend observed will provide a preliminary basis for evaluation and decisions about continued management actions. Initial success with reduced feeding will be associated with a declining trend in EFD and BFD, with greater magnitudes indicating higher degrees of success. However, determinations of overall program success will necessarily include evaluation of all system components. For example, gains in reduced feeding come could be accompanied by an increase in private land conflicts, which would affect overall success determinations. While the overriding strategy will be to decrease feeding as aggressively as possible while gauging effects on other system components, overall measures of program success through time will necessarily involve evaluating a matrix of effects. These evaluations will be included in annual Step-Down Plan reports.

As proposed and new management strategies are implemented and evaluated under this plan, at some point in the future it may become apparent that meeting reduced feeding goals will not possible without reducing elk and/or bison population objectives.

Population objectives for both herds are set by Wyoming Game and Fish Commission and are evaluated regularly by WGFD personnel, including public review through annual season setting meetings. The BEMP supported the State herd objectives of 500 bison and 11,000 elk, and thus due to NEPA requirements, any further consideration of reduced herd sizes by the NER or GRTE are beyond the scope of this plan. However, Wyoming Game and Fish Commission changes to Jackson bison or elk herd objectives are not constrained by the BEMP.

Investigating the potential effects of climate change on elk and bison management will also be important in the long-term. During implementation of this plan, we will collect a variety of data that could be drawn upon for this purpose.

Table 6. Elk winter distribution and elk calf mortality variables			
Variable	**Source**	**Elk Winter Distribution Model**	**Elk Calf Mortality Model**
Proportion Jackson Elk Herd on NER Feeding grounds	WGFD/NER Jackson Elk Herd February Classification Count	Yes	No
Proportion Jackson Elk Herd from South Snake River summer segment	Determined from elk GPS collar data for elk captured on NER	Yes	No
Number of wolf packs in the Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated total wolf numbers in Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated number of wolves using NER in winter	NER observations	Yes	Yes
Total NER herbaceous forage biomass	NER forage production survey data	Yes	Yes
Snow Water Equivalent	NOAA snowtell site data	Yes	Yes
NER Elk Winter Mortality (calf)	NER elk winter mortality survey	No	Yes
Snow Depth	NOAA Snowtell sites and NER measurements	Yes	Yes
Available Forage	NER and GTNP monitoring in winter months	Yes	Yes
NER Elk and Bison Fed Days	NER feeding records and daily feeding ground estimates of elk and bison	Yes	Yes
NER Feeding Start Date	NER feeding records	Yes	Yes
Gros Ventre Feeding Start date	WGFD feeding records	Yes	No
Elk Hunting Pressure by Hunt Area	Estimated number of hunter days from WGFD completion reports	Yes	Yes

Public Outreach and Education

The practice of winter feeding is inexorably woven into the historic fabric of Jackson Hole. Elk are identified with the rich and unique legacy for which Jackson Hole is known around the world. De-emphasizing the supplemental feeding program will be a major paradigm shift for the residents of Jackson Hole, Teton County, and the State of Wyoming.

An effective Public Outreach and Education program is essential for effective Step-Down Plan implementation. The practice of feeding elk evokes passionate responses from those that oppose and those that support this practice. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the Step-Down Plan in order to gain general consent to modify longstanding elk/bison herd management methods.

A detailed communication plan to guide outreach and education efforts can be found in Appendix C.

Schedule

Table 7. Proposed implementation schedule for the Step-Down Plan	
Action	**Date**
Public outreach and education	November 2016
Initiate private lands conflicts mitigation contacts/actions	January, 2017
Implement enhanced forage monitoring	January, 2017
Initiate changes in supplemental feeding protocol	January/February 2017
GPS Collar 30-40 elk (Iridium platform)	March 2017
Monitoring/Evaluation/Annual Report	June 2017

Budget

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.					
	Year				
Agency / Activity	1	2	3	4	5
National Elk Refuge:					
Monitoring:					
Seasonal Biological Technician (0.5 FTE, GS-7)	$24,000	$25,000	$26,000	$27,000	$28,000
Bison/elk fed days					
Mid-winter census					
Elk summer herd segment distribution1					
Expanded standing forage estimates1					
Chronic Wasting Disease, 2 seasonal bio.-techs	$32,000	$32,000	$32,000	$32,000	$32,000
Winter bison/elk distribution					
Irrigation					
50 Elk radio telemetry collars; Iridium Platform	$115,000	$25,000	$25,000	$25,000	$25,000
Bison barrier maintenance at NER south entrance	$500	$500	$500	$500	$500
Step Down Management Plan annual reporting	$2,000	$2,000	$2,000	$2,000	$2,000
Private lands:					
Easements / Leases (Private Foundations)	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000
Conflict mitigation technicians (WGFD)	$91,000	$91,000	$91,000	$91,000	$91,000
Hazing (helicopter)	$6,000	$6,000	$6,000	$6,000	$6,000
Vegetation restoration/protection1					
Public Outreach and Education	$11,000	$1,000	$1,000	$1,000	$1,000
Subtotal					
Grand Teton National Park:					
Monitoring:					
Summer elk classification/distribution	$10,000	$11,000	$12,000	$13,000	$14,000
Collaborative elk monitoring (GRTE portion)	$5,000	$5,000	$5,000	$5,000	$5,000
Vegetation Restoration/Protection					
Monitoring	$16,000	$16,000	$18,000	$18,000	$12,000
Temporary bison fencing	$24,000				
Temporary fence maintenance	$6,000	$8,000	$8,000	$4,000	
Hayfields restoration	$84,000	$70,000	$70,000	$31,000	
Exotic plant mitigation	$50,000	$52,000	$46,000	$32,000	$16,000
Elk Reduction Program (subject to annual review)					

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.					
	Year				
Agency / Activity	1	2	3	4	5
Hunter harvest evaluation	$1,500	$1,500	$1,500	$1,500	$1,500
Harvest age distribution	$2,000	$2,000	$2,000	$2,000	$2,000
CWD monitoring (0.15 FTE, GS-6)	$7,000	$7,000	$7,000	$7,000	$7,000
Law Enforcement and Visitor Protection (0.15 FTE for 20 LE and support staff; supplies, and permitting)3	Unknown				
Subtotal					
Wyoming Game and Fish Department:2					
Subtotal					
Grand Total					

[1]See detail in Appendix

[2] Dependent on size of elk reduction program; current annual expenditures are approx. $295,000 for 0.15 FTE for 20 LE and support staff; supplies, and permitting.

[3]Through Interagency Agreement

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Williams, B.K., R. C. Szaro, and C.D. Shapiro. 2009. Adaptive Management: The U.S. Department of the Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.

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Frequently Asked Questions

Question

Why is the MSP vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?

Response

This is the first time that the strategy of delaying feed season initiation has been employed to reduce reliance on supplemental feeding. There is uncertainty regarding the effects of this strategy on elk and bison distribution and elk winter mortality, and therefore it is important to maintain flexibility in plan implementation to avoid significant unintended negative consequences. Unintended negative consequences the MSP seeks to avoid include 1) elk or bison moving to areas where they damage property, risk human safety, or commingle with livestock, and 2) elk winter mortality levels significantly higher than baseline levels.

Question

Why were reductions to the Jackson Elk Herd and Jackson Bison Herd population objectives not considered as a strategy to reduce reliance on supplemental feeding?

Response

The BEMP has clear population objectives of 5,000 elk wintering on NER and 500 wintering bison. Modifying those population objectives would require additional NEPA analysis. The BEMP also agreed to support State elk herd objectives. The WGFD completed a public process in 2016 to set the population objective for the overall Jackson Elk Herd, and that objective remains unchanged at 11,000 elk.

Question

The BEMP has an objective of 5,000 elk wintering on NER. Why has that objective not been achieved through increased elk harvest?

Response

The overall Jackson Elk Herd population has declined and is currently close to the 11,000 elk objective, but the number of elk wintering on NER has been well above the 5,000 elk objective since implementation of the BEMP in 2007 (Mean =7,100 elk). When the analysis was conducted for the BEMP, elk winter distribution data suggested that 5,000 elk could winter on NER while still maintaining 11,000 elk in the Jackson Elk Herd overall. However, the proportion of the Jackson Elk Herd that winters on NER has increased significantly over time, and based on current elk distribution it is no longer possible to winter 5,000 elk on NER and maintain 11,000 elk in the overall Jackson Elk Herd. Although increasing elk harvest above current levels would likely allow us to achieve the 5,000 elk objective for NER, it would also reduce the overall Jackson Elk Herd population below the 11,000 objective. If increasing elk harvest in not plausible, the only other option to meet the 5,000 elk objective on NER is to change winter

elk distribution, which is the principal strategy of the MSP.

Question

Why is your principal strategy to delay the start of the feed season?

Response

By delaying the start of the supplemental feed season we decrease the probability that elk that use native winter range or state feed grounds will discover NER feed grounds. Because elk use of feed grounds is a learned behavior, over time this could increase the proportion of elk that winter on native winter range, reduce the number of elk that move from the Gros Ventre drainage to NER, and decrease the NER wintering elk population. The resulting shift in elk distribution would allow us to achieve the 5,000 elk objective for NER. Because 5,000 elk and 500 bison is close to the estimated carrying capacity of NER habitat, less feeding will be necessary at these population levels.

Question

Will delaying the start of the feed season result in elk starvation?

Response

Our goal is to delay elk feeding a sufficient amount of time to affect elk distribution without causing an increase in elk mortality.

Appendix A

Summary of Potential Impacts

Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007).

Populations

- Jackson elk herd objective of 11,000 would be maintained.
- New Jackson bison herd objective of 500 established.

Winter Feeding

- Supplemental feeding could be delayed or could occur earlier compared to current practices.
- Changes [to feeding program could] include alterations in the timing of feeding and providing supplemental feed in fewer years.
- Ration or pellet composition might need to be changed.
- Supplemental feeding would be initiated according to established criteria, including pre-winter forage production, assessments of forage utilization (done jointly by WGFD and NER personnel), elk condition and movements, and potentially on the January 1 index of winter severity calculations for elk (Farnes, Heydon, and Hansen 1999).
- Mechanical means could be used to increase forage access for elk after snow crusting events.
- Changes in the refuge supplemental feeding program could begin to affect elk nutrition (negligible adverse effect on NER elk from lower nutrition).
- Displacement of elk by bison during competition for standing forage would decrease as the bison herd is reduced.
- Aggressive social interactions involving competition for food among elk and bison would increase overall as feeding periods are reduced.

Winter Distribution

- Elk densities on the NER would decline due to more reliance on standing forage and wider distribution.
- Elk use of lands surrounding the NER would increase, including:
  - USFS lands east of the NER
  - Gros Ventre feedgrounds possibly

  - Southern GRTE
  - State feedgrounds south of the NER
- Most of winter distribution shift would involve elk in the Yellowstone, Teton Wilderness, and Gros Ventre segments.
- As ungulate numbers decreased and supplemental feeding was reduced, competition and aggressive social interactions on the refuge would also be reduced.
- Elk and bison distribution would increase as the animals relied more on native winter range.
- Fewer animals would be present on the refuge.

Mortality

- As supplemental feeding is reduced, natural factors such as climate and native forage availability would have a greater influence on numbers, movements, distribution, and mortality.
- More elk would be subject to natural factors affecting mortality, including loss of body condition, predation, and starvation.
- Increased mortality on and off the refuge would mainly affect older elk and calves, and some prime bulls entering the winter energetically stressed due to rut activities.
- Late winter calf ratios could decrease as a result of higher winter calf mortality
- Average winter mortality on the refuge would increase from 1%–2% annually to an estimated 1%–5%.
- Overall, a higher total winter mortality rate of approximately 5% could be expected.

Disease

- Reductions in supplemental feeding or elk numbers would reduce the potential for impacts due to tuberculosis, septicemic pasturelosis, and CWD.
- The health and sustainability of the Jackson elk herd would be increased gradually as supplemental feeding was reduced and there was greater reliance on standing forage and wider ungulate distribution.
- Health and sustainability of the Jackson elk herd would be enhanced in the long term.
- Wider distribution of elk would result in moderate reductions in both the prevalence and potential transmission of brucellosis, as well as potential for spread of diseases not yet in the population.

Private Lands

- The agencies would work closely with the WGFD and landowners, including livestock producers, to coordinate actions that would prevent conflicts due to elk dispersal and to defray costs of managing potential conflicts. Preventing access to food/hay rewards on private lands would be vital for effective management.
- Private land conservation easements within NER boundaries would promote wider distribution.

Appendix B

Monitoring Supplemental Materials

Feeding Initiation Methods

At each sample site, 10 subplots will be measured at every 5 steps along the random bearing determined for each site. At each subplot a 13.27" diameter metal sampling ring will be placed on the ground. The amount of forage available to elk within the sampling ring (dry weight in grams) will be visually estimated. The 13.27" diameter subplot allows easy conversion from grams to lbs. per acre (each gram is equivalent to 100 lbs. per acre). During annual forage production sampling, refuge biologist Eric Cole has made approximately 1,000 of these visual estimates per year for 17 years, and 33% of Cole's estimates have been verified by clipping and weighing. Therefore, Cole will be the principal estimator, but additional personnel will be trained in these techniques to provide redundancy in the event of personnel changes and to increase the number of observers to facilitate estimation of error.

Estimating available forage within the sample ring at each subplot is relatively straightforward when snow cover is limited, but estimating how much of the forage is accessible to elk when snow is dense, deep and crusted can be subjective. To decrease the subjectivity of the estimation process, if the area under the sample ring is covered with snow, only forage that can be exposed with a gloved hand will be included in the estimate of available forage. Forage that is fouled with manure and/or flush with the ground due to trampling and/or encrusted in ice will not be included in the estimate of available forage.

At each subplot the estimate of available forage (dry weight g) will be converted to an equivalent lbs./acre value (1 gram=100 lbs./acre). The arithmetic mean of available forage (lbs./acre) for the 10 subplots provides an estimate of available forage for each index site. There are 3 sample site categories: 1) Historic Key Index Sites that have been used since 2007, 2) New randomly selected sites within areas preferred by elk, and 3) New randomly selected sites in areas not preferred by elk. Historic key index sites were not randomly selected, but were instead selected to represent areas most preferred by elk on the south end of NER. These were the sites used to determine when supplemental feeding would be initiated from 2007 until the implementation of the MSP. To facilitate comparison with pre-MSP data, we will continue to use mean lbs. per acre across historic key index sites to determine the 300 lbs. per acre threshold. However, post MSP implementation we will delay feeding initiation by 2 weeks once the 300 lbs./acre level has been reached. We will concurrently sample at randomly selected sites stratified on an annual basis between areas highly preferred and not highly preferred by elk. This will enable us to quantify the relationship between mean forage availability at historic key index sites and random sites over time.

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Appendix C

Communication Plan

Communication Goals

Prior to the MSP's Implementation

- Utilize a variety of outreach methods to inform the public on the goals and timing of the MSP implementation and possible effects on wintering herds.
- Utilize a variety of outreach methods to inform the public on public comment opportunities.
- Identify and coordinate key messages and outreach with USFWS regional and national offices, State and federal agency partners, non-profits, elected officials, and other identified audiences.

During the MSP's Implementation

- Continue to utilize a variety of outreach methods to describe current management actions as well as measurable and noticeable changes on the landscape, in animal behavior, or in animal health.
- Provide a comprehensive overview of the MSP by providing links and references to previous outreach and background information.

Communication Objectives

- Work with current media contacts to promote news of the MSP via print, radio, Web, and social media platforms.
- Utilize new media and social media tools to provide information on why the MSP was developed, what public comment opportunities exist, and how the plan is being implemented.
- Plan, coordinate, and execute public meetings to allow for public comment and questions on the plan.
- Develop and provide methods for the public to submit written comments on the MSP.
- Monitor print media on Refuge elk and bison management to see how the Step own Plan objectives and reactions are being portrayed to the public.

Current Outreach Resources

- National Elk Refuge web site
- National Elk Refuge news release list

- (approximately 300 contacts)
- National Elk Refuge Twitter site (1,039 followers)
- Bison and Elk Management Plan web site (http://www.fws.gov/bisonandelkplan/)
- Space for an 11" x 17" poster in the Visitor Center on Refuge management topics
- Display panels in the Visitor Center theater for temporary displays

Available Supporting Outreach Resources

- USFWS Mountain–Prairie External Affairs staff
- USFWS Mountain–Prairie web site, including the
- "Top Stories" feature
- USFWS Mountain–Prairie Twitter site USFWS Mountain-Prairie Region Facebook page
- USFWS National Wildlife Refuge System
- Facebook page
- USFWS Facebook page

Previous Outreach Efforts

- NER routinely writes and disseminates news releases on Refuge management activities, including the Comprehensive Conservation Plan, supplemental feeding, herd health monitoring, and forage production.
- Post the above news stories as Content.
- Management System (CMS) articles.
- Post CMS news story promos so they prominently appear on the home page, linking readers to the articles.
- Send out Twitter messages linking viewers back to the news stories.
- Prepare, upload and provide links to Adobe PDF versions of news stories with additional photos where additional images are available and/or help understand or visualize the content.
- Utilized the Conservation link on the web Content
- Management System to post information about
- the Bison and Elk Management Plan and the draft Comprehensive Conservation Plan.
- Retained and provided a link to the original Bison and Elk Management web page (http://www.fws. gov/bisonandelkplan/) that was developed during the planning process. The web site includes links to the Final Plan/EIS, Record of Decision, Federal Register Notice of Availability for both the Record of Decision and Final Plan/EIS, associated news releases, public meeting highlights, and other related documents. Note: the National Elk Refuge does not manage the site.

Additional Outreach Opportunities

- Public meetings in Jackson and other identified locations.
- Service produced video; video could be posted to the National Elk Refuge's multimedia web page, or USFWS Mountain–Prairie home page "Top Video" feature.
- Live radio interview on KHOL (Jackson, WY radio)
- Wyoming Public Radio interview with Refuge management staff
- Interviews with local print media sources
- Updates at community leader meetings such as Rotary Club, Jackson Hole Chamber of Commerce board meetings, and interagency breakfast meetings (with Federal agencies and local elected officials).

Target Audiences

INTERNAL

- Regional and National USFWS Leadership
- Refuge permanent staff
- Refuge seasonal staff
- Refuge volunteers

EXTERNAL

- Congressional representatives
- State of Wyoming leadership
- Federal agency partners, particularly Grand Teton National Park and the Bridger–Teton National Forest
- Wyoming Game & Fish Department
- Other NER partners, including county and town agencies and local nonprofit organizations
- Local elected officials
- Private landowners in proximity to the National
- Elk Refuge or neighboring Federal lands
- Tribes
- Local and state media
- Local public

Key Outreach Topics

- Overview of BEMP objectives
- Strategy to change elk/bison behavior
- Threat of disease

- Natural mortality rates
- Anticipated winter distribution changes for bison/elk
- Mitigate negative effects on private lands
- Change elk behavior and distribution while avoiding increased mortality.
- Explain the historic reasons a supplemental feeding program began and why it was continued.
- Explain the NER's limited large ungulate carrying capacity and the disproportionate impact of bison on available forage; 1 bison is equivalent to 3 elk.

Appendix D

Models

Elk Winter Distribution Models

The proportion of the JEH that winter on the NER will be linked to factors hypothesized to influence elk winter distribution using a generalized linear mixed effects model (GLMM). A GLMM can account for a proportional response variable (i.e., constrained to the interval 0–1) using a log link and binomially-distributed errors. A GLMM also includes fixed and random effects, with the latter capturing residual model variance otherwise not explained by fixed effects. Year will be including as a random effect, providing several benefits. First, we don't assume years are independent and comprise all of the factor levels of interest. Instead, the effect of year is treated as a random variable, with individual year effects realizations of that distribution. This allows inference to non-sampled factor levels, i.e. years, by estimating a latent population-level proportion of elk expected to winter on the NER regardless of fixed effect influences. Thus, the random year effect can be considered a latent variable describing elk behavior manifested as observed winter distribution. Second, because year effects are not treated as independent, estimated effects of year on the proportion of JEH elk wintering on the NER are dependent on all factor levels, leading to greater precision when estimating individual year effects (Kéry 2010).

The full GLMM incorporating fixed effects for each factor identified as influencing elk winter distribution is:

$$P_t = \beta_{0(t)} + \beta_1 * AFI_t + \beta_2 * SDM_t + \beta_3 * WP_t + \beta_4 * GSP_t + \beta_5 * SWE_t + \varepsilon_t$$

where the random intercept and residual model variance are

$B_{0(t)} \sim N(\mu_{\beta_0}, \sigma^2_{\beta_0})$, and

$\varepsilon_t \sim N(0, \sigma^2)$, respectively.

Fixed effects include 1) per capita available forage at initiation of winter feeding (AFI) , 2) proportion of the JEH that are short-distance migrants (SDM), 3) number of wolf packs present on JEH native winter range (WP), 4) growing season (May–August) precipitation for the Wyoming Snake Drainage climate division (GSP; a proxy for available forage on native winter range), and 5) snow water equivalent on 1 January at Thumb Divide (SWE; a proxy for early winter severity).

Elk calf winter survival and forage deficits

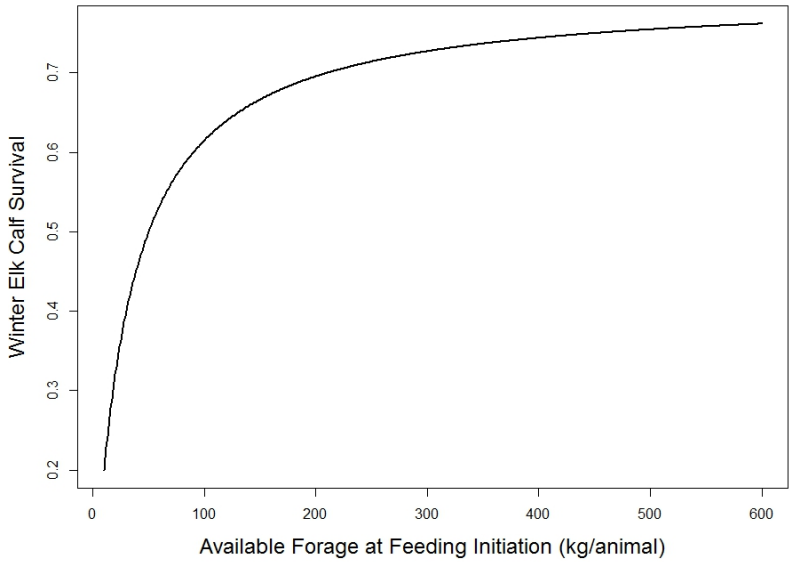
The Forage Accounting Model of Hobbs et al. (2003) has as an output weekly available forage biomass for the NER (sum of predictions for 30 × 30 m cells). These predictions account for snow conditions using a proxy of SWE and decrement total available biomass by 35% to account for unpalatable plants within the total estimate.

While calf survival is a function of multiple factors the primary management action influencing calf survival is supplemental winter feeding. Current winter feeding initiation criteria lead to calf survival generally higher than in unfed populations. Proposed feeding initiation criteria will result in later initiation of supplemental feed, which will be most influential to calf survival. There is currently little understanding regarding the relationship between initiation of winter feeding and calf survival, except that current feeding initiation criteria result in high calf survival. We believe a threshold level of available forage at initiation of winter feeding exists such that winter calf survival reaches an asymptote. Below this threshold, calf survival is hypothesized to decline quickly with reductions in available forage at winter feeding initiation. Available forage at the initiation of winter feeding will be related to on elk calf winter survival using a saturating function (i.e., Holling type-II functional response; Fig. 6) by

$$S_t = \frac{aAFI_t}{b + AFI_t}.$$

The parameters a and b determine how calf survival is related to available forage. Maximum calf survival is a, and b represents the value of available forage to an individual when survival is 50% of a (Hilborn and Mangel 1997).

Although this approach doesn't capture forage deficits per se, it does provide a potentially sensitive proxy for this concept. It is assumed that a forage deficit for calves would occur at a point on the curve of the relationship between calf survival and available forage at initiation of supplemental feeding. Modeling the response of winter calf elk survival to changes in feeding initiation criteria facilitates our ability to maximize the influence of feeding initiation criteria on winter distribution while minimizing the likelihood of a large mortality event.



Hypothesized relationship between winter survival of elk calves and per capita available forage at initiation of winter feeding on the National Elk Refuge.

From: Danielle Stevens
To: Steve Kallin
Cc: Toni Griffin
Subject: RE: Step-Down Plan Bison and Elk Management
Date: Friday, September 23, 2016 12:11:10 PM
Attachments: Draft_NER_Stepdown_092216.pdf

Hi Steve,
Great.
I have attached the preliminary draft to this email, in PDF for you and Eric's review.
I did have some issues with the charts – fairly certain I fixed all of them, but if you see something off, just let me know and I'll correct it.

I am out of the office next week at NCTC for training.
Thanks,
Danielle

Danielle Stevens, Writer-Editor
"Whatever you are, be a good one." ~Abraham Lincoln
"Every great dream begins with a dreamer." - Harriet Tubman
Refuge Planning
Office Phone: 303-236-4317
danielle_stevens@fws.gov

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Friday, September 23, 2016 9:53 AM
To: Danielle Stevens
Cc: Toni Griffin
Subject: RE: Step-Down Plan Bison and Elk Management

Hi Danielle:

Now, we have a bit of extra time. On Wednesday, I learned that we will be taking a "strategic pause" with rolling out the Step Down Plan. So October 7 should work. In fact, that may allow us to provide you the updated map with the "bison range" and perhaps some other comments.

Thank you for your help,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Danielle Stevens [mailto:danielle_stevens@fws.gov]
Sent: Friday, September 23, 2016 8:29 AM
To: Steve Kallin

Subject: Step-Down Plan Bison and Elk Management

Hi Steve,
As I am working through my edits, I would like to ask if there is any way I could have until October 7 to get the final Draft back to you.
I know there are some deadlines (not sure when those are), but I'd like the opportunity to re-read the document one more time (and add an Abbreviations list) before it gets sent out to the public.

Otherwise, I am aiming for early afternoon today to get you a PDF and the Word file.

Let me know.
Thanks,

Danielle Stevens, Writer-Editor
"Whatever you are, be a good one." ~Abraham Lincoln
"Every great dream begins with a dreamer." - Harriet Tubman
Refuge Planning
Division of Biological Resources
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
Lakewood, CO 80228
Office Phone: 303-236-4317
danielle_stevens@fws.gov

From: Tom Segerstrom
To: Steve Kallin
Subject: NER Easement - Lease Proposal
Date: Saturday, September 24, 2016 6:36:31 AM

Hello Steve,

Following discussions with the Teton Conservation District Board of Supervisors yesterday, it was decided that promoting the tools envisioned in your proposal did not represent an initial approach in which the District would participate. That said, the Supervisors understand that the status quo within our District for agriculture relative to elk distribution, wildlife diseases, trending management actions of the National Elk Refuge and Wyoming Game and Fish Department that will influence potential co-mingling of elk and livestock is likely to change in the future.

As a result, the District has decided to begin conversations with ranchers within the District to earnestly ask the simple question of "What actions or management tools would benefit you in adapting to the potential future changes in elk distribution, wildlife/livestock diseases, management actions on the National Elk Refuge or State feed-grounds and potential co-mingling of elk and livestock in the future?". There will be no sideboards or suggested remedies implied and landowners will be free to propose any changes or opportunities they can envision and/or that they would consider, if opportunities were made possible.

The Supervisors acknowledge that any remedies derived from the outreach effort may or may not sound feasible, in part or in their entirety, to wildlife and land managers or agencies, but the effort will enlist the thinking of the pertinent livestock operators that are likely to actually implement any solutions to future problems. The District's intention is to discern an accurate playing field for the District's consideration that will reflect thorough insights into the realities of ranching and being a rancher as partners in the future of agriculture within the District.

It is the hope of the Teton Conservation District Supervisors that the U.S. Fish and Wildlife Service will philosophically support our earnest endeavor to obtain rancher generated feedback on items that concern your agency planning. It is in this manner that the Supervisor's believe they can best serve all concerned.

Sincerely,

Tom Segerstrom
Executive Director
Teton Conservation District
P.O. Box 1070
Jackson, WY 83001
Phone: (307) 733-2110
Fax: (307) 733-8179
Cell: (307) 413-2704
Email: tom@tetonconservation.org

From: Cole, Eric
To: Danielle Stevens
Cc: Steve Kallin
Subject: Re: FW: Map for Feeding Reduction Step Down Plan
Date: Monday, September 26, 2016 11:03:15 AM
Attachments: BEMP_MSP_draft_fig1_23-Sep-16_v3.jpg

Please see the attached .jpg file for the revised Figure 1.

Thanks for your efforts in this regard!

Eric Cole
Refuge Biologist
U.S. Fish & Wildlife Service, National Elk Refuge
Jackson, WY
307.201.5432

On Thu, Sep 22, 2016 at 1:53 PM, Danielle Stevens <danielle_stevens@fws.gov> wrote:

> Good to know.
>
> I already have Figure 1 in the document, so updating it won't be a problem.
>
> Thanks,
>
> Danielle Stevens, Writer-Editor
>
> "Whatever you are, be a good one." ~Abraham Lincoln
>
> "Every great dream begins with a dreamer." - Harriet Tubman
>
> Refuge Planning
> Office Phone: 303-236-4317
>
> danielle_stevens@fws.gov
>
> **From:** Cole, Eric [mailto:eric_cole@fws.gov]
> **Sent:** Thursday, September 22, 2016 1:52 PM
> **To:** Danielle Stevens
> **Cc:** Steve Kallin
> **Subject:** Re: FW: Map for Feeding Reduction Step Down Plan
>
> The new map will replace the current map portrayed in Figure 1. I have not heard when (or if) Grand Teton National Park staff will get to it, but I can say with certainty that it will not be completed by today.

Eric Cole

Refuge Biologist

U.S. Fish & Wildlife Service, National Elk Refuge

Jackson, WY

307.201.5432

On Thu, Sep 22, 2016 at 1:48 PM, Danielle Stevens <danielle_stevens@fws.gov> wrote:

Thanks. I'll get it inserted.

Here is the reference to the map (per comment from Eric)

Winter Feeding

Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the long run, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning animals to "expect" feed to be available later in the winter; this could build cohorts of animals that rely primarily on native winter range. To reduce supplemental feeding, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, which is the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding (Figure ?) and[CE1] identify private land conflict areas that may require assistance with focused mitigation measures[CE2] .

It's closer to page 28.

Any chance of my getting that last map today? I am adding all the figures and tables in to the double column formatting and it's not so simple as just sticking a new figure in – the layout has to be adjusted to avoid excessive columnar white space.

Cheers!

Danielle Stevens, Writer-Editor

"Whatever you are, be a good one." ~Abraham Lincoln

"Every great dream begins with a dreamer." - Harriet Tubman

Refuge Planning
Office Phone: 303-236-4317

danielle_stevens@fws.gov

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Thursday, September 22, 2016 1:31 PM
To: Danielle Stevens
Cc: Eric Cole
Subject: FW: FW: Map for Feeding Reduction Step Down Plan

Hi Danielle:

Please see attached a map to include in the Step Down Plan in several formats. Please insert on p. 17 in the "Winter Feeding" section with the caption Eric Cole listed below.

Also, we have one additional, updated map that we will be sending you to insert into the document.

Thank you again for your help!

Steve Kallin

Project Leader

National Elk Refuge

PO Box 510

675 East Broadway

Jackson, WY 83001

Phone: (307) 201-5409

Fax: (307) 733-9729

steve_kallin@fws.gov

From: Cole, Eric [mailto:eric_cole@fws.gov]
Sent: Thursday, September 22, 2016 11:14 AM
To: Steve Kallin
Subject: Re: FW: Map for Feeding Reduction Step Down Plan

This is the version that I would send to the editor. I have attached both the .pdf and .jpg versions.

The caption could read: "Figure #. Areas with high potential for conflict for elk and bison with human activities. Significant elk or bison movements to these areas during winter months from NER could trigger agency review of MSP implementation and subsequent changes in management actions."

Eric Cole

Refuge Biologist

U.S. Fish & Wildlife Service, National Elk Refuge

Jackson, WY

307.201.5432

On Thu, Sep 22, 2016 at 10:39 AM, Steve Kallin <steve_kallin@fws.gov> wrote:

Please let me know when you believe this is ready to incorporate into the Step Down Plan, and whatever the caption should be. I will then forward to the editor.

Thanks,

Steve Kallin

Project Leader

National Elk Refuge

PO Box 510

675 East Broadway

Jackson, WY 83001

Phone: (307) 201-5409

Fax: (307) 733-9729

steve_kallin@fws.gov

From: Gustine, David [mailto:dave_gustine@nps.gov]
Sent: Thursday, September 22, 2016 9:42 AM
To: Cole, Eric
Cc: Steve Kallin
Subject: Re: Map for Feeding Reduction Step Down Plan

Ha, hunting season just started! I'm on it!

See attached. And if we call this something along the lines of "areas that may signify or represent increased conflicts when occupied by elk or bison" during Jan-Mar, GRTE is good with it.

Also, do you have a USWFS background or frame that you like to go around your maps? If so, send it my way.

dave

On Thu, Sep 22, 2016 at 9:13 AM, Cole, Eric <eric_cole@fws.gov> wrote:

Great, thanks! I appreciate your help with this and I think that the map will be very useful in the document.

Sorry to hear that you might have a vegetarian winter.

Eric Cole

Refuge Biologist

U.S. Fish & Wildlife Service, National Elk Refuge

Jackson, WY

307.201.5432

On Thu, Sep 22, 2016 at 9:10 AM, Gustine, David <dave_gustine@nps.gov> wrote:

okay, I'll tweak that map I sent you with original bison-elk coverage with a potential name change. Sound good?

On Thu, Sep 22, 2016 at 8:53 AM, Cole, Eric <eric_cole@fws.gov> wrote:

I agree with your plan to change the title of the map. "No-go" was just a label that I used for simplicity, but I like your idea to describe it as an area of potential conflict. This can easily be done in the the figure legend when we get to that point.

Eric Cole

Refuge Biologist

U.S. Fish & Wildlife Service, National Elk Refuge

Jackson, WY

307.201.5432

On Thu, Sep 22, 2016 at 8:07 AM, Gustine, David <dave_gustine@nps.gov> wrote:

No problem, glad to help.

Sorry on delay getting back to you, I was out scaring deer and elk away from my rifle the past couple of days.

Perhaps this could be remedied with a name change? A "no go" zone implies animals wouldn't be tolerated there, however, it's movement to this area that signifies the potential (possibly high) for conflict. Areas with high potential for conflict? Not the best, but would damp down concerns from NPS leadership and stakeholders that might be in response to an incorrect interpretation of the "no go" zone.

thoughts?

dave

On Sun, Sep 18, 2016 at 2:08 PM, Cole, Eric <eric_cole@fws.gov> wrote:

Hi Dave,

In general the map looks very good, thanks!

I noticed that you excluded the portion of my elk and bison no-go polygon in Grand Teton National Park west of highway 89 and east of the airport. Although I understand why you made this change from GTNP's perspective, I anticipate that WGFD would view elk and bison leaving NER during the winter to this area as a problem because of the vicinity of this area to private lands and the highway. I have cc'd Steve Kallin on this as well to see if he has any thoughts about which version of the polygon is included in the step down plan.

Eric Cole

Refuge Biologist

U.S. Fish & Wildlife Service, National Elk Refuge

Jackson, WY

307.201.5432

On Sat, Sep 17, 2016 at 12:08 PM, Gustine, David <dave_gustine@nps.gov> wrote:

what do you think?

I can also send to you in an ArcMap package if you have capability to tweak that way (e.g., add USFWS logos, etc). Let me know, but as off Monday, I'm out of office until Thurs (elk hunting).

dave

On Thu, Sep 15, 2016 at 9:50 AM, Cole, Eric <eric_cole@fws.gov> wrote:

Hi Dave,

Steve Kallin mentioned that Grand Teton might be able to help produce a map for the feeding reduction step down plan. Basically we are interested in portraying the areas where we do not want elk and bison to move during the winter months in response to the changes in the feeding program. Movements into these areas would likely trigger management action such as hazing to mitigate their effects or might result in a more conservative strategy in future years regarding adjustment to the feed season start date.

I have created a shapefile for elk and a shapefile for bison (see attached) The map should include these polygons and perhaps refuge, park, forest, and private land boundaries. I have not received any comments on the proposed polygons from other members of the inter-agency planning team, but I suspect that I will once they see the version in the document.

Eric Cole

Refuge Biologist

U.S. Fish & Wildlife Service, National Elk Refuge

Jackson, WY

307.201.5432

--

Dave Gustine, PhD

Branch Chief, Fish and Wildlife Program

Grand Teton National Park

Moose, WY 83012

dave_gustine@nps.gov

307-739-3485

--

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--

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Grand Teton National Park

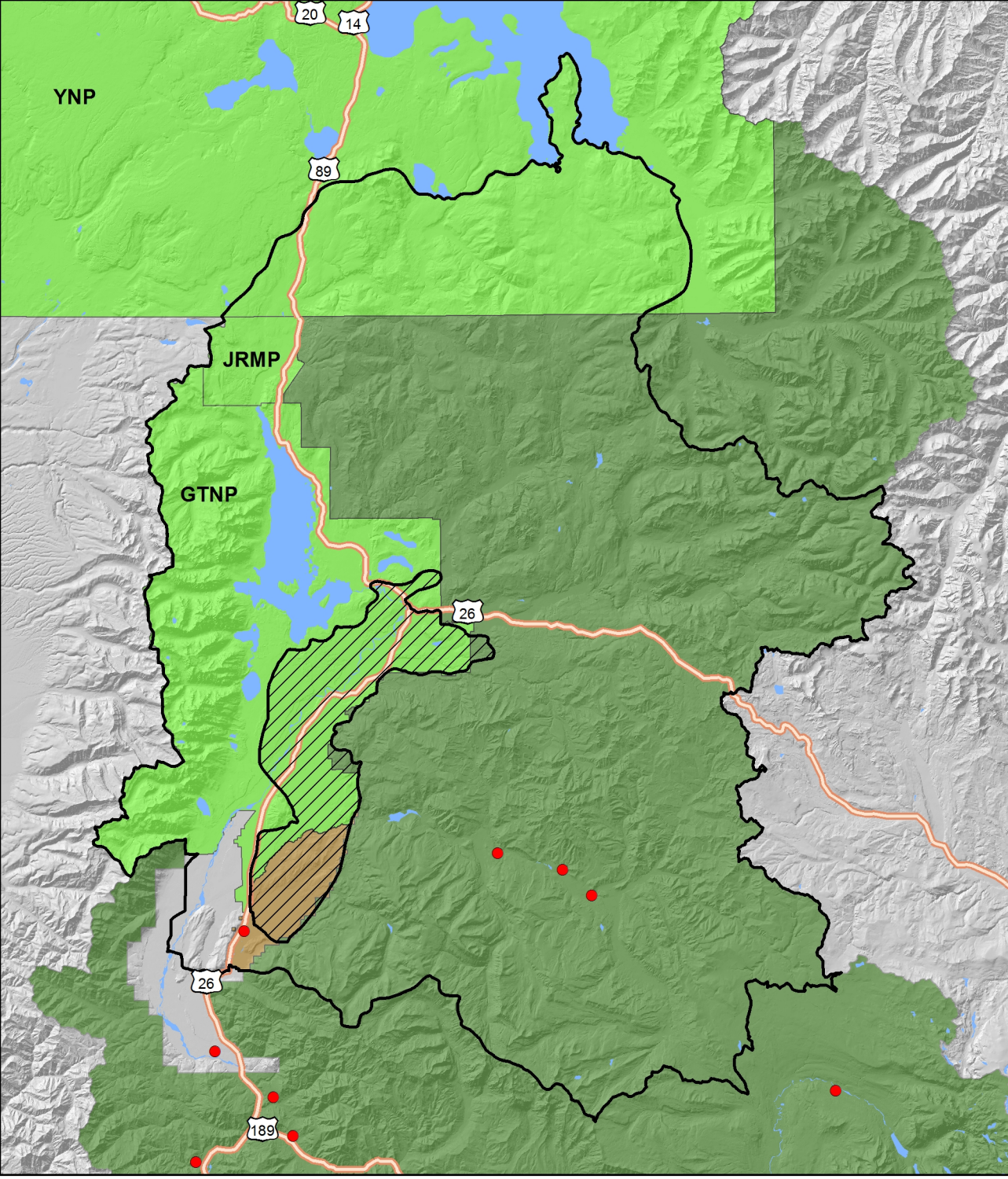
Moose, WY 83012

dave_gustine@nps.gov

307-739-3485

[CE1]The map that shows where elk and bison should not be could be placed in this section. This would be figure number? And subsequent figure numbers will need to be adjusted accordingly. Also the text does not currently reference the map?

[CE2]Consider FAQ on principal strategy of delaying feeding initiation here



Highways
Major water bodies
National Parklands
Bridger-Teton National Forest
National Elk Refuge
Jackson Bison range
Jackson Elk Herd Unit
Elk Feedgrounds

N

Miles
0 5 10

From:	Ryan Moehring
To:	Toni Griffin
Subject:	RE: NER CCP
Date:	Monday, September 26, 2016 1:11:00 PM

Thanks!

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Griffin, Toni [mailto:toni_griffin@fws.gov]
Sent: Monday, September 26, 2016 1:09 PM
To: Ryan Moehring
Subject: Re: NER CCP

Done, postcard is on Denise's desk. (I gave her a CCP Summary too)

Toni Griffin
Refuge Planning
Division of Biological Resources
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
Lakewood, CO 80228
Office Phone: 303-236-4378

On Mon, Sep 26, 2016 at 9:58 AM, Ryan Moehring <ryan_moehring@fws.gov> wrote:
Given what you just described, Toni, I vote we leave the postcard as-is for surnaming purposes. We can always make minor changes re: center/justified after surname. I'll take any other edits folks may have through the end of business today and will package all of the outreach materials for surname tomorrow morning. Toni, if you could leave a nice postcard on the desk of my AO, Denise Sanchez (she will route the package for us), that would be great. Thanks!

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Griffin, Toni [mailto:toni_griffin@fws.gov]
Sent: Monday, September 26, 2016 9:46 AM
To: Ryan Moehring
Cc: Iverson, Lori; Steve Kallin; Cris Dippel; Mike Blenden
Subject: Re: NER CCP

Hi Everyone,

The postcard was prepared last spring by a contract editor. The contract has since been closed out. Our in-house staff editor is at NCTC this week. If we need her to make changes it would be next week before she can get to it. So, unless we find a fatal flaw (misspelling, wrong info, etc.) I suggest we go with it as is.

Ryan, let me know what you need for the routing package. I have copies of the Final CCP (full doc), CCP Summary, and postcard on nice paper.

Toni Griffin
Refuge Planning
Division of Biological Resources
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
Lakewood, CO 80228
Office Phone: 303-236-4378

On Fri, Sep 23, 2016 at 4:09 PM, Ryan Moehring <ryan_moehring@fws.gov> wrote:
It is standard format/process. I'll let Toni weigh in on the centered text question. I'll need any additional edits by COB Monday if I am to get this into surname by Tuesday. Thanks, all, and enjoy your very well-deserved weekends.

Sent from my iPhone

On Sep 23, 2016, at 11:43 AM, Iverson, Lori <lori_iverson@fws.gov> wrote:

> I'm guessing this follows the same format and process all other refuges have used for their CCP announcements. I'm not a fan of centered text -- it decreases readability -- so would advocate for left justifying the text on the postcard. Otherwise, I don't see anything after a quick review.
>
> Thanks,
> Lori
>
> Lori Iverson
> Outreach & Visitor Services
> U.S. Fish & Wildlife Service
> National Elk Refuge
> PO Box 510 / 675 East Broadway
> Jackson, WY 83001
> Phone: 307.201.5433
> Cell: 307.690.4375
> Fax: 307.733.9729
> lori_iverson@fws.gov
> National Elk Refuge photo gallery

National Elk Refuge web site
Twitter: @NatlElkRefuge

"I only went out for a walk and finally concluded to stay out till sundown, for going out, I found, was really going in." - John Muir

On Fri, Sep 23, 2016 at 11:26 AM, Ryan Moehring <ryan_moehring@fws.gov> wrote:
All,

I'm slammed the next couple of days, but I want to keep the ball rolling on this. I see a couple of tiny changes I would like to make to the attached, but I'm on my way out the door for a site visit and in the meantime I wanted to get this package in front of you for one last review. Could you please take a final look for any fatal flaws and send your feedback to me ASAP? I would like to get this in to surname no later than next Tuesday, if possible.

Thanks, everyone!

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Will Meeks [mailto:Will_Meeks@fws.gov]
Sent: Thursday, September 22, 2016 12:35 PM
To: Mike Blenden; Steve Kallin; Toni Griffin; Ryan Moehring
Cc: Maureen Gallagher; Anna Munoz; Roya Mogadam
Subject: NER CCP

All –

I have the green light to complete any final edits to the comms plan and news release for the final signature of the CCP for NER.

Can you package and route the CCP with the Comms Plan and News Release for surname and signature. I think Toni was working with HQ on this as well.

Thanks.

Will Meeks
U.S. Fish and Wildlife Service
Mountain Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

From:	Ryan Moehring
To:	Mike Blenden
Cc:	Toni Griffin; Lori Iverson; Steve Kallin; Cris Dippel
Subject:	RE: NER CCP
Date:	Tuesday, September 27, 2016 2:34:00 PM

Thanks, all. The package will be introduced into surname by COB today.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Blenden, Mike [mailto:mike_blenden@fws.gov]
Sent: Monday, September 26, 2016 12:14 PM
To: Ryan Moehring
Cc: Toni Griffin; Lori Iverson; Steve Kallin; Cris Dippel
Subject: Re: NER CCP

I have no edits or suggestions.

Mike

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Given what you just described, Toni, I vote we leave the postcard as-is for surnaming purposes. We can always make minor changes re: center/justified after surname. I'll take any other edits folks may have through the end of business today and will package all of the outreach materials for surname tomorrow morning. Toni, if you could leave a nice postcard on the desk of my AO, Denise Sanchez (she will route the package for us), that would be great. Thanks!

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Mountain-Prairie Region
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Ryan, let me know what you need for the routing package. I have copies of the Final CCP (full doc), CCP Summary, and postcard on nice paper.

Toni Griffin
Refuge Planning
Division of Biological Resources
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
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Office Phone: 303-236-4378

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Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Will Meeks [mailto:Will_Meeks@fws.gov]
Sent: Thursday, September 22, 2016 12:35 PM
To: Mike Blenden; Steve Kallin; Toni Griffin; Ryan Moehring
Cc: Maureen Gallagher; Anna Munoz; Roya Mogadam
Subject: NER CCP

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Will Meeks
U.S. Fish and Wildlife Service
Mountain Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

--
Michael Blenden
Refuge Supervisor - Montana, Wyoming and Utah
134 Union Boulevard
Lakewood, CO 80228
303-236-4306
303-710-7934 cell

Too often we...enjoy the comfort of opinion without the discomfort of thought.
John F. Kennedy

News Release

U.S. FISH AND WILDLIFE SERVICE
Mountain-Prairie Region
134 Union Boulevard
Lakewood, Colorado 80228

For Immediate Release
October XX, 2016

Management Plan Completed for National Elk Refuge

Contact: Ryan Moehring, (303) 236-0345, Ryan_Moehring@fws.gov

LAKEWOOD, Colo. – The U.S. Fish and Wildlife Service (Service) has released a final Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) that will guide management of the National Elk Refuge in Jackson Hole, Wyoming for the next 15 years. The management decisions included in the CCP are a result of thorough environmental review and input from the local community and other stakeholders.

A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation, photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.

The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the refuge, including supplemental feeding. Instead, the CCP addresses all other aspects of refuge management including migratory birds, threatened and endangered species, habitat, visitor use, and cultural resources.

The final CCP/EA is available online here: https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. Hard copies are available at the refuge administrative offices located at 675 E. Broadway in Jackson. For questions about the CCP/EA, please call 307-733-9212.

Established in 1912, the National Elk Refuge spans approximately 25,000 acres and provides wildlife with a variety of habitat types, including grassy meadows, marshes, forest, sagebrush, and rock outcrops. Although the refuge is best known for the largest herd of wintering elk in the world, nearly 175 species of birds and at least 47 mammal species have been observed on the refuge. A free-roaming bison herd also winters at the refuge. Each year, roughly 500,000 people visit the National Elk Refuge to enjoy the views and charismatic wildlife.

To learn more about the refuge,
visit: https://www.fws.gov/refuge/National_Elk_Refuge/about.html.

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. We are both a leader and trusted partner in fish and wildlife conservation, known for our scientific excellence, stewardship of lands and natural resources, dedicated professionals, and commitment to public service.

For more information on our work and the people who make it happen, visit http://www.fws.gov/mountain-prairie/. Connect with our Facebook page at http://www.facebook.com/USFWSMountainPrairie, follow our tweets at http://twitter.com/USFWSMtnPrairie, watch our YouTube Channel at http://www.youtube.com/usfws and download photos from our Flickr page at http://www.flickr.com/photos/usfwsmtnprairie/.

– FWS –

From: Ryan Moehring
To: Denise Sanchez
Subject: Surname Materials
Date: Tuesday, September 27, 2016 2:34:00 PM
Attachments: NER CCP Comms Strategy.docx
NER CCP Dear Reader Letter.doc
NER CCP News Release.docx

Hi Denise,

As briefly discussed during our staff meeting today, I'm hoping you can route the attached materials, along with the postcard Toni left on your desk, through the surname process for me. The order would be: Refuges -> EA -> RD. The desired turnaround time is ASAP. Let me know if you have any questions, and thanks again for your help!

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

Web |Facebook | Twitter | Flickr | YouTube

BASIC COMMUNICATIONS STRATEGY

SECTION I: GENERAL INFORMATION

1. **Plan title:** Release of the National Elk Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA)

2. **DTS number: 44T**

3. **What is the action triggering this communications plan?** *(Please explain in no more than three sentences)*

The CCP and EA have been approved since September 2015, so this announcement is overdue. A separate engagement strategy for the Bison and Elk Management step-down plan is currently in development and will be available for leadership review soon.

4. **What is the proposed date to announce this action? Why has that date been selected?** *(Please note whether this date is flexible)*

We propose to release this CCP/EA as soon as possible and no later than early October 2016.

SECTION II: GOALS AND MESSAGES

5. **What are our primary communications goals?**

Our primary communications goal is to inform our primary partners at the Wyoming Game and Fish Department, National Park Service, U.S. Forest Service, and the local public that the CCP/EA have been finalized and that certain activities under the CCP are underway. Our secondary communications goal is to draw a clear line between the CCP/EA and the Bison and Elk Management Plan, separating those items in the minds of our constituents and indicating to interested stakeholders that information about the latter plan is forthcoming this Fall.

6. **What are our key messages?** *(List no more than four!)*

- The purpose of Comprehensive Conservation Plans is to guide refuge management over the next 15 years. These plans includes goals, objectives, and

strategies for refuge programs, and detail the combination of actions we will implement to protect species, manage habitats, and support compatible, public recreational and other uses.

- A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).
- Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.
- The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the refuge, including supplemental feeding. A separate announcement and a series of meetings on the Bison and Elk Management Plan are forthcoming this Fall.

SECTION III: IMPLEMENTATION

7. Who is leading this communications effort? *(Check one. Note if the response is neither of these, you should be using either a Partnership, Full or Targeted plan)*

◉ **Region** ○ **HQ**

8. Which programs and/or regions does this issue involve?

The National Elk Refuge (R6)

Refuges (R6)

External Affairs (R6)

9. Implementation timeline:

Date	Time	Tactic	Responsible
August 12	COB	Draft news release and comms plan, submit to NER staff for review	Ryan Moehring
August 19	COB	Review outreach package and return any edits to Ryan Moehring	NER Staff
ASAP	COB	Refuges Planning re-submits *Federal Register* package to HQ for clearance.	Toni Griffin
Day before release	10:00 a.m. MDT	Contact Brad Hovinga, Regional Wildlife Supervisor, WGFD	Steve Kallin
Day before release	10:00 a.m. MDT	Congressional notifications	Ryan Moehring and Steve Kallin
Day of release *(Day available in the Reading Room)*	10:00 a.m. MDT	Distribute press release	Ryan Moehring Lori Iverson will also forward the news release to the NER's news release list.
Day of release	10:00 a.m. MDT	Post Final CCP on Mountain-Prairie Refuge Planning website. Distribute Final CCP (electronic and hard copy) to individuals on the CCP mailing list.	Danielle Stevens will work with Rob Mansheim to post files on RO website. Toni Griffin will distribute the Final CCP to the mailing list.
Day of release	10:00 a.m. MDT	Post press release on R6 website and FWS homepage. Also, post link to press release on social media	Rob Mansheim Lori Iverson will send out a link on the NER's Twitter

			account.
Day of release	10:00 a.m. MDT	Email Dear Interested Party Letter to interested stakeholders.	Toni Griffin

10. Which communications tools are needed to support these strategies and tactics? *(Be as specific as possible about the products identified and who will produce them)*

Tool	Responsible	Due Date
News Release	Ryan Moehring	8/12/16
Communications Plan	Ryan Moehring	8/12/16
Dear Interested Party Letter	Toni Griffin	8/26/16

11. Which agencies, organizations and/or individuals should be notified?

Stakeholder Name	Contact Info	Pro/Anti/ Neutral	Contact By
Grand Teton National Park	David Vela, Superintendent; david_vela@nps.gov.	neutral	Day before announcement
National Park Service, Intermountain Region	James Doyle, Chief – Communication and Legislation; 303-969-2321; james_doyle@nps.gov	neutral	Day before announcement
Bridger-Teton National Forest	Patricia O'Connor, Supervisor; poconnor@fs.fed.us	neutral	Day before announcement
Wyoming Game and Fish Department	Brad Hovinga; brad.hovinga@wyo.gov	neutral	Day before announcement

12. Who are the primary points of contact for this action?

Media coordinators *(For national-level plans, list at least one person from HQ Public Affairs and others from region/program if appropriate. For regional-level plans, only regional coordinators are required. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Congressional coordinators *(Optional. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Subject matter experts available for interview *(Must be approved by HQ Public Affairs for an HQ-led announcement or Regional Public Affairs for region-led announcement. Enter name, email and phone)*

- Steve Kallin, 307-201-5409; Steve_Kallin@fws.gov

Additional technical experts for reference *(Enter name, email and phone)*

- Eric Cole, 307-201-5432; Eric_Cole@fws.gov

SECTION IV: DOCUMENT INFO

13. Date Created **Created By**

8/12/2016	Ryan Moehring

14. Date last edited **Edited By**

3/7/2017	Ryan Moehring

SECTION V: CONGRESSIONAL CONTACT LISTS

Delegation Contacts

Member Title	State	Member Name	STAFF_EMAIL
Senator	Wyoming	John Barrasso	brian_clifford@barrasso.senate.gov; kaitlynn_glover@ba

			kristi_wallin@barrasso.senate.gov
Senator	Wyoming	Michael Enzi	alison_mcguire@enzi.senate.gov karen_mccreery@enzi.senate.gov
Representative	Wyoming	Cynthia Lummis	landon.stropko@mail.house.gov tucker.fagan@mail.house.gov

Committee Contacts

N/A

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:
FWS/R6/NWRS/Planning
MAILSTOP 60130

MAILING ADDRESS:
P.O. Box 25486, DFC
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Boulevard
Lakewood, Colorado 80228-1807

Dear Reader:

We, the U.S. Fish and Wildlife Service, are pleased to provide you with a copy of the comprehensive conservation plan (CCP) for the National Elk Refuge. The CCP will guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will implement to protect species, manage habitats, and support compatible, public recreational and other uses. During the planning process, we worked closely with representatives from the National Park Service, the Wyoming Game and Fish Department, and the Teton County Planning Department. A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected Alternative D as the preferred management alternative.

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem. We will work closely with Wyoming Game and Fish Department and other Federal, State, and local partners to evaluate and manage habitats for the benefit of bison, elk, migratory birds, and other native species. An emphasis on adaptive management, including monitoring the effects of habitat management practices and use of research results to direct ongoing management, will be a priority.

We will use this plan, along with the Bison and Elk Management Plan (2007), as guidance for managing the refuge over the next 15 years. This comprehensive conservation plan will complement, not replace, the Bison and Elk Management Plan. A stepdown management plan is currently being drafted for the Bison and Elk Management Plan. This plan will outline, consistent with the Bison and Elk Management Plan, guidance to adaptively manage bison and elk herds to meet the goals and objectives outlined in the Bison and Elk Management Plan. Public comments will be solicited before the stepdown management plan is finalized.

The CCP document can be viewed online at https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. For more information about the CCP, please contact Steve Kallin, Project Leader at (307) 733-9212, or Steve_kallin@fws.gov.

Thank you for your continued interest in this planning process.

Sincerely,

Will Meeks
Assistant Regional Director
National Wildlife Refuge System

From: Gustine, David
To: Steve Kallin
Subject: Re: BEMP Step Down Plan Schedule and Update
Date: Wednesday, September 28, 2016 3:52:03 PM

---

shoot -- that's disappointing, we were rolling! Oh well, it is what it is . . . are we still on track for a period of public comment this fall/winter?

thanks Steve,

dave

On Wed, Sep 28, 2016 at 3:44 PM, Steve Kallin <steve_kallin@fws.gov> wrote:

> Hi Planning Team:
>
> I recently briefed our Regional Office concerning the status of the BEMP Step Down Plan and the Planning Team's recommended schedule for completion, public outreach/comments, and implementation. Our Regional Leadership decided to take a "strategic pause" for several reasons which included: 1) Bad timing in the Election Cycle (soon the country will have a new President, DOI Secretary & USFWS Director); 2) The time schedule was on the aggressive side; more time to engage the public may be beneficial.
>
> I anticipate the process to resume after completion of the next supplemental feeding season.
>
> The draft Step Down Plan is currently going through formatting, minor editing and a map update. When this is complete, I will send you a copy.
>
> I want to extend my sincere appreciation for all of the precious time you have been willing to devote to this effort in recent years. During these past months, your involvement required short deadlines and you responded to these challenges by providing quality work and professional insights, despite your busy schedules. Thank you again for all of your help!
>
> Take care,
>
> **Steve Kallin**
>
> Project Leader

National Elk Refuge

PO Box 510

675 East Broadway

Jackson, WY 83001

Phone: (307) 201-5409

Fax: (307) 733-9729

steve_kallin@fws.gov

--

Dave Gustine, PhD
Branch Chief, Fish and Wildlife Program
Grand Teton National Park
Moose, WY 83012
dave_gustine@nps.gov
307-739-3485

From: Ryan Moehring
To: Will Meeks
Cc: Denise Sanchez; Mike Blenden
Subject: RE: Surname Materials
Date: Thursday, September 29, 2016 11:30:00 AM
Attachments: NER CCP Dear Reader Letter.doc

Sure thing, see attached. Am I giving too much decision space here?

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Will Meeks [mailto:will_meeks@fws.gov]
Sent: Thursday, September 29, 2016 11:00 AM
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Subject: Re: Surname Materials

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Will Meeks
U.S. Fish and Wildlife Service
Mountain-Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303(w)
720-541-0310 (c)

On Sep 29, 2016, at 10:57 AM, Ryan Moehring <ryan_moehring@fws.gov> wrote:

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> Ryan Moehring
> Public Affairs
> U.S. Fish and Wildlife Service
> Mountain-Prairie Region

303-236-0345

From: Will Meeks [mailto:will_meeks@fws.gov]
Sent: Thursday, September 29, 2016 10:50 AM
To: Ryan Moehring
Cc: Denise Sanchez; Mike Blenden
Subject: Re: Surname Materials

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Will Meeks
U.S. Fish and Wildlife Service
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Assistant Regional Director
National Wildlife Refuge System
303-236-4303(w)
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>
> Ryan
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> Ryan Moehring
> Public Affairs
> U.S. Fish and Wildlife Service
> Mountain-Prairie Region
> 303-236-0345
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> **From:** Sanchez, Denise [mailto:denise_sanchez@fws.gov]
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Do you know if Will is making edits to the "Dear Reader" letter and will bring those back at some point? It is unclear to me how to proceed w/ respect to that document based on the comments on the yellow surname insert. Thanks again!

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Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

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Hey Ryan,

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Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

Web |Facebook | Twitter | Flickr | YouTube

--

Denise Sanchez | Public Affairs Assistant
USFWS Mountain-Prairie Region External Affairs
134 Union Blvd, Lakewood, CO 80228
denise_sanchez@fws.gov | 303-236-2985

http://www.fws.gov/mountain-prairie



Flickr - Photos linked in this email.

--

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Flickr - Photos linked in this email.

<NER SURNAME.PDF>

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:
FWS/R6/NWRS/Planning
MAILSTOP 60130

MAILING ADDRESS:
P.O. Box 25486, DFC
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Boulevard
Lakewood, Colorado 80228-1807

Dear Reader:

We, the U.S. Fish and Wildlife Service, are pleased to provide you with a copy of the comprehensive conservation plan (CCP) for the National Elk Refuge. The CCP will guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will implement to protect species, manage habitats, and support compatible, public recreational and other uses. During the planning process, we worked closely with representatives from the National Park Service, the Wyoming Game and Fish Department, and the Teton County Planning Department. A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected Alternative D as the preferred management alternative.

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem. We will work closely with Wyoming Game and Fish Department and other Federal, State, and local partners to evaluate and manage habitats for the benefit of bison, elk, migratory birds, and other native species. An emphasis on adaptive management, including monitoring the effects of habitat management practices and use of research results to direct ongoing management, will be a priority.

We will use this plan, along with the Bison and Elk Management Plan (2007), as guidance for managing the refuge over the next 15 years. This comprehensive conservation plan will complement, not replace, the Bison and Elk Management Plan. A stepdown management plan is currently being drafted for the Bison and Elk Management Plan. This plan will outline, consistent with the Bison and Elk Management Plan, guidance to adaptively manage bison and elk herds to meet the goals and objectives outlined in the Bison and Elk Management Plan.

Prior to finalizing the stepdown management plan, the Service will conduct a thorough public engagement process with neighboring communities and other members of the public on how they can help shape the future refuge experience and to listen to and address concerns they bring to our attention. This process will include clearly explaining to stakeholders what decisions have already been made as well as how their input will be used and can influence the decisions that are yet to be made. Public input is incredibly important to the Service and we intend to listen to and implement feedback received from the refuge's neighbors and other interested stakeholders regarding how we move forward with the stepdown management plan.

The CCP document can be viewed online at https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. For more information about the CCP, please contact Steve Kallin, Project Leader at (307) 733-9212, or Steve_kallin@fws.gov.

Thank you for your continued interest in this planning process.

Sincerely,

Will Meeks
Assistant Regional Director
National Wildlife Refuge System

News Release

U.S. FISH AND WILDLIFE SERVICE
Mountain-Prairie Region
134 Union Boulevard
Lakewood, Colorado 80228

For Immediate Release
October XX, 2016

Management Plan Completed for National Elk Refuge

Contact: Ryan Moehring, (303) 236-0345, Ryan_Moehring@fws.gov

LAKEWOOD, Colo. – The U.S. Fish and Wildlife Service (Service) has released a final Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) that will guide management of the National Elk Refuge in Jackson Hole, Wyoming for the next 15 years. The management decisions included in the CCP are a result of thorough environmental review and input from the local community and other stakeholders.

A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation, photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.

The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the refuge, including supplemental feeding. Instead, the CCP addresses all other aspects of refuge management including migratory birds, threatened and endangered species, habitat, visitor use, and cultural resources.

The final CCP/EA is available online here: https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. Hard copies are available at the refuge administrative offices located at 675 E. Broadway in Jackson. For questions about the CCP/EA, please call 307-733-9212.

Established in 1912, the National Elk Refuge spans approximately 25,000 acres and provides wildlife with a variety of habitat types, including grassy meadows, marshes, forest, sagebrush, and rock outcrops. Although the refuge is best known for the largest herd of wintering elk in the world, nearly 175 species of birds and at least 47 mammal species have been observed on the refuge. A free-roaming bison herd also winters at the refuge. Each year, roughly 500,000 people visit the National Elk Refuge to enjoy the views and charismatic wildlife.

To learn more about the refuge,
visit: https://www.fws.gov/refuge/National_Elk_Refuge/about.html.

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. We are both a leader and trusted partner in fish and wildlife conservation, known for our scientific excellence, stewardship of lands and natural resources, dedicated professionals, and commitment to public service.

For more information on our work and the people who make it happen, visit http://www.fws.gov/mountain-prairie/. Connect with our Facebook page at http://www.facebook.com/USFWSMountainPrairie, follow our tweets at http://twitter.com/USFWSMtnPrairie, watch our YouTube Channel at http://www.youtube.com/usfws and download photos from our Flickr page at http://www.flickr.com/photos/usfwsmtnprairie/.

– FWS –

From:	Ryan Moehring
To:	Mike Blenden
Cc:	Will Meeks; Denise Sanchez
Subject:	RE: Surname Materials
Date:	Thursday, September 29, 2016 2:51:00 PM
Attachments:	NER CCP Comms Strategy.docx NER CCP News Release.docx NER CCP Dear Reader Letter (3)mbedits (2).doc

---

Thanks, Mike. I have made those edits.

Denise,

Attached are all three revised documents. Could you please re-initiate the surnaming process when you have a moment?

Thanks, everyone!

Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Blenden, Mike [mailto:mike_blenden@fws.gov]
Sent: Thursday, September 29, 2016 2:30 PM
To: Ryan Moehring
Cc: Will Meeks; Denise Sanchez
Subject: Re: Surname Materials

Ryan,

Will had to go and asked me to review. Looks good to me with one concern. I'm thinking last sentence of fourth paragraph may not be necessary and may even lead to the impression that there is more decision space than will actually exist. I've suggested a subtle rewording.

Mike

On Thu, Sep 29, 2016 at 11:30 AM, Ryan Moehring <ryan_moehring@fws.gov> wrote:
Sure thing, see attached. Am I giving too much decision space here?

Thanks,
Ryan

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303-236-4303(w)
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> Public Affairs
> U.S. Fish and Wildlife Service
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> U.S. Fish and Wildlife Service
> Mountain-Prairie Region
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Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

Web |Facebook | Twitter | Flickr | YouTube

--
Denise Sanchez | Public Affairs Assistant
USFWS Mountain-Prairie Region External Affairs
134 Union Blvd, Lakewood, CO 80228
denise_sanchez@fws.gov | 303-236-2985

http://www.fws.gov/mountain-prairie



Flickr - Photos linked in this email.

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denise_sanchez@fws.gov | 303-236-2985

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Flickr - Photos linked in this email.

<NER SURNAME.PDF>

--
Michael Blenden
Refuge Supervisor - Montana, Wyoming and Utah
134 Union Boulevard
Lakewood, CO 80228
303-236-4306
303-710-7934 cell

Too often we...enjoy the comfort of opinion without the discomfort of thought.
John F. Kennedy

BASIC COMMUNICATIONS STRATEGY

SECTION I: GENERAL INFORMATION

1. **Plan title:** Release of the National Elk Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA)

2. **DTS number: 44T**

3. **What is the action triggering this communications plan?** *(Please explain in no more than three sentences)*

The CCP and EA have been approved since September 2015. A separate engagement strategy for the Bison and Elk Management step-down plan is currently in development and will be soon available for leadership review.

4. **What is the proposed date to announce this action? Why has that date been selected?** *(Please note whether this date is flexible)*

We propose to release this CCP/EA no later than early October 2016.

SECTION II: GOALS AND MESSAGES

5. **What are our primary communications goals?**

Our primary communications goal is to inform our partners at the Wyoming Game and Fish Department, National Park Service, U.S. Forest Service, and the local public that the CCP/EA have been finalized and certain activities under the CCP are underway. Our secondary communications goal is to draw a clear line between the CCP/EA and the Bison and Elk Management Plan, separating those items in the minds of our constituents and indicating to interested stakeholders information about the latter plan is forthcoming this Fall.

6. **What are our key messages?** *(List no more than four!)*

- The purpose of Comprehensive Conservation Plans is to guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will

implement to protect species, manage habitats, and support compatible, public recreational and other uses.

- A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).
- Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.
- The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the refuge, including supplemental feeding. A separate announcement and a series of meetings on the Bison and Elk Management Plan are forthcoming.

SECTION III: IMPLEMENTATION

7. Who is leading this communications effort? *(Check one. Note if the response is neither of these, you should be using either a Partnership, Full or Targeted plan)*

◉ **Region** ○ **HQ**

8. Which programs and/or regions does this issue involve?

The National Elk Refuge (R6)

Refuges (R6)

External Affairs (R6)

9. Implementation timeline:

Date	Time	Tactic	Responsible
Day before release	10:00 a.m. MDT	Contact Brad Hovinga, Regional Wildlife Supervisor, WGFD	Steve Kallin
Day before release	10:00 a.m. MDT	Congressional notifications	Ryan Moehring and Steve Kallin
Day of release *(Day available in the Reading Room)*	10:00 a.m. MDT	Distribute press release	Ryan Moehring Lori Iverson will also forward the news release to the NER's news release list.
Day of release	10:00 a.m. MDT	Post Final CCP on Mountain-Prairie Refuge Planning website. Distribute Final CCP (electronic and hard copy) to individuals on the CCP mailing list.	Danielle Stevens will work with Rob Mansheim to post files on RO website. Toni Griffin will distribute the Final CCP to the mailing list.
Day of release	10:00 a.m. MDT	Post press release on R6 website and FWS homepage. Also, post link to press release on social media	Rob Mansheim Lori Iverson will send out a link on the NER's Twitter account.
Day of release	10:00 a.m. MDT	Email Dear Interested Party Letter to interested stakeholders.	Toni Griffin

10. Which communications tools are needed to support these strategies and tactics? *(Be as specific as possible about the products identified and who will produce them)*

Tool	Responsible	Due Date
News Release	Ryan Moehring	Complete
Communications Plan	Ryan Moehring	Complete
Dear Interested Party Letter	Toni Griffin	Complete

11. Which agencies, organizations and/or individuals should be notified?

Stakeholder Name	Contact Info	Pro/Anti/ Neutral	Contact By
Grand Teton National Park	David Vela, Superintendent; david_vela@nps.gov.	neutral	Day before announcement
National Park Service, Intermountain Region	James Doyle, Chief – Communication and Legislation; 303-969-2321; james_doyle@nps.gov	neutral	Day before announcement
Bridger-Teton National Forest	Patricia O'Connor, Supervisor; poconnor@fs.fed.us	neutral	Day before announcement
Wyoming Game and Fish Department	Brad Hovinga; brad.hovinga@wyo.gov	neutral	Day before announcement

12. Who are the primary points of contact for this action?

Media coordinators *(For national-level plans, list at least one person from HQ Public Affairs and others from region/program if appropriate. For regional-level plans, only regional coordinators are required. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Congressional coordinators *(Optional. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Subject matter experts available for interview *(Must be approved by HQ Public Affairs for an HQ-led announcement or Regional Public Affairs for region-led announcement. Enter name, email and phone)*

- Steve Kallin, 307-201-5409; Steve_Kallin@fws.gov

Additional technical experts for reference *(Enter name, email and phone)*

- Eric Cole, 307-201-5432; Eric_Cole@fws.gov

SECTION IV: DOCUMENT INFO

13. Date Created **Created By**

8/12/2016	Ryan Moehring

14. Date last edited **Edited By**

3/7/2017	Ryan Moehring

SECTION V: CONGRESSIONAL CONTACT LISTS

Delegation Contacts

Member Title	State	Member Name	STAFF_EMAIL
Senator	Wyoming	John Barrasso	brian_clifford@barrasso.senate.gov; kaitlynn_glover@ba kristi_wallin@barrasso.senate.gov
Senator	Wyoming	Michael Enzi	alison_mcguire@enzi.senate.gov karen_mccreery@enzi.senate.gov
Representative	Wyoming	Cynthia Lummis	landon.stropko@mail.house.gov tucker.fagan@mail.house.gov

Committee Contacts

N/A

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:
FWS/R6/NWRS/Planning
MAILSTOP 60130

MAILING ADDRESS:
P.O. Box 25486, DFC
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Boulevard
Lakewood, Colorado 80228-1807

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stepdown management plan. We intend to listen to and implement feedback received from refuge neighbors and other interested stakeholders.

The CCP document can be viewed online at https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. For more information about the CCP, please contact Steve Kallin, Project Leader at (307) 733-9212, or Steve_kallin@fws.gov.

Thank you for your continued interest in this planning process.

Sincerely,

Will Meeks
Assistant Regional Director
National Wildlife Refuge System

From:	Steve Kallin
To:	Mike Blenden
Cc:	Will Meeks; Maureen Gallagher; Cris Dippel; Lori Iverson; Eric Cole
Subject:	Step Down Plan, Jackson Hole Media
Date:	Thursday, October 06, 2016 12:00:27 PM
Attachments:	Close-Up JHNews & Guide_Steve Kallin 10-5-2016.jpg

Mike:

This is a follow-up to our recent conversation about the BEMP Step Down Plan.

After being interviewed by the Jackson Hole News and Guide for the attached article, the news reporter asked me about the status of the Step Down Plan. I told him the decision was made to delay the process because of the election and for a longer discussion period with the public. He said the local rumor is that it was delayed due to the poor relationship between R-6 FWS Leadership and the WGFD due to the Grizzly Bear delisting process. He asked if the Regional Office would give him the same reasons for the delay if he called them. I told him I believed the RO would tell him the same thing said and gave him your contact information. Yesterday, this same reporter called and said his paper wants him to do a story on the Step Down Plan for this next week's paper (Wednesday).

We are in an awkward position. A news release announcing that we are delaying the Step Down Plan process will surely anger many because this process has taken several years and they want to see us move forward. At the same time, a news release would likely motivate those opposed to any change, and trigger a blistering attack criticizing us for mismanagement and starving elk, similar to last year's "feedback". If we were following the Step Down Communications and Engagement Plans, we would be more proactive and better positioned to address the management criticism we all expect to occur again this year. However, for a number of reasons as I previously recommended, we should not follow these plans prior to the upcoming feed season if we are not going to start making changes to the upcoming feeding program.

I suggest that I do the interview with the reporter from the New & Guide and in addition to the reasons I initially gave him for the delay, that we add time separation between the CCP and the Step Down Plan to avoid confusion. What is the status of the CCP and when can we expect to release it?

Let me know your thoughts and be prepared for a call from this reporter.

Take care,

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BRADLY J. BONER / NEWS&GUIDE

Steve Kallin has been the manager of the National Elk Refuge for the past nine years.

Sportsman at the helm on refuge

A Midwesterner by birth, Kallin loves being in Jackson Hole, faces complex issues at work.

By Mike Koshmrl

It was one of the opening days of the 2016-17 bison hunt, and Steve Kallin, bow in hand, was on the refuge he oversees, within about 60 yards of a herd.

He marked a cow, drew and released, but strong winds carried the arrow slightly off course and made for a less-than-perfect shot. A rifle the National Elk Refuge manager carried just in case finished the job. Shortly after Kallin's kill, the herd left for a no-hunting area in Grand Teton National Park, making the refuge manager the only person to harvest a bison on the property in the opening week of the season.

CLOSE-UP

Steve Kallin

The love of hunting that was motivating Kallin, 60, to be out stalking a herd of 1,000-plus-pound animals that August day helped steer him down a career path that's culminated in the top post at the scenic federal preserve stretching north from Jackson.

A self-described Wisconsin "cheesehead," Kallin grew up with four brothers in a loving family in farm country on the fringes of Green Bay. Kallin's grandfather's dairy farm played a big role in his life as a youngster.

"The farm really planted the seed for loving the outdoors," Kallin said while on a drive into the heart of the 24,700-acre refuge. "Those seeds of loving the outdoors were really kind of cemented by hunting.

"Getting out and hunting really recharges my soul," he said, "and reinvigorates my passion for the outdoors and natural resources."

By the time Kallin was college age he knew that working with wildlife in some form professionally was his ambition. Landing at University of Wisconsin-Stevens Point, the Midwesterner found himself in one of the top wildlife management schools in the nation. An internship his junior year on the Upper Mississippi River Refuge, which straddles the Wisconsin-Minnesota state line, introduced him to the U.S. Fish and Wildlife Service.

The gig had Kallin managing students, patrolling hunt areas and surveying for wood ducks. It sealed his affinity for working for the federal wildlife management agency.

Kallin's first job out of college, however, was with the U.S. Forest Service, which hired him as a technician studying beavers in the Minnesota northwoods' Boundary Waters Canoe Area Wilderness. From there he bounced around full-time Fish and Wildlife jobs in an array of positions, putting in stints at Michigan's Seney National Wildlife Refuge and Minnesota's Detroit Lakes Wetland Management District and 12-county Windom Wetland Management District.

"I wanted to be in refuge management, certainly," Kallin said. "That path, when I was there, included being a law enforcement officer, running fire programs. There was a lot more field work that I get to do now."

Kallin's longest tenure was in Windom, in southwestern Minnesota, where he and his wife purposely stayed put long enough so their two children could finish school in one place. Now grown, those kids have made Kallin a grandfather of seven. The landscape in the Windom area was "intense, intense row crop agriculture," he said — paradise if you have a passion for corn and soybeans.

Once Kallin was an empty nester, the allure of the West and the opportunity to manage Montana's National Bison Range pulled him away from the American Heartland for the first time in life. Swapping out whitetail deer hunting on 40-acre farmland plots for stalking elk on vast tracts of public lands was an agreeable trade, he found.

"I love it. Love it," he said. "It's hard to imagine going back to the Midwest. I can watch the Packers on television."

Seconds after that statement a pronghorn buck backdropped by the Tetons passed by, temporarily interrupting the driving tour.

"Just look at how they move," Kallin said. "It's just poetry in motion."

The National Bison Range, Kallin found, was a hotbed of controversy. Located on the Flathead Reservation, the preserve was co-managed by the Confederated Salish and Kootenai tribes, which was a novel arrangement for the national wildlife refuge system. That collaborative management scheme is still tied up in the courts. After nearly four years in Montana, Kallin's compass turned toward Jackson Hole and the National Elk Refuge, a place he had never been.

"I had a number of refuges in the western states I could have transferred to," Kallin said, "and even though this one was more challenging than most, it's spectacular."

He arrived here in 2007, right as a long-term plan guiding the future management of National Elk Refuge was being finalized. A central component of the plan was and remains driving elk numbers down to 5,000 and cutting back on supplemental feeding, goals that have proved persistently elusive.

> *"Getting out and hunting ... reinvigorates my passion for the outdoors and natural resources."*
>
> *— Steve Kallin*
> NATIONAL ELK REFUGE MANAGER

"I'm always hopeful," Kallin said, now a decade into his tenure. "But it's an extremely complex set of issues."

A good ways back in history, the biggest challenge for the refuge was coming up with enough feed for the elk and bison and carrying out those feeding operations. That's no longer the case, he said.

"Now the threat of disease is the challenge," Kallin said. "There's the potential for having a major catastrophic disease outbreak in either the elk or bison."

Always-fatal chronic wasting disease, which has made steady annual strides toward Jackson Hole and the refuge, is one malady that's garnered lots of attention. But there is a "whole array" of other disease threats as well, Kallin said.

"When you concentrate that many animals — just like concentrating people in a jet during flu season — you're going to spread disease around," he said. "We're kind of set up for a real potential disaster."

Contact Mike Koshmrl at 732-7067 or environmental@jhnewsandguide.com.

Draft Step-Down Plan
Bison and Elk Management

A Structured Framework for Reducing Reliance on Supplemental Winter Feeding
National Elk Refuge
Grand Teton National Park

Wyoming

October 2016

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Summary

Overview

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and NPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP) (USFWS and NPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands, focused on four broad goals:

1) habitat conservation;
2) sustainable populations;
3) numbers of elk and bison; and
4) disease management.

The final Bison and Elk Management Plan directed the NER and GRTE (in conjunction with the Wyoming Game and Fish Department [WGFD]) to maintain the state's elk herd objective of 11,000; establish a bison population objective of 500; restore habitat on the NER and in GRTE; continue hunting bison and elk on the NER; continue the elk reduction program, when necessary, in GRTE; allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available; and develop a dynamic, structured framework and Step-Down Plan for decreasing the need for supplemental feeding on the NER. This Step-Down Plan for Bison and Elk Management was developed specifically to address the criteria for a structured framework referenced in the Record of Decision.

Background

Winter feeding of elk in Jackson was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. The loss of available winter range in Jackson Hole due to new ranching operations and a growing town resulted in significant numbers of elk dying during several severe winters in the late 1800s and early 1900s. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, established the National Elk Refuge. Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding.

Bison were hunted to near-extinction outside Yellowstone National Park (YNP) by the mid-1880s but in 1948 were reintroduced to Jackson Hole when 20 bison from YNP were released near Moran, Wyoming. The herd remained small until discovering elk feedlines in 1980, when the population began sustained population growth. Bison and elk that winter on the NER are migratory and occupy summer ranges predominantly to the north.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER (Boyce 1989), high animal concentrations have created an unnatural situation that has contributed to an increased risk for major outbreaks of exotic diseases (Murie 1951, Franson and Smith 1988, Samuel et al. 1991), currently demonstrated by the high level of brucellosis in the elk and bison herds (Cross et al. 2010, Kamath et al. 2016). It has also resulted in damage to and loss of habitat due to browsing of willow,

cottonwood, and aspen stands (Smith et al. 2004), thereby reducing other wildlife associated with woody vegetation.

The BEMP and this step-down plan implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feeding grounds and the number of days they are fed. The potential risk of catastrophic disease outbreaks and the need to mitigate this threat is a vital component in achieving the BEMP Sustainable Populations Goal.

Objectives

This Step-Down Plan addresses several objectives under a broader BEMP goal of sustainable populations, which directed the agencies to: 1) develop a dynamic, structured framework for reducing NER supplemental feeding; 2) implement a phased reduction of animals on feed: a) Phase 1, to 5,000 elk and 500 bison, and b) Phase 2, elk and bison rely predominantly on native habitat; 3) maintain natural elk bull-to-cow ratios in park summer herd; and 4) enhance public outreach/education. The BEMP further stated that consideration criteria for implementing the 2nd phase of reduced feeding would include some or all of:

1) the level of forage production and availability on the National Elk Refuge;
5) desired herd sizes and age/sex ratios,
6) effective mitigation of bison and elk co-mingling with livestock on private lands;
7) winter distribution patterns of elk and bison;
8) prevalence of brucellosis, chronic wasting disease, and other wildlife diseases; and
9) public support.

In short, the overall objective of this plan is to provide a path for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on freestanding forage, while maintaining population and herd ratio objectives and public support.

Strategies

Elk have been fed for some period during nearly every winter on the National Elk Refuge since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during a time of year when natural forage is typically most limited is powerful to both species, and their knowledge of its existence has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Attempting to modify this behavior on a large scale is unprecedented and will necessarily require investigation; constant evaluation; and adaptive modifications to the approach; and repeated trials.

The Step-Down Plan's primary focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with landowners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into the three broad categories of

1) timing and intensity of winter feeding,
10) timing and intensity of hunting, and
11) overall and herd segment specific harvest levels.

Measuring the success of Step-Down Plan strategies will require knowledge of several bison and elk herd attributes. Because we are interested in reducing the intensity of elk and bison feeding throughout the entire winter season, which includes both the number of animals on feed and the duration of feeding, we will use measurements of elk-fed-days (EFD; the total number of elk fed per day per season derived from daily feeding ground estimates) and bison-fed-days (BFD; the total number of bison fed per day derived from daily feeding ground estimates) to evaluate feeding intensity. For example, if 5,000 elk were fed for 100 days during a given winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD. Average baseline

feeding intensity during the post-BEMP to pre-Step-Down Plan period from 2008-2016 was 487,838 EFD (range = 223,614-746,800), and 45,224 BFD (range = 26,035-82,124). Reductions in EFD and BFD compared to these baselines will represent progress in meeting feeding reduction objectives under the Step-Down Plan. Reductions in EFD and BFD could be achieved by reducing the length of the feed season, reducing the number of elk and bison on feed, or some combination of both factors.

Initial success of Step-Down Plan implementation will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP did not provide specific measurement criteria for the definition of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage" we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. These levels of reduction are consistent with elk and bison predominantly relying on freestanding forage rather than supplemental feed.

Similarly, there are population-specific objectives derived from the BEMP and Phase 1 of the Step-Down Plan for 5,000 elk wintering on NER and 500 bison wintering in the Jackson Hole area. Progress towards these objectives will be measured using annual classification counts and the average number of elk and bison counted during daily feeding ground estimates.

CHRONIC WASTING DISEASE

As of 2016, chronic wasting disease (CWD) has been detected within 40 miles of the Jackson Elk Herd (Jackson elk herd) in moose, within 35 miles in deer, and within 175 miles in elk. Continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence will take place. Some aspects of CWD response planning could change based on implementation of WGFD's CWD management plan (WGFD 2016).

WINTER FEEDING

Currently, the initiation of supplemental winter feeding occurs when available forage drops to 300 lbs./acre along transects in areas with highly preferred grasses. This protocol will change to delay the initiation of feeding.

The strategy of delaying the start of supplemental feeding is to encourage elk and bison to use native winter range, especially those individuals that have not previously received a food reward on the Refuge. Over time, it is anticipated a cohort of animals will develop that are not conditioned to the Refuge supplemental feeding program, which will reduce herd concentrations and the risk of disease transmission.

To reduce supplemental feeding overall, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk and bison fed days, the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years of Step-Down Plan implementation, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require focused mitigation measures.

As bison and elk behavioral responses are better understood, feeding delays will be extended to encourage a redistribution of elk and bison to native winter range. However, other factors outside of the scope of this plan such as wolf numbers and distribution could reduce the effectiveness of this strategy.

Variables that influence feeding initiation date will be considered (Table 4, Figure 9). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the Step-Down Plan, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the

potential for animals to move to private lands is greater. Forage availability could also have an influence, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Finally, the distribution of animals, particularly on private, livestock producing lands, would be considered prior to delaying feeding initiation date.

Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If Step-Down Plan implementation results in elk winter mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years.

In the early years of Step-Down Plan implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management, feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date as the Step-Down Plan is implemented.

HARVEST/HUNTING

Few options for manipulating elk hunting are currently available because the Jackson elk herd is at or near the 11,000 WGFD objective. Proposed changes include allowing limited any elk permits; allowing a bow season near developments on the NER; delaying the elk hunting season to coincide with migration timing; and alternating open and closed areas to encourage animal movements or facilitate harvest.

Based on summer bull ratios in GRTE that were chronically below 35 bulls : 100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded hunting opportunities is considered.

The proportion of the Jackson Elk Herd that winters on NER has increased in the past 2 decades. This trend is correlated with a decline in elk use of native winter range and an increase in the proportion of NER elk that occupy winter ranges immediately adjacent to the Refuge. If efforts to encourage increased use of native winter range are unsuccessful, agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future Jackson elk herd population objective. This will provide a level of harvest flexibility more commensurate with addressing changes in herd distribution.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution or discouraging bison from attempting to leave the NER via the south boundary into the town of Jackson.

The effectiveness of NER late-season harvest regimes is influenced by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could help reduce winter elk numbers on the Refuge. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st.

PRIVATE LANDS MITIGATION

Several strategies would be employed to mitigate likely changes in bison and elk distribution, including providing incentives for non-breeding cattle operations, increased fencing in limited areas to separate elk and bison from livestock feed lines, hazing elk and bison away from livestock feed lines, and purchasing private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to

establish three seasonal wildlife conflict technician positions supervised by WGFD.

VEGETATION RESTORATION

Various approaches to restore the Kelly Hayfields in GRTE (4,500 acres) were initiated in 2008. Work will likely be complete in 2035. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and providing visitor opportunities to enjoy wildlife viewing within a natural setting. The restoration process involves removal of non-native vegetation, collecting and propagating native seeds and plants, as well as the seeding of native plants.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres are currently under restoration treatment and 3,265 acres remain non-native pasture. Maintenance of restored ecological conditions will require management efforts in perpetuity to keep non-native species from colonizing restored areas. The park will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Strategies Considered but Rejected

Strategies considered but rejected include fertility control in elk and bison, agency reduction of either elk or bison, and altering rations of supplemental feed. These strategies were rejected because they were not included in the BEMP preferred alternative and/or because they were not supported by cooperating agencies.

Models and Monitoring

Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix C). Over time, this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

A robust monitoring program will be necessary to track the effects of actions implemented under this plan. Critical monitoring components will include: 1) enhanced forage production and availability sampling; 2) measuring animal abundance and distribution including differences in some sex and age classes; 3) determining elk and bison fed days each feeding season; 4) estimating winter mortality; 5) brucellosis seroprevalence rates; and 6) CWD surveillance. In many cases, attribute baselines for the period preceding implementation of this plan have been developed for comparison after the plan is implemented.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Actions completed each year, the results of monitoring programs, and any proposed changes in management direction will be presented in an annual Step-Down Plan update/report, completed by NER staff by the end of June.

Public Outreach / Education

De-emphasizing the supplemental feeding program will be a major paradigm shift especially for the residents of Jackson Hole and Teton County, but will also be of interest to others in Wyoming and across the nation familiar with the long history of feeding elk on the National Elk Refuge. The general public and especially key stakeholder groups must

understand the biological needs for and strategies of the Step-Down Plan in order to gain general consent to modify longstanding elk and bison herd management methods. A detailed communication plan has been developed that identifies key messages and utilizes a variety of outreach methods, including print, video, and voice material, utilizing social media, and meetings with elected officials, state and local governments, agency and tribal partners, community organizations, stakeholders, and the general public.

Schedule

GPS collars were deployed on 30 adult cow elk in February 2016. Assuming adequate funding, additional GPS collars will be deployed in winter 2017. Public outreach, private lands conflict mitigation and contacts, and enhanced forage monitoring will occur in fall 2016 through January 2017. Reductions in feed season length will begin in winter 2017.

Introduction

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and NPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and NPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands. It included directives for forthcoming development of adaptive management practices to address several objectives in the plan, including a desired future condition of elk and bison relying predominantly on native forage. This Step-Down Plan has been developed expressly for that purpose.

Bison and Elk Populations

While Jackson Hole is probably best known for the splendor and ruggedness of the Teton Range, the Jackson bison and elk herds rank among the top characterizing features of the valley. Both figure prominently in Jackson Hole's history and culture, although bison were absent from the valley for about 100 years between the mid-1800s and mid-1900s.

The Jackson elk herd occupies approximately 8,000 km^2 in the upper Snake River watershed north of the town of Jackson (see Figure 1). Much of the herd is migratory, moving between distinct wintering and summer ranges. Primary wintering areas include the Buffalo Valley, lower elevations of the Gros Ventre River drainage, the NER, and areas adjacent to the NER on Bridger-Teton National Forest (BTNF) lands. Summering areas occur throughout the herd's range and for convenience are divided into five geographic regions that include GRTE, Yellowstone National Park (YNP), the Gros Ventre drainage, Teton Wilderness, and Southwest Boundary area, which includes private and public lands in the vicinity of GRTE's southwest boundary.

In the late 1800s, when elk populations all over North America were being hunted to near-extinction, the residents of Jackson Hole protected elk from "tusk hunters" and large-scale commercial hunting operations. Elk are just as important to today's residents of the valley. Thousands of people each year have the opportunity to see elk at close range on the refuge while riding on horse-drawn sleighs. Thousands of pounds of shed elk antlers are sold at an annual antler auction each spring in the town square. Elk are important to backcountry users as well as to people that never leave the road. Jackson Hole is a popular destination for instate and out-of-state elk hunters. The draw of elk to visitors contributes significantly to the local economy.

Winter feeding of elk in Jackson Hole began in 1910 and was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. According to historical reports, before Euro-American settlement some Jackson elk wintered in the southern portion of Jackson Hole (present location of the NER town of Jackson) and may have used areas outside Jackson Hole, including the Green River and Wind River basins to the south and east, respectively, and the Snake River basin to the southwest in what is now eastern Idaho (Allred 1950; Anderson 1958; Blair 1987; Barnes 1912; Sheldon 1927). Radio-collar studies have documented small numbers of Jackson elk wintering in each of these areas in recent times as well (NER and GRTE, unpublished data). Over time, changes in land use and development in these areas, over hunting, and establishment of feeding grounds probably reduced the use of these areas by Jackson elk.

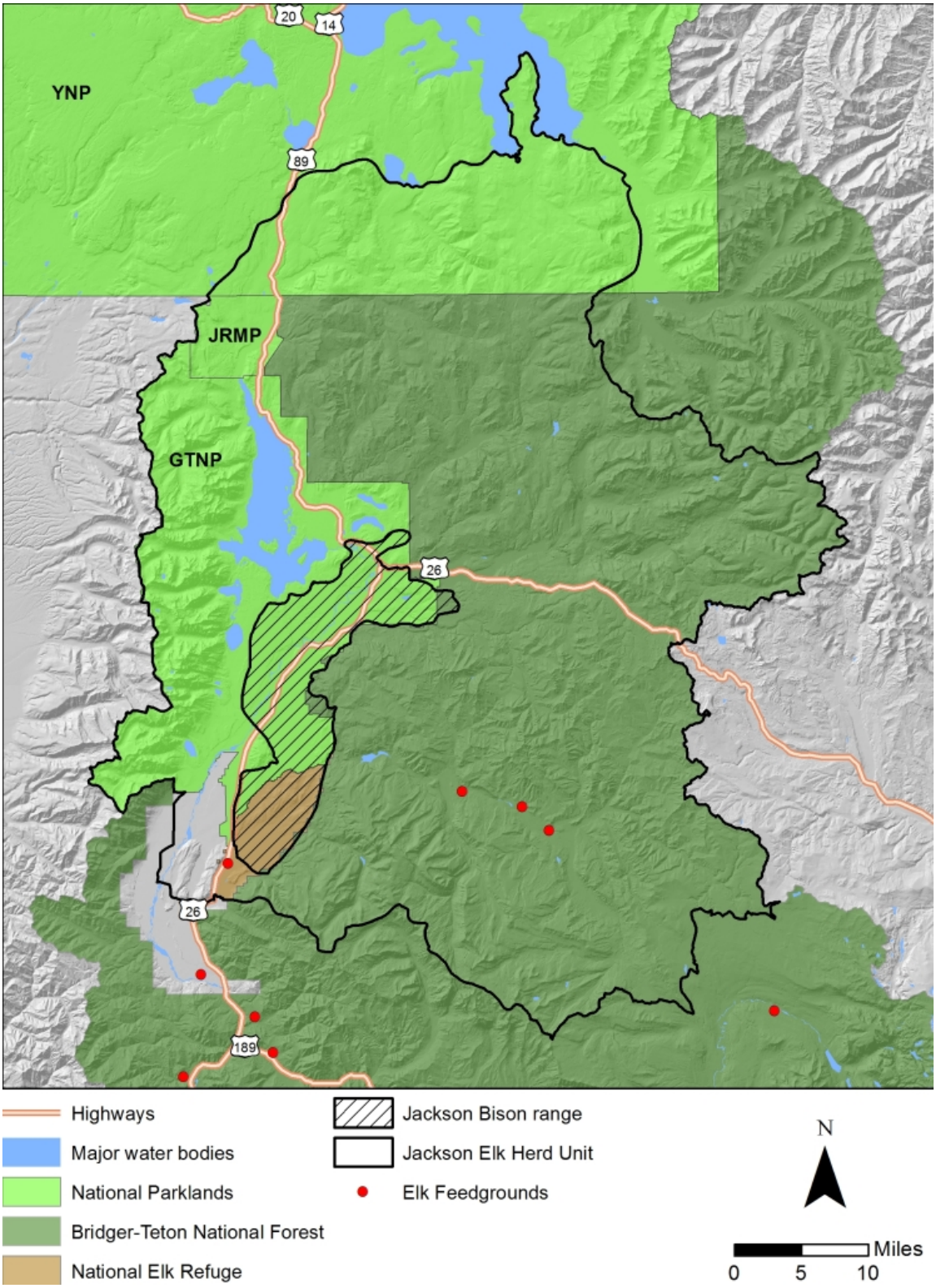


Figure 1. Jackson elk and bison herd ranges, including the National Elk Refuge, Grand Teton and Yellowstone National Parks, and Bridger-Teton National Forest.

By the end of the 19th century, the Jackson elk herd was believed to be largely confined to Jackson Hole and the immediately surrounding area, where wintering conditions are often harsh. Significant numbers of elk died during several severe winters in the late 1800s and early 1900s. The primary reasons for these mortality events included the loss of available winter range in Jackson Hole due to new ranching operations and an expansion of Jackson. The expansion prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, appropriated $45,000 for the purchase of lands and maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first winter census in the area was conducted in 1912 and showed about 20,000 elk residing in Jackson Hole and the Hoback River drainage (the latter is not within the Jackson elk herd's range).

Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding. In recent times, the population has fluctuated near the herd objective of 11,000 that was adopted by the WGFD (see Figure 2).

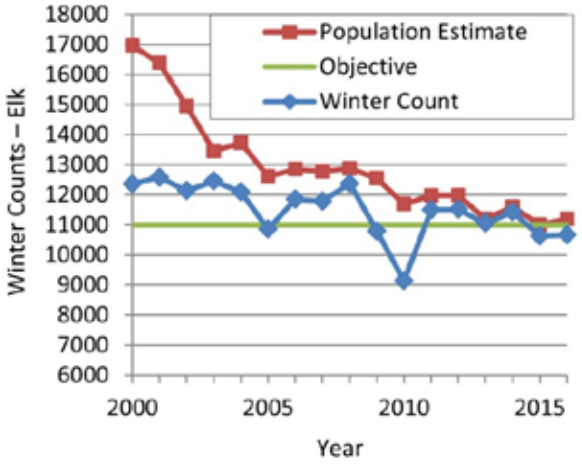


Figure 2. Winter Counts, population estimates, and herd objective for the Jackson elk herd, 2000-2016.

An iconic symbol of the American West, bison are also popular with visitors and residents. Because so few opportunities remain to see bison in the wild, viewing and photographing them in GRTE with the Teton Range in the background is a treasured opportunity for many of the valley's visitors. Similar to elk, there is also a high level of interest in bison hunting. Bison are of particular interest to nearby American Indian tribes and tribes in other parts of the United States because the animals are central to their culture and tradition.

Bison are native to Jackson Hole, as evidenced by the presence of prehistoric bison remains throughout the valley, but were hunted to near-extinction outside Yellowstone National Park by the mid-1880s. In 1948, 20 bison from YNP were reintroduced to the 1,500-acre Jackson Hole Wildlife Park near Moran. The Jackson Hole Wildlife Park was a private, non-profit organization sponsored by the New York Zoological Society, the Jackson Hole Preserve, Inc., and the WGFD. A population of 15–30 bison was maintained in a large enclosure there until 1963, when brucellosis was discovered in the herd (likely transferred with the original 20 animals from YNP). At that time, all the adult animals were destroyed, but four vaccinated yearlings and five vaccinated calves were retained. In 1964, twelve certified brucellosis free bison from Theodore Roosevelt National Park were added to the herd. In 1968, the herd (down to 11 animals) escaped the confines of the wildlife park, and a year later, the decision was made to allow them to range freely. The expansion of GRTE in 1950 had enveloped the Wildlife Park, and this allowed the bison to range freely and was consistent with National Park Service wildlife management policy. The herd remained small and wintered mostly in the Snake River bottoms in GRTE until 1975, when it followed the winter environmental gradient to the NER and began wintering there. The use of standing forage by bison on the NER was viewed as natural behavior and acceptable to managers. In 1980, bison discovered and utilized supplemental feed provided to elk in winter, and they have continued to do so ever since.

The discovery of supplemental feed by bison has had several consequences, including a significant increase in the population's growth rate (see Figure 3). Bison on the elk feedlines have at times disrupted feeding operations and displaced and injured elk. To minimize conflicts between bison and elk, managers have provided separate feedlines for bison since 1984. As the population has grown, separating elk and bison on feedlines has become increasingly difficult, and a variety of feeding strategies are employed to help reduce displacement of elk.

As the herd has grown it has maintained stable movement patterns, wintering almost entirely on the NER and summering within GRTE and adjacent lands on the BTNF (see figure 1).

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands and thereby reducing availability of these habitats to other wildlife as well as unusually low winter mortality, which has affected predators and other species and has required intensive hunting programs.

PLANNING HISTORY

Jackson's bison and elk populations have been the subject of previous planning efforts. Elk management and research has been guided by the Jackson Hole Cooperative Elk Studies Group since it was established in 1958. The group consists of biologists and agency administrators from the NER, GRTE, YNP, BTNF, and WGFD, who meet at least annually to coordinate management of the population and its habitat. Coordination of bison management began soon after they started frequenting the NER in 1976 and using supplemental feed provided to elk in 1980 (Figure 3). Release of an "Interim" plan that called for maintaining a herd of 90-110 bison while data were gathered for a long-term plan occurred in 1988. It was followed by implementation of a sport hunt outside GRTE, administered by WGFD. This plan was halted after litigation in which the plan's violation of NEPA was successfully argued by plaintiffs.

In 1996, after considerable herd growth, a new long-term management plan and environmental assessment for the Jackson bison herd was released (Fig 3). This plan had strong support and called for maintaining a herd size of 350-400 bison, but it was shelved a year later when plaintiffs from the earlier litigation successfully argued that, because the plan failed to consider the effects of feeding elk on bison management, it also violated NEPA and was not sufficient. This led to development of the draft bison and elk management plan and environmental impact statement from 2000-2006 and release of the final plan in 2007 (see Figure 3).

The 2007 Bison and Elk Management Plan (BEMP; USFWS 2007) considered six alternatives for bison and elk management focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The primary management scenarios presented in the alternatives included the status quo, terminating elk and bison hunting on the NER and the elk reduction program in GRTE, brucellosis vaccination options, restoring habitat, improving forage, and decreasing or phasing out supplemental winter feeding.

The final BEMP (USFWS 2007; www.fws.gov/bisonandelkplan) which set management direction for 15 years or until a subsequent plan is developed, proposed to maintain the state's elk herd objective of 11,000, establish a bison population objective of 500, restore habitat in the NER and GRTE, continue hunting bison and elk on the NER, continue the elk reduction program in GRTE in concert with the parks enabling legislation, allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available, and develop a dynamic framework of management actions which adaptively decrease the need for supplemental feeding on the NER.

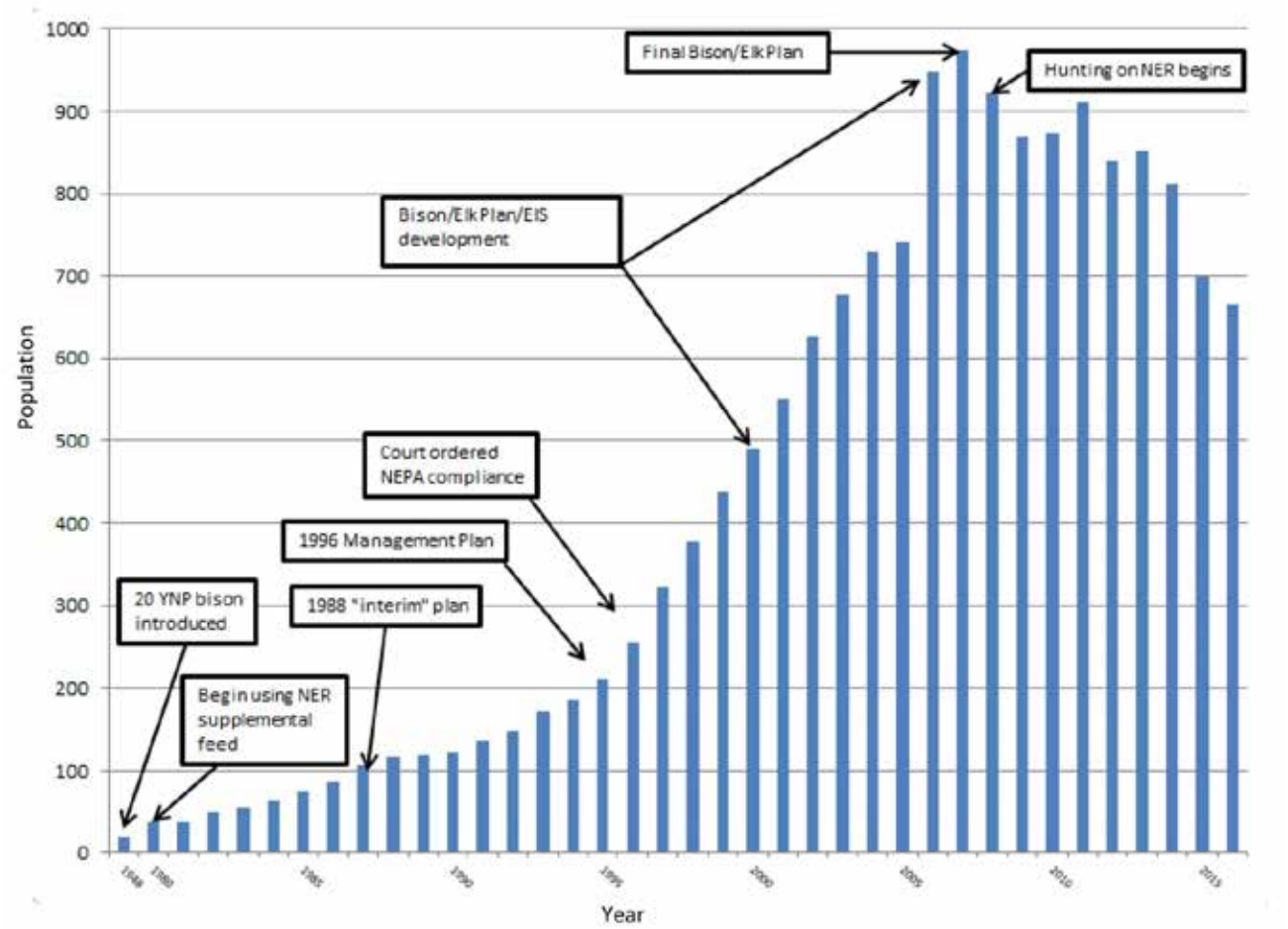


Figure 3. Population growth and planning history for the Jackson bison herd, 1948-2016

This Bison and Elk Management Step-Down Plan was developed to address the latter and specifically addresses the criteria for a structured framework listed on page 5 of the Record of Decision (see Figure 4). It does not address other on-going bison and elk management actions already prescribed by the BEMP.

The BEMP scheduled the completion of the Step-Down Plan for 2008. However, litigation challenging the BEMP in 2008 led to the decision to postpone its development until litigation was resolved. As of March 2015, two court rulings have upheld the 2007 BEMP and ROD. In a lawsuit against the BEMP and its author agencies (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2010), plaintiffs argued that the BEMP violated the National Wildlife Refuge System Improvement Act (National Wildlife Refuge System Improvement Act 1997) by disrupting the biological integrity of the Refuge, and that the plan and the accompanying EIS violated NEPA because they were insufficiently detailed to allow a reasonably complete discussion of mitigation. The crux of the plaintiff's argument was that the plan did not set a specific date for the cessation of supplemental feeding. In response, the agencies argued that the plan constituted a valid exercise of discretion and that it and the EIS were sufficiently detailed to satisfy the requirements of NEPA. In March 2010, the United States District Court for the District of Columbia sided in favor of the agencies in this case. In 2011, the plaintiffs appealed this ruling to the United States Court of Appeals for the District of Columbia Circuit. This Court affirmed the District Court ruling (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2011).

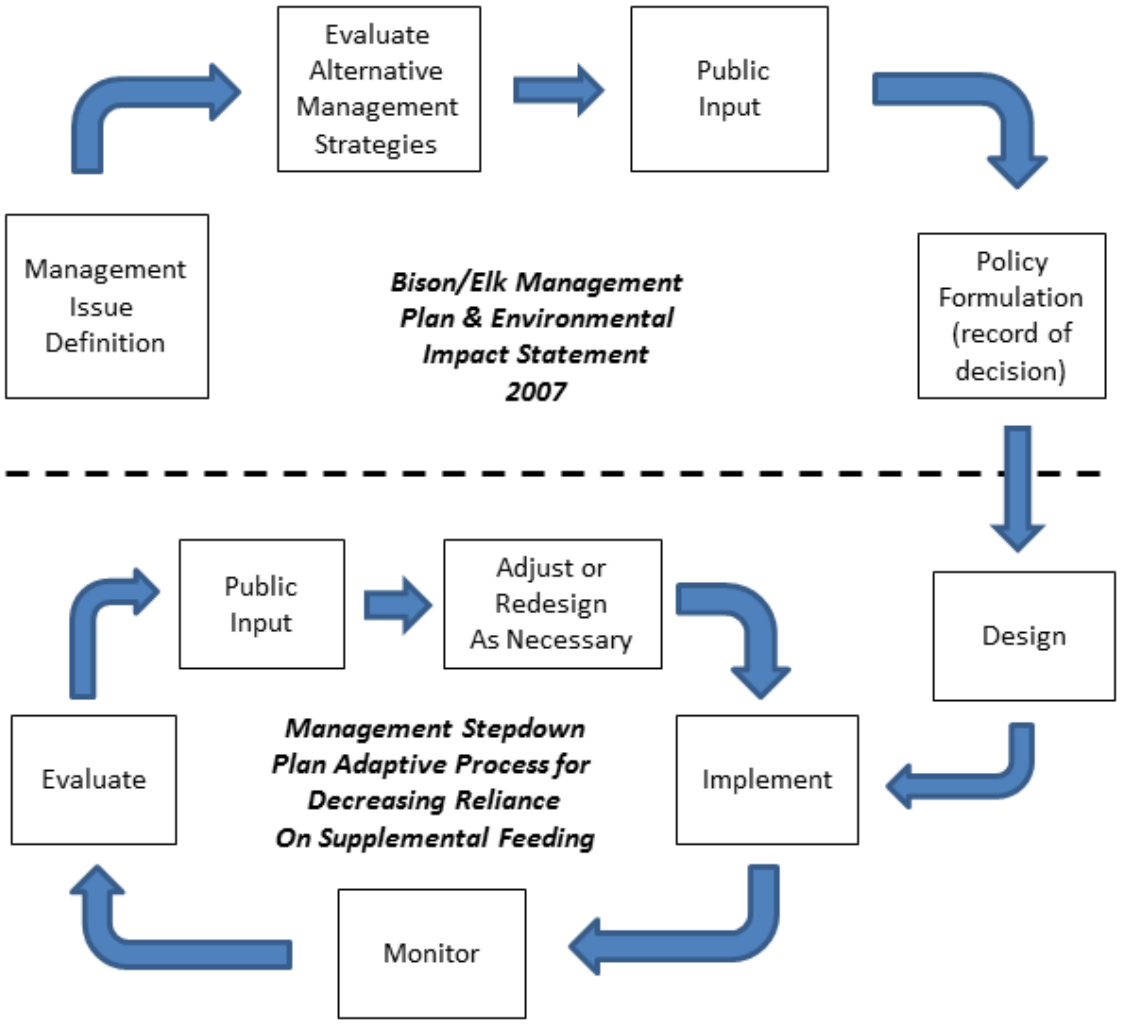


Figure 4. Step-down planning on the National Elk Refuge as it relates to the BEMP

National Environmental Protection Act Compliance

The 2007 BEMP/EIS and ROD satisfied NEPA requirements for current bison and elk management through a detailed analysis of alternative management actions and their likely effect on the environment, and substantial involvement of the public in the process. This step-down plan does not duplicate or add to this process. It is a tier of the BEMP to be used as a dynamic implementation guide to one part of the preferred alternative outlined in the BEMP ROD. As such, references to NEPA covered in the BEMP will be included where necessary in this document, and the discussion of any action that would require additional NEPA compliance will be explicitly stated as such in that context.

Step-Down Planning

The use of adaptive management plans has gained popularity in natural resource management planning because, by definition, they allow modifications of strategy based on

monitoring results and outcomes toward reaching specific goals or objectives. Four elements generally included in an adaptive management approach include:

1) well defined and mutually agreed upon objectives;
2) knowledge (including descriptive models) of the dynamics of the system being managed;
3) clearly articulated management actions and strategies; and
4) a monitoring program to evaluate responses of the system to management actions (Walters 1986).

This Step-Down Plan utilizes adaptive management planning principles but is not intended to include all of the adaptive management planning elements outlined in the Department of Interior Adaptive Management Technical Guide (2007). This Step-Down Plan is more accurately described as a "structured framework" of adaptive management actions that progressively transitions from supplemental winter feeding to greater reliance on freestanding forage (BEMP ROD p.5).

Table 1. 2007 Bison/Elk Management Plan Goals and Objectives
Goal: Habitat Conservation
Objectives:
· Conserve important private lands. · Increase forage production. · Minimize non-native plants. · Protect sagebrush grasslands. · Restore willow, aspen, and cottonwood. · Perpetuate natural mosaic of plant communities.
Goal: Sustainable Populations
Objectives (BEMP pages 135-136):
· Develop structured framework for reducing NER supplemental feeding.* · Phase reduction of animals on feed: 1) to 5,000 elk and 500 bison, and 2) elk and bison rely predominantly on native habitat.* · Maintain 35:100bull-to-cow ratios in park summer elk herd.* · Ensure a genetically viable bison herd with close to an even sex ratio. · Enhance public outreach/education.*
Goal: Elk and Bison Numbers
Objectives:
· Maintain state elk herd objective of 11,000. · Maintain a genetically viable bison population of about 500 animals.
Goal: Disease Management
Objectives:
· Manage brucellosis transmission risk from elk and bison to livestock. · Manage feeding to reduce brucellosis transmission among bison and elk. · Educate hunters about wildlife disease human health hazards.
Note: * Step-down plan objective

Objectives

The management direction and desired conditions stated in the BEMP called for the NER and GRTE staffs to work with others (agencies, partners, etc.) to "adaptively manage elk and bison in a manner that contributes to the State's herd objectives yet allows for the biotic integrity and environmental health of the resources to be sustained," so that the public can enjoy a variety of compatible wildlife-dependent recreational opportunities. Under the BEMP's four primary goals, 20 associated objectives were identified (see table 1). This Step-Down Plan addresses four objectives under the goal of sustainable populations (see Figure 5).

The reduction of animals on feed at the NER was proposed to be spread over two phases. In Phase 1, the aim is to reduce the average number of elk on feed to 5,000 (while maintaining WGFD's 11,000 elk herd objective), and reduce the winter population of bison to the BEMP recommended, and WGFD adopted, objective of 500. In Phase 2, the overall objective is to reduce the reliance of bison and elk on supplemental feed (USFWS and NPS 2007a). Desired conditions include animals relying predominantly on native habitat and cultivated forage on NER. Important consideration criteria for implementing Phase 2 will include: 1) the level of forage production and availability on the NER and adjacent winter ranges; 2) maintenance of desired herd sizes and age/sex ratios; 3) the ability to effectively mitigate bison and elk livestock conflicts; such as co-mingling on private lands during high risk disease transmission periods; 4) maintaining desirable winter distribution patterns of elk and bison; 5) the prevalence of brucellosis, chronic wasting disease, and other wildlife diseases; and 6) public support. In short, the overall objective of this plan is to outline a framework for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on freestanding forage, while maintaining population and herd ratio objectives.

This Plan focuses on management actions to achieve Phase 1 objectives. However, if successful, these actions will continue to be used to achieve the Phase 2 objective of reducing reliance on supplemental feeding while considering the six criteria listed above.

Management Actions and Strategies

BACKGROUND

The principal goal of reducing reliance on supplemental feeding is to limit transmission of density dependent diseases in elk and bison while simultaneously minimizing winter mortality in elk. We will attempt to achieve this goal by experimentally reducing feed season length and closely monitoring elk and bison distribution and winter mortality.

Elk have been fed on the NER each year in all but 9 winters since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during winter months is powerful to both species, and their knowledge of NER feeding grounds has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Because use of feeding grounds is a learned behavior, decreasing feed season length will potentially reduce the likelihood of elk that winter on native range finding NER feeding grounds. Over time, this could result in a greater percentage of elk using native winter range

relative to NER feeding grounds. Because it is largely unprecedented,

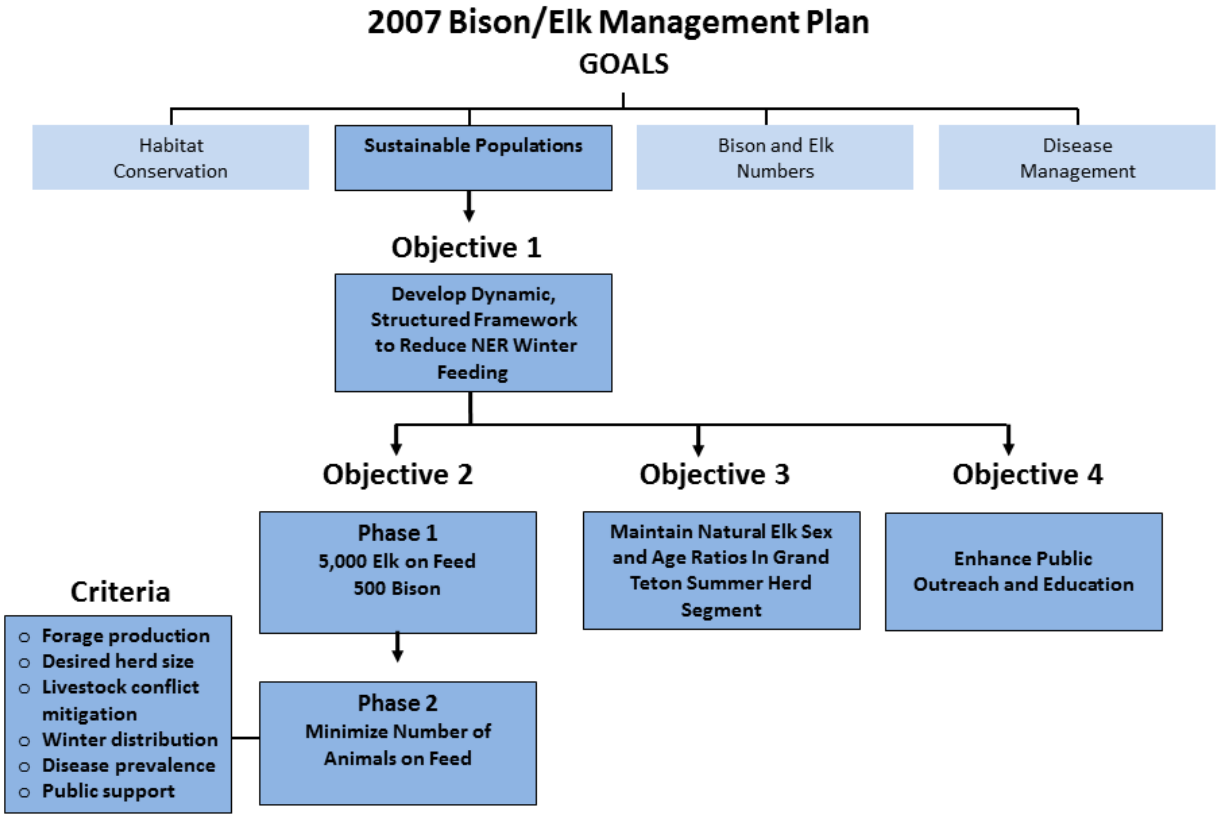


Figure 5. Relationship of the Step-Down Plan to the BEMP goals, phasing of objectives, and consideration criteria for Phase 2

the concept of modifying this behavior on such a large scale is daunting and poses questions for which there are no immediate answers. In some cases, the likelihood a specific management strategy's success will only be able to be roughly estimated, and unanticipated results are likely. Closely monitoring forage availability, elk and bison distribution, and elk mortality will allow us to evaluate the effectiveness of management actions and adjust management actions as needed should unintended negative consequences arise.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with landowners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into three broad categories: 1) timing and duration of winter feeding, 2) timing and intensity of hunting, and 3) overall and herd segment specific harvest levels.

IMPORTANT CHANGES SINCE 2007

The BEMP was developed based on data collected and knowledge that existed up until its ROD. Since then, important changes have taken place, some of which are advantageous to this effort and some of which are not.

A primary change that will facilitate meeting objectives under this plan is the reduction of the bison population from nearly 1,200 animals in 2007 to about 675 during winter 2015-2016 (Figure 3) through hunting programs administered by WGFD. Licensing changes enacted in 2014 included a reduction in the bison cow/calf license fee (from $416 to $263 for residents and $2522 to $1022 for non-residents) and eliminating the once-in-a-

lifetime restriction on a successful bison hunter to only those that successfully harvested a bull. Continued progress toward the 500 animal herd objective will require sustained harvest success.

During the same period, the Jackson Elk Herd has declined from nearly 13,000 to its objective of 11,000, but because the proportion of the Jackson elk herd that winters on NER has increased dramatically (see figure 6), this will make achieving the Phase I objective of 5,000 elk on feed and any future elk population reductions more difficult.

Frequently Asked Question

Question:

The BEMP has an objective of 5,000 elk wintering on NER. Why has that objective not been achieved through increased elk harvest/hunting?

Response

The overall Jackson Elk Herd population has declined and is currently close to the 11,000 elk objective, but the number of elk wintering on NER has been well above the 5,000 elk objective since implementation of the BEMP in 2007 (Mean =7,100 elk). When the analysis was conducted for the BEMP, elk winter distribution data suggested that 5,000 elk could winter on NER while still maintaining 11,000 elk in the Jackson Elk Herd overall. However, the proportion of the Jackson Elk Herd that winters on NER has increased significantly over time, and based on current elk distribution it is no longer possible to winter 5,000 elk on NER and maintain 11,000 elk in the overall Jackson Elk Herd. Although increasing elk harvest above current levels would likely allow us to achieve the 5,000 elk objective for NER, it would also reduce the overall Jackson Elk Herd population below the 11,000 objective. If increasing elk harvest is not plausible, the only other option to meet the 5,000 elk objective on NER is to change winter elk distribution, which is the principal strategy of the Step-down plan.

Preliminary analysis suggests that the increasing proportion of the Jackson elk herd wintering on NER has been associated with 1) Declines in elk use of native winter range and movements of elk from State feed-grounds in the Gros Ventre drainage to NER, and 2) increasing numbers of elk that summer immediately adjacent to NER (Cole and Foley et al. 2015).

Refuge-wide herbaceous forage production averaged 14,387 (SD = 4,125) tons during 1998–2013. In recent years, irrigation of approximately 3,600 acres has increased refuge-wide forage production by approximately 10% compared to what would have been produced with precipitation alone, and by 15% in the southern portion of NER that receives the greatest use by elk and bison.

Since 2007, the general awareness of climate change among the public has greatly increased. A strong, credible body of scientific evidence shows that climate change is occurring, is caused largely by human activities, and poses significant risks for a

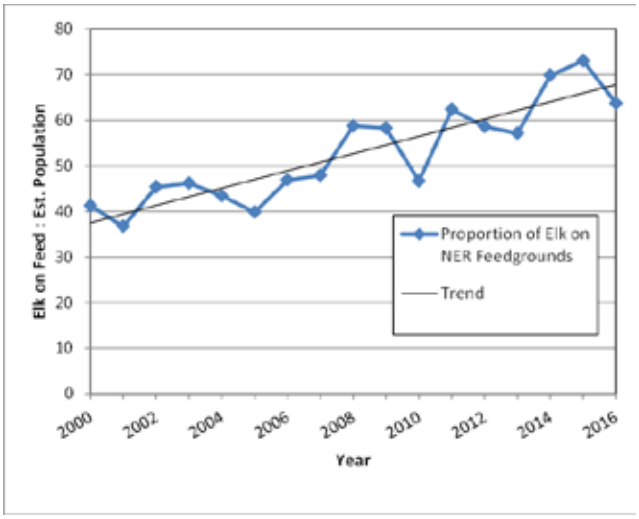


Figure 6. Trend of National Elk Refuge elk on supplemental feed as a proportion of the Jackson elk herd

broad range of human and natural systems (National Academy of Science 2010). Ecological systems in the GYE are likely to be affected and associated changes may have implications for elk and bison management. Moderate to long-term effects of climate change in Jackson Hole will likely include increases in average temperature, a reduction in the duration and distribution of snow cover, an increase in the number of frost free days, increased wildfire frequency, and changes in plant community composition and structure including loss of forest and shrub cover and an increase in invasive plants (Riginos and Newcomb 2015). The net effect of these changes relative to the

implementation of the Step-Down Plan remains uncertain.

CURRENT MANAGEMENT

Ongoing primary management actions on the NER include winter feeding, harvest, irrigation, and hazing. In GRTE, harvest of elk during the Elk Reduction Program takes place, when necessary, in collaboration with WGFD, and restoration of previously cultivated and irrigated sagebrush-grasslands is ongoing. Fundamental components of each of these will be briefly described below to provide a basis for comparison to Step-Down Plan strategies that will follow.

CHRONIC WASTING DISEASE

Supplemental feeding has occurred in all but 9 winters on NER since 1912, and although this strategy minimizes winter elk mortality from starvation, contributes to Wyoming state elk herd objectives, eliminates commingling with livestock, and keep elk off adjacent roadways, elk occur at numbers and densities well in excess of carrying capacity (Smith et al. 2004, Lubow and Smith 2004). Considerable evidence suggests that Chronic Wasting Disease (CWD) transmission and prevalence are density dependent (Peters et al. 2000, Williams et al. 2002). Monello et al. (2014) found that elk densities of 15-110/km2 (0.06 to 0.45/ac) in Rocky Mountain National Park were associated with 13% CWD prevalence, and they predicted elk population declines when CWD prevalence exceeded 13%. NER elk densities range from 77-16,850/km2 (0.31-68/ac; NER unpublished data), which suggests that the introduction of CWD to NER elk would have significant negative population effects over time.

WINTER FEEDING

Initiation of feeding has the primary objectives of 1) minimizing elk winter mortality, focusing on calves since they are the most susceptible age class, and 2) minimizing comingling of elk with cattle on nearby adjacent private lands. Winter feeding begins when available forage reaches approximately 300 lbs./ac. Historic radio telemetry data and observations of elk movements indicate that when available forage declines below 300 lbs./ac., some elk leave NER for surrounding private lands. Therefore, the purpose of this feeding "trigger" is to keep elk on the NER and prevent them from searching for forage off the NER, which would increase the potential of comingling with cattle causing damage to private lands, and moving across Highway 89 where the risk of vehicles hitting elk is high. This trigger is not a warning that a significant nutritional deficit threshold has been reached. Available winter forage for elk and bison on the NER is determined by biomass of forage produced during the previous growing season, rate of forage consumption during fall and winter, and snow conditions.

Index sites are used to sample forage biomass and determine when feeding should be initiated. These sites are selected annually to represent plant communities that are highly preferred by elk due to plant species composition and the persistence of green vegetation. Weekly sampling begins in late December to estimate available forage biomass at each index site. When average available forage across index sites is below 300 lbs./ac, biologists typically recommend that supplemental feeding be initiated.

During 1995–2013, the average initiation of winter feeding in NER occurred 28 January (range = 30 December–28 February), and feeding was terminated on 3 April (range = 20 March–20 April). Variation in feeding initiation and termination dates has been based on winter conditions and a desire to avoid elk-cattle comingling on nearby private lands. Coordination of winter feeding dates on the NER and WGFD-operated Gros Ventre drainage feeding grounds (Alkali, Patrol Cabin, and Fish Creek) occurs annually to help minimize movement of elk between these areas. This coordination will continue regardless of the management strategy employed. The relationship of recent elk numbers and objectives for NER and WGFD-operated feeding grounds and native range is shown in Table 2.

Table 2. Annual distribution of wintering elk from the Jackson elk herd during February classification counts relative to the current objective, 2011-2016

	Objective	2011	2012	2013	2014	2015	2016	Mean
NER	5,000	7,746	7,360	6,285	8,296	8,390	7,290	7,561
Gros Ventre	3,500	2,775	3,265	2,982	2,326	1,162	1,667	2,362
Native Range[1]	2,500	982	894	1,784	801	913	1,711	1,180
Total	11,000	11,503	11,519	11,051	11,423	10,465	10,668	11,105

[1]Excludes objectives for native range adjacent to Gros Ventre feeding grounds.

Bison discovered refuge feeding operations in 1980, and since that time, they have been fed each year to help minimize disruption to elk feeding operations. Because bison displace elk from feedlines, NER staff attempt to feed most bison in the northernmost refuge feeding ground and provide a heavy feed ration, which helps keep them in this area. This strategy prevents bison from mingling with elk and prevents bison from moving to areas where conflicts with humans are more likely.

HARVEST

Total hunter harvest of the Jackson elk herd was gradually reduced over the last decade as the population neared objective (see Figure 7). Elk hunting on the NER (Hunt Area 77) typically begins in mid-October and ends in mid-December, with peak harvest in recent years occurring in late November to early December. From 2005 to 2015, 422 ± 102 (mean ± SD, range = 329-612) hunters harvested 196 ± 95 (range = 126-457) elk per year during the NER hunt.

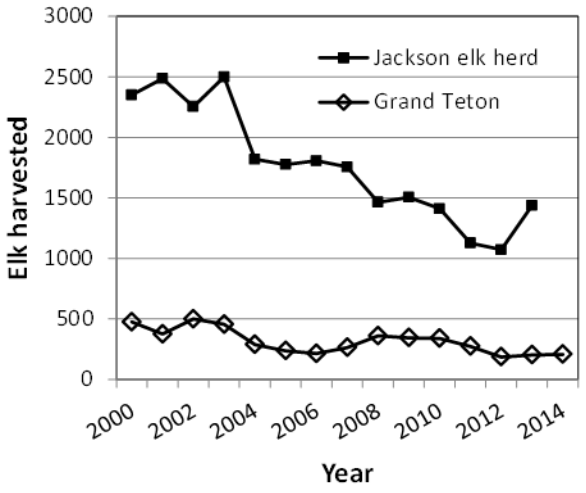


Figure 7. Estimated elk harvests for the whole Jackson elk herd and the portion that occurs in Grand Teton National Park, 2000-2014

The 1950 legislation that created GRTE provided for a controlled reduction of elk, when necessary, in specific portions of the park, primarily east of the Snake River. Elk reduction programs have taken place in the park each year since 1950 except two (1959 and 1960), when GRTE and WGFD officials agreed a reduction was not necessary (Figure 8). Season dates have varied over the years but recently have run from mid-October to early-December. The GRTE harvest accounts for about 25% of the overall Jackson elk herd harvest, and has been an important factor in regulating the population. Increased predation, likely a result of increases in grizzly bears and wolves over the last 20 years, has decreased the need for large harvests in GRTE.

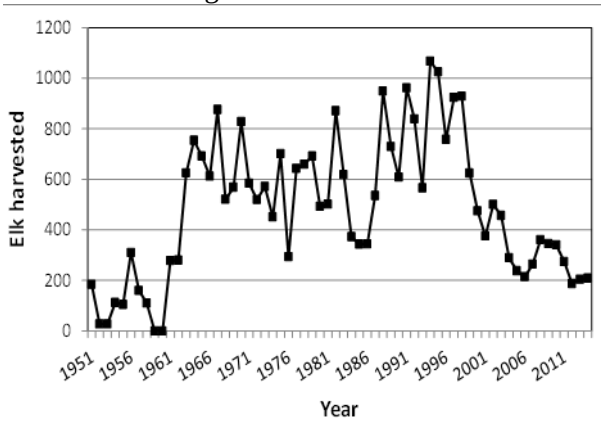


Figure 8. Elk harvest in Grand Teton National Park, 1950-2015

Bison hunting begins 15 August and ends in early to mid-January. Most harvest occurs on the NER, with some additional harvest on private and BTNF lands. Since resuming the bison hunt in 2007, harvest has been 210 ± 45.5 (range 139-301) bison per year. This level of

harvest has been sufficient to arrest the exponential growth of the population; reducing bison numbers from the peak in 2007 to about 700 animals in winter 2015 (see Figure 3). Tribal bison harvest of up to five animals for ceremonial purposes was authorized in the BEMP. Translocation of wild bison to lands outside of Teton County is not currently permitted due to brucellosis concerns.

Bison hunting is not allowed in GRTE because of long-standing NPS policy that prohibits most hunting in national parks. Bison quickly learned to take advantage of the safety of GRTE, which has made hunter harvest goals difficult to achieve. Many bison stay in GRTE during the hunting season, with only occasional short-term movements to the NER, until severe winter conditions occur. In response, NER and WGFD managers have attempted to extend the hunt to late January while minimizing the conflict with the initiation of winter feeding. The unpredictable nature of winter conditions that time of year makes this challenging, and has (or could) result in the use of emergency season extensions or reductions.

HAZING

NER staff haze elk and bison to conserve winter forage, prevent year-round use of winter range, and in some cases to prevent elk and bison from moving to private lands or other areas where conflicts with humans are likely. Hazing using ATVs has proven most effective. The strategy is typically employed during 3 time periods: 1) in May to move elk and bison off NER that are lingering on NER winter range; 2) in July when some bison typically return to NER; and 3) in the period just prior to feeding initiation when elk and bison are most likely to leave NER for private lands. Hazing of elk and bison by WGFD staff also occurs on private lands adjacent to NER periodically throughout the year.

VEGETATION RESTORATION AND PROTECTION

The BEMP identified approximately 4,500 acres of previously irrigated and cultivated grasslands in GRTE in need of restoration to native sagebrush grasslands community. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. After 2 years of research and field studies, restoration efforts began in 2008. The restoration process involves several steps including removal of non-native vegetation through repeated herbicide applications, collection, and propagation of native grass, forb and shrub seeds, and finally native seeding. Repeated herbicide treatments have been warranted prior to native seed planting as well as spot treatments of invasive weed species subsequent to native seeding. Substantial progress in this endeavor has been made since 2008, including 1,235 acres of previously cultivated lands under restoration treatment. Of the 1,235 acres undergoing treatment, 745 acres has been seeded with native grass, shrub, and select forb mixes, and 89 acres is considered fully restored. Two-hundred and seventy-five of these acres are currently fenced to reduce grazing pressure of early native vegetation establishment from bison and other ungulates. An additional 490 acres are targeted for native seeding in 2016 once removal of the invasive vegetation is successful. All treatments are monitored for native plant establishment and invasive plant infestations and treatments will be adjusted as necessary. Invasive plant treatments may have to continue indefinitely. GRTE will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

PRIVATE LANDS MITIGATION

Fencing of haystacks and livestock feedlines has been historically used to mitigate particularly difficult conflicts on private lands. Targeted fencing of golf course greens and sand traps fall through spring has also been successful in some situations for mitigating elk and bison presence and associated damage in these areas. It is important to note that the county has a “wildlife-friendly” fence policy and

does not support extensive fencing that is impermeable to wildlife in residential areas.

COMMON METHODS, ASSUMPTIONS, AND CONSTRAINTS

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes, particularly population sizes. Measurements of the Jackson bison herd will be based on the annual mid-winter census and sex and age classification survey performed by NER, GRTE, and WGFD biologists. This survey occurs one day in February and includes ground counts of animals on feed at the NER and aerial counts of outlying bison across their winter ranges on the refuge, park, and Bridger-Teton National Forest.

Elk population estimates will also be based on mid-winter aerial and ground counts. However, the mid-winter counts are undertaken during a single survey period and do not necessarily represent either peak or cumulative abundance of elk on feed. Rather than basing progress toward the number of elk on feed for the entire season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 elk were fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000.

We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both species on supplemental winter-feeding.

Initial success of the Step-Down Plan will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP does not provide specific measurement criteria to determine when the NER has successfully attained the objective of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage", we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. This level was chosen to define success because it indicates that elk and bison will predominately be foraging on freestanding natural and cultivated plants on NER and adjacent winter ranges rather than on supplemental feed.

Several management constraints are common to the strategies discussed below (Table 3). Many law and policy constraints are applicable but we include here only those most pertinent. Endangered Species Act (16 USC 1531 et seq.) requirements for wolves, grizzly bears, lynx, and others apply. Lynx requirements for maintaining certain habitat types could limit methods used and areas considered for habitat improvements in GRTE and the BTNF. Such improvements could increase elk and bison use of native winter range off the Refuge while simultaneously reducing use of feedlines. Similarly, compliance with the 2015 sage grouse amendment to the 1990 Bridger-Teton National Forest Land and Resource Management Plan and the Wyoming greater sage-grouse core area protection executive order (2011-5 and supplement 2013-3) could affect habitat manipulations. NEPA compliance conducted as part of the BEMP/EIS constrains what federal actions can be taken as a part of this plan. State regulations constrain late (winter) hunt and carcass disposal timing to protect against brucellosis contamination, since February-April represent the period bison and elk are most likely to transmit the disease. Restrictions on hunting timing also result from BTNF winter range closures, immediately east of the NER and elsewhere, December 1 to April 30. Additional details about these and other constraints will be included in discussions about specific strategies that follow.

Table 3. Summary of potential step-down plan constraints
Policy
· ESA[1] Lynx – limits on habitat impacts
· Greater Sage Grouse – core area protection
· 2007 BEMP/EIS (federal actions/lands)
o No fertility control
o No test and slaughter
o Limited tribal ceremonial take
· Bison/elk hunt end date (Feb. 1st)
o WGFD, brucellosis safety
· Carcass disposal (Feb. 15th)
o WGFD, brucellosis safety
· Forest Service winter closure (Dec. 1st – April 30th)
· Easement limitation (NER boundary)
Winter Feeding
· Only during non-hunting periods
Harvest
· State regulations
Vegetation Restoration/Protection
· Bison/elk distribution
· Exotic plant species management
Private Lands
· Owner agreements
Social
· Hunter density (safety; hunt quality)
· Elk/bison winter mortality levels
· Public safety (ungulate/vehicle collisions)
· Disease
· Land-use conflicts (agricultural and residential)
Biological
· Disease (bison/elk/cattle commingling)
· Sage grouse habitat conflicts
· Fencing/wildlife conflicts
· Elk herd distribution
o summer segment distribution goals
Funding
· Easement purchase
· Plan implementation

Note: [1]Endangered Species Act

Strategies

This section describes the management action this Step-Down Plan proposes to implement. As such, it unveils the heart of management changes proposed to begin the process of transitioning to greater reliance of bison and elk on native forage during winter. Fundamentally, the strategies discussed in this plan represent an experiment designed to achieve Phase I objectives of 5,000 elk and 500 bison on NER and are a first step towards reducing reliance on supplemental feeding while meeting the sustainable population goals identified in the BEMP.

Initial strategies for achieving sustainable population goals identified in the BEMP (Table 1) are presented by the objectives below. The primary management actions available to the agencies to achieve Phase I objectives are modifications to winter feeding and hunting seasons. To a lesser extent, vegetation protection and restoration can be important, particularly for improving long-term ecological function and enhancing natural production of native forage. Private lands are also an integral component as changes in elk and bison distribution occur and new challenges develop. The likely consequences of implementing these strategies were evaluated in the BEMP. The most relevant of these are summarized in Appendix A.

OBJECTIVE

1) Implement a phased reduction of animals on NER feed to 5,000 elk and 500 bison, and,
2) influence elk and bison to rely predominantly on native habitat (Table 1).

The first phase will be to reduce the number of elk on NER feed to approximately 5,000 and achieve a target population of about 500 bison. The second phase will be to manage bison and elk populations to achieve desired conditions, with animals relying predominately on available native habitat (NER, GRTE, and USFS lands) and cultivated forage (NER).

As previously mentioned, reducing winter feeding after more than 100 years of the practice; and the associated behavioral conditioning of elk and bison to its presence; represents a formidable challenge that must be approached cautiously and systematically. Efforts to scale back elk supplemental feeding operations in other parts of North America have been rare and fraught with controversy (Smith 2001). The strategies discussed below have been developed in this context, with appropriate feedback mechanisms through rigorous monitoring and frequent evaluation. Inability to meet this objective under the strategies presented here would trigger a thorough evaluation and consideration of more aggressive strategies when the BEMP is updated in 2022.

Chronic Wasting Disease

Since 1997, NER has cooperated with WGFD to conduct intensive surveillance for CWD in the JACKSON ELK HERD unit. GRTE has also collaborated with WGFD to collect samples from the ERP and from road-killed cervids. Although this effort indicates that CWD is not currently found in the Jackson elk herd, continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence annually will be critical to ensure a timely management response and limit the long-term population effects of the [USFWS and NPS, 2007b]. Given that CWD has been detected within 40 miles of the Jackson elk herd in moose, within 35 miles in deer, and within 175 miles in elk, this level of surveillance is warranted.

In 2016, the WGFD cooperated with federal agencies and other stakeholders to revise the 2006 Wyoming CWD Management Plan. The NER and USFWS Region 6 Wildlife Health Office staff participated in several meetings associated with this effort. The Wyoming CWD Plan lists several management responses for consideration if CWD is detected on or adjacent to State or NER elk feeding grounds. Early detection of CWD in the Jackson elk herd is essential to allow implementation of management responses.

The BEMP (2007) identifies the management response to the arrival of CWD as following the State of Wyoming CWD Plan in effect in 2007. The Wyoming CWD Plan was

updated and significantly changed in 2016. In light of changes in the Wyoming State CWD Plan, and the results of CWD Studies completed since 2007, the NER management response to CWD will be reviewed and updated in a NER Disease Contingency Plan, as identified in the NER Comprehensive Conservation Plan (2016). The CWD section of the NER Disease Contingency Plan will remain consistent with the goals of the BEMP. The NER Disease Contingency Plan is scheduled to be completed in 2017.

Winter Feeding

Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the end, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning animals to "expect" feed to be available later in the winter; this could build cohorts of animals that rely primarily on native winter range. To reduce supplemental feeding, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, which is the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding (Figure 9) and identify private land conflict areas that may require assistance with focused mitigation measures.

As bison and elk behavioral responses are better understood, and targeted mitigation on private lands is achieved as needed, feeding delays will be extended depending on several variables (see Table 4, Figure 10). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the Step-Down Plan, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence on feeding initiation date, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Forage availability would also be affected by the numbers of elk and bison on the NER. Finally, the distribution of animals, particularly on private, livestock producing lands would be considered in determining feeding initiation date.

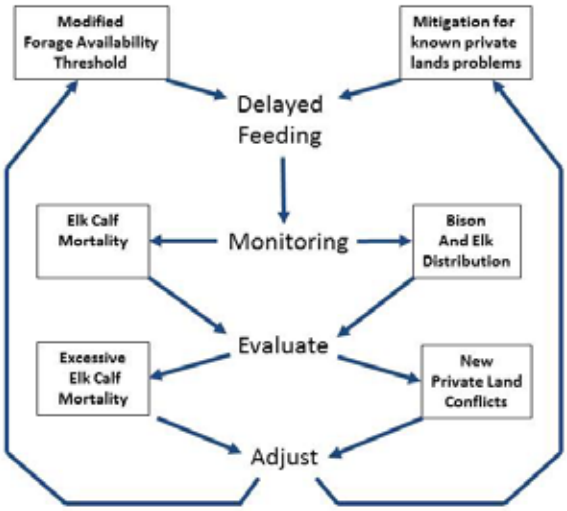


Figure 9. Framework for delayed feeding strategy under the step-down plan

Frequently Asked Question

Question:

Why is your principal strategy to delay the start of the feed season?

Response:

By delaying the start of the supplemental feed season, we decrease the probability that elk that use native winter range or state feeding grounds will discover NER feeding grounds. Because elk use of feeding grounds is a learned behavior, over time this could increase the proportion of elk that winter on native winter range, reduce the number of elk that move from the Gros Ventre drainage to NER, and decrease the NER wintering elk population. The resulting shift in elk distribution would allow us to achieve the 5,000 elk objective for NER. Because 5,000 elk and 500 bison is close to the estimated carrying capacity of NER habitat, less feeding will be necessary at these population levels.

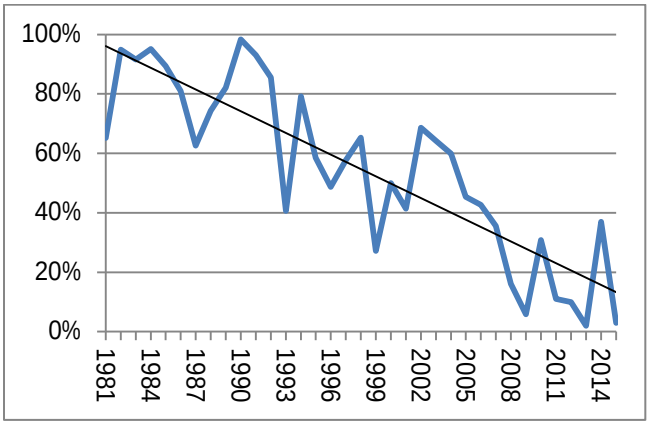


Figure 10. The percentage of elk that wintered on NER as of December 1; showing a progressively later annual fall/winter arrival over the past several decades

A primary concern of manipulating feeding is elk winter mortality, particularly among calves. For example, research on unfed elk populations in Yellowstone National Park suggested an average elk calf winter mortality of 28%, with the majority of cases caused by malnutrition (Singer et al. 1997). Similarly, Smith and Anderson (1998) found unfed winter elk calf mortality of 29% compared to 11% for elk calves using feeding grounds. As food becomes limited in winter, calves are usually the first to experience nutritional deficit and winter mortality because they are displaced by animals that are more dominant, they have limited fat reserves, and are more susceptible to cold temperatures than larger animals. Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If Step-Down Plan implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years (Appendix A).

In the early years of Step-Down Plan implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management, feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date during the period of Step-Down Plan implementation.

The Step-Down Plan winter feeding strategy would include the establishment of additional key forage index sites and on-going measurements at those sites throughout the winter.

Harvest

Currently the Jackson elk herd is at the Wyoming Game and Fish Commission established objective of 11,000 animals, which means there is less flexibility in manipulation of harvest regimes than there would be if the herd was above objective. Initially there would be little change in elk harvest programs on the NER, with the exception of allowing a limited number of any elk permits throughout the season, considering allowing bow hunting near developed areas (roads and buildings) and shifting the season about a week later (Table 4). Allowing a limited number of any elk permits would be consistent with providing sport hunting recreation on National Wildlife Refuges (NWRS Improvement Act; 1997) and the NER CCP [USFWS, 2015] and possibly encourage more hunters to participate in antlerless elk hunts. Monitoring programs and consideration of bull ratios in the GRTE summer segment (since most park bulls migrate to the NER) would help inform levels of proposed take. Bow hunting in areas currently closed to firearms will likely increase harvest by eliminating “no-hunt” areas, which can become sanctuaries for large numbers of elk. Shifting the hunt one week later is consistent with later migrations and will improve harvest effectiveness (see Figure 10).

General elk harvest patterns in GRTE would continue to be based on need for harvest, summer segment population estimates, herd status relative to population objective, herd demographic parameters, herd-wide distribution of harvest, and mitigation for impacts on other resources and visitor activities.

Elk herd population objectives are reviewed every five years by the Wyoming Game and Fish Commission and adjusted as necessary. Agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future Jackson elk herd population objective. Lowering the population would help compensate for reduced use of traditional native winter range and increased growth of short-distance migrants, which has led to significant increases of winter elk concentrations on the NER.

The annual fall/winter arrival of elk to the NER during the past several decades has been occurring progressively later. This trend may necessitate extending the elk-hunting season later into the year to achieve harvest objectives.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later end dates that are commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution. Special limited hunts designed to discourage bison from attempting to leave the NER via the south boundary into the town of Jackson will also be considered. If progress toward reaching the herd objective of 500 animals continues and the objective is reached, WGFD will adjust harvest quotas in the context of the objective, as necessary, to address population changes through time.

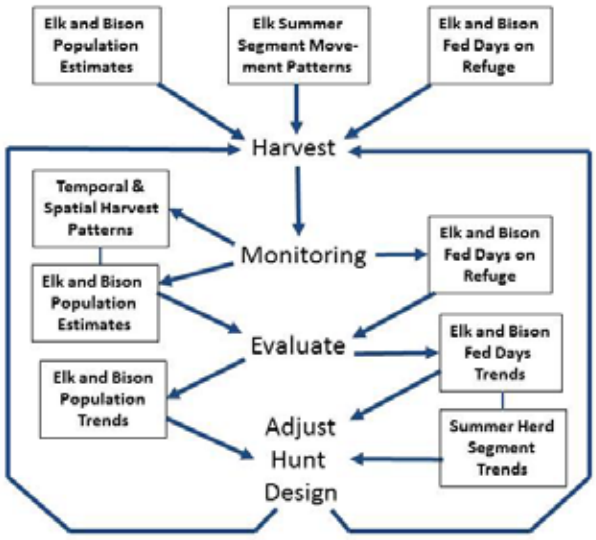


Figure 11. Framework for harvest strategy under the step-down plan

A cattle guard was installed on the Refuge Road near the east end of Broadway Avenue to help prevent bison and elk herds from entering the Town of Jackson. This will reduce the potential for dangerous human/wildlife interactions.

Currently, the effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives, but also that elk are sensitive to hunting pressure that can cause elk movements to areas that cause management issues for WGFD. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1 in the future.

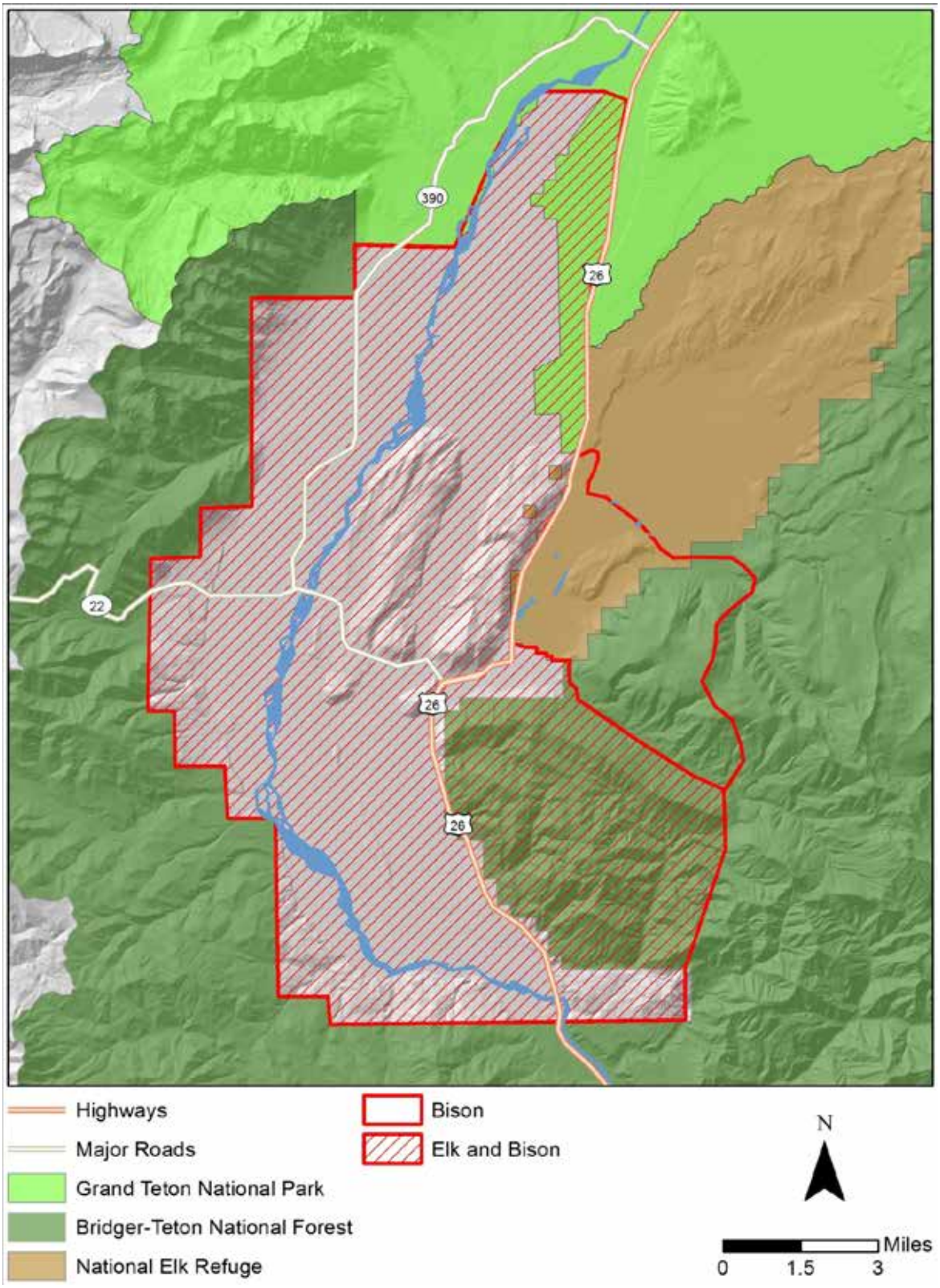


Figure 12. Areas with high potential for conflict of elk and bison with human activities. Significant elk or bison movements to these areas from NER during winter months could result in changes and/or review of the step-down plan.

Annual herd-wide population estimates, elk summer herd segment estimates in GRTE and NER, temporal and spatial harvest patterns, and animal-fed-days would be monitored, and the resulting information would be used to inform ongoing evaluation of elk and bison management harvest programs (Figs. 9 and 11).

Hazing

No change in hazing practices is anticipated initially under this Step-Down Plan framework.

Private Lands Mitigation

Delaying the onset of NER, feeding is likely to result in changes in bison and elk distribution (Appendix A). Some elk or bison may move to private lands in search of forage. Of greatest concern is the potential for elk or bison to commingle with cattle of cow/calf operations, where brucellosis transmission could have considerable consequences, such as requiring depopulation of the cattle herd.

Several strategies would be employed to mitigate potential problems (Table 4), including providing incentives for non-breeding cattle operations (because brucellosis transmission to slaughter-bound cattle is not economically important), increased fencing in some limited areas to separate elk/bison from livestock feed lines, haze elk/bison away from livestock feed lines and purchase private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal Wildlife Conflict Technician positions that are supervised by the WGFD. These Technicians are also critical to the success of an expanded monitoring program vital to the Step-Down Plan (see Monitoring section below).

A database will be established to track non-agricultural conflicts on private lands to determine trends that will help evaluate the effectiveness of Step-Down Plan mitigation efforts.

Preventing elk and especially bison from entering the Town of Jackson is essential in maximizing public safety and minimizing private property conflicts. Currently, bison are hazed northward when they drift south of Miller Butte. A cattle guard was installed on the Refuge Road just north of Broadway Avenue. This barrier is designed to prevent elk/bison from entering the Town of Jackson.

Vegetation Restoration/Protection

The varied approaches to restore the Kelly Hayfields in GRTE (4,500 acres) was initiated in 2008 following 2 years of research and field studies (Moeny 2008) (see Figure 13).

The approach to ecological restoration includes serial treatments to

1) remove non-native species (e.g., herbicide application and prescribed burning);
2) seed native shrub, grass, and forb species; and
3) treat subsequent invasive plants by applying herbicides and, where appropriate, construct temporary fences to protect recently seeded pastures from colonization of non-native species and damage from large herbivores during early phases of restoration.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres within 7 pasture units are currently under restoration treatment and 3,265 acres remain non-native grass pasture (as of 2016; Figure 13). The non-native grass pastures are divided into 13 pasture treatment areas and are projected to be restored by 2035. As of 2016, approximately 745 acres are seeded with native vegetation, and 89 acres are considered fully restored. Maintenance of restored ecological conditions, however, will likely require management efforts in perpetuity to keep non-native species from colonizing restored areas. All 1,235 acres that are underway toward ecological restoration are being monitored for native plant establishment, invasive plant infestations, including cheatgrass spread. Park staff will continue to monitor and adaptively adjust treatments and restoration strategies according to our results.

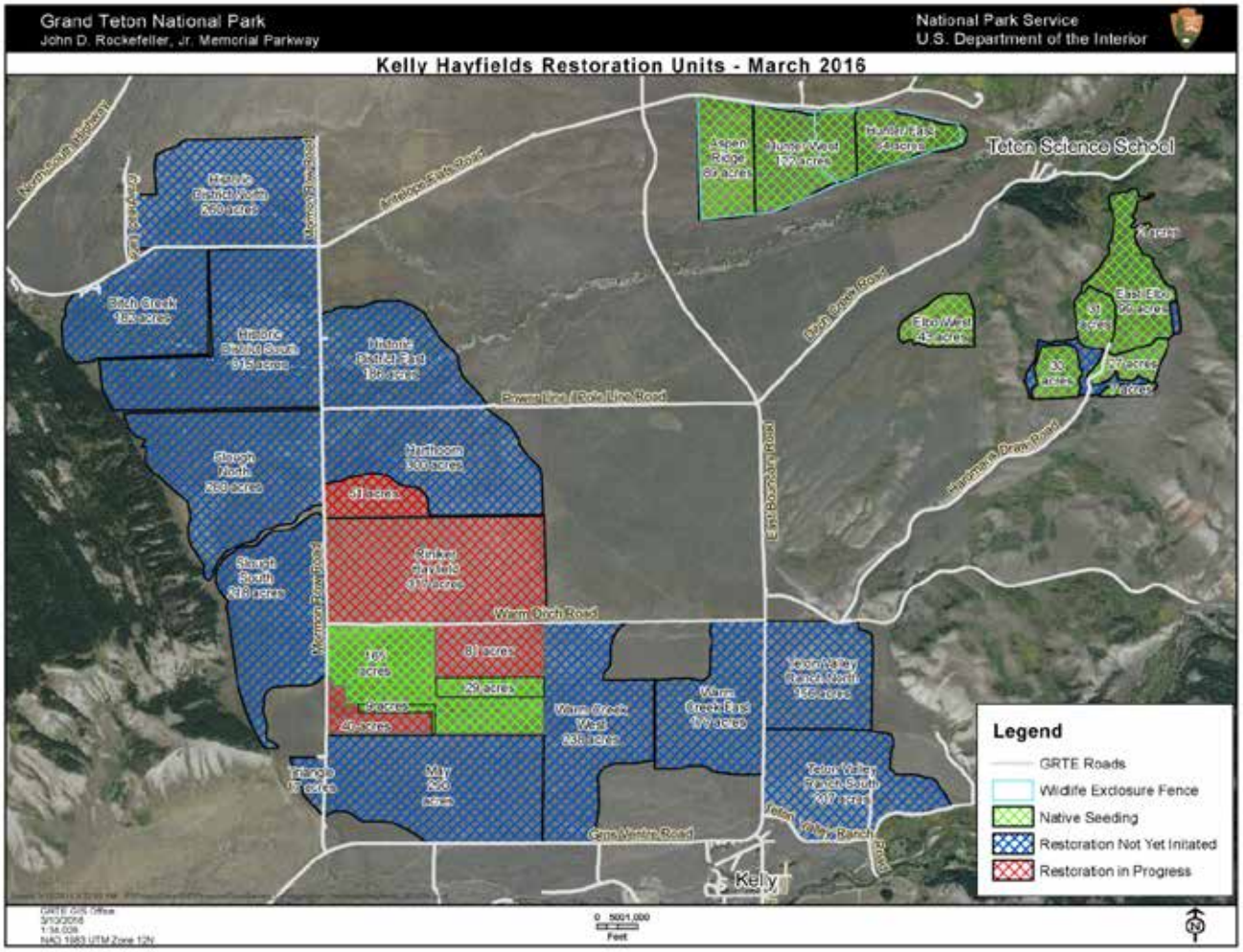


Figure 13. Units and status of the Kelly Hayfields ecological restoration effort in Grand Teton National Park, March 2016

OBJECTIVE

1) Maintain bull-to-cow ratios in park summer herd (Table 1).

National Park Service management policy (NPS 2006) provides guidance for maintaining naturally regulated wildlife populations, free from the impacts of humans, to the greatest extent possible. The final BEMP identified a goal of maintaining park elk bull:cow ratios (a common way of expressing sex and age ratios in wild ungulate populations) near 35 adult bulls per 100 adult cows, based on estimates of what this ratio would be in a herd free from the effects of human harvest. The sex and age ratios of most North American elk populations are affected by sport hunting and herd managers generally maintain lower bull ratios.

Harvest

Based on summer bull ratios for elk in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded refuge hunting opportunities are considered.

Table 4. Comparison of current and primary step-down plan components and parameters			
Action	Current Management	Management	Comment
Winter Feeding:			
Feed	Pelleted alfalfa	Pelleted alfalfa	No change
Ration	Full ration average: 8-12 lbs./day/elk	No Change	No change, to minimize calf mortality. Note average daily ration over the entire feed season is lower than a full ration because feed rate is gradually increased at the beginning of the feed season and gradually reduced at the end to facilitate rumen acclimation
	20-22 lbs./day/bison	20 lbs./day/bison	
Start criteria:			
Available standing forage	300 lbs./acre, as measured at traditional key index sites	Generally later; index sites to be increased in number and distribution	Influencing factors: -time of season -forage availability -number of elk/bison on NER -elk/bison distribution
End criteria:			
Available forage	Based on a snow cover index and subjective estimate of when residual or new forage is adequate	Generally 1 week earlier than current management	Ongoing development of more objective criteria for future implementation
Monitoring:			
Animals on feed	Mid-winter census	Elk/bison fed days[1]	
Proportion of JEH on NER	Mid-winter census	Mid-winter census	
feed			
Calf mortality	2008-2015 Average: 3.3% (range 1.1-9.0%)	Potentially higher than current levels but less than native winter range	
Elk/bison distribution – collars	Almost no documented use of private lands during feeding operations	Unknown, but likely higher use of private lands than current management	
Elk Winter mortality (all age classes)	2008-2015 Average:	<=3%	
	1.2% (range 0.6-1.9%)		

Table 4. Comparison of current and primary step-down plan components and parameters			
Action	Current Management	Management	Comment
Elk summer range segment Proportions for NER wintering elk	Approximately -40% GTNP North of Moose -35% South Snake River -10% Gros Ventre/Flat Creek -10% Teton Wilderness -5% Southern Yellowstone	Unknown, but will be monitored based on summer distribution of radio collared elk	Based on summer distribution of elk that were randomly radio collared on NER.
Harvest, National Elk Refuge elk:			
Frequency	Annual	Annual	
Begin Date	2nd week October	No Change	Modified as necessary
End Date	3nd week December	No Change	Modified as necessary
Structure	- 1 week initial drawing	- 1 week initial drawing	
	- 1 week left over 1st served	- 1 week left over 1st served	
	- partial week alternate	- partial week alternate	
	-daily 1st served alternates	- daily 1st served alternates	
Refuge permit types	- 1st week any elk	- Primarily antlerless only	
	- Antlerless only remainder of season	- limited any elk permits throughout season	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries		Consider expanding to allow bow hunting near developed areas	
Harvest, National Elk Refuge bison:			
Frequency	Annual	Annual	
Begin date	August 15th	August 15th	Modified as necessary
End date	2nd or 3rd week January	Consider later dates as appropriate	Modified as necessary
Hunting Season Structure	As per WGFD	As per WGFD	
Refuge permit types	Any bison or cow/calf per state license	Any bison or cow/calf per state license	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries	Limited to north of Nowlin Creek area	Consider escorted hunting in South Unit as needed	Guided hunts in South Unit when authorized
Harvest, Grand Teton NP elk:			
Frequency	As needed	As needed	
Begin Date	3rd week October	3rd week October	Modified as necessary

Table 4. Comparison of current and primary step-down plan components and parameters			
Action	Current Management	Management	Comment
End Date	2nd week December	2nd week December	Modified as necessary
License types	Antlerless only	Antlerless only[2]	
Special regulations:	Cartridge limits	Cartridge limits	
	Bear spray required	Bear spray required	
	Hunter safety card required	Hunter safety card required	
Harvest, Bridger-Teton NF, Elk Hunt Area 80:			
Begin Date			
End Date		15-Dec	Would require change in winter closure dates
Harvest, Elk Hunt Area 78			
Structure			Changes at discretion of WGFD
License Types			
Private Lands Mitigation:			
Cattle commingling		Incentives for non-breeding operation	
Hay depredation		Increased fencing	
Landscape damage			
Easement acquisition			
Vegetation Restoration/ Protection: Elk Refuge			
Vegetation Restoration/ Protection: Grand Teton	Herbicide treatments, prescribed burning, native seed propagation and planting, and protection and maintenance of restored pastures	Same as Current Management for remaining non-native grasslands in Kelly Hayfields	

Notes:
[1]Number elk and bison on feed per day, totaled by feeding season.
[2]Any elk licenses could be offered if bull ratios in the park consistently exceed BEMP criteria.

STRATEGIES CONSIDERED BUT REJECTED

The BEMP considered several additional strategies for elk and bison management that, for a variety of reasons, were not selected for implementation in the preferred alternative and Record of Decision. The agencies reconsidered a subset of these during the development of this Step-Down Plan (Table 5). Since they were not part of the ROD, additional NEPA compliance would be necessary to incorporate any of them into this Step-Down Plan, and they are not being considered at this time.

Models of System Dynamics

Models provide a simplified representation of the biological system being managed. We will use modeling to quantify the effects of our

management actions on two key responses of interest, elk distribution, and elk calf winter mortality. There are suites of possible factors that affect the proportion of elk on NER feeding grounds versus native winter range. Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix C). Over time, this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

An increase in elk calf winter mortality is a potential result of reduced feed season length. Several factors influence elk calf winter survival on NER (Figure 14). Models will be used to assess the effects of available forage on elk calf winter survival (Appendix D). Over time, this will allow us to assess the effects of our principal management strategy (reducing feed season length) relative to elk calf winter survival.

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Table 5. Strategies considered but rejected

Strategy Considered	Reason Rejected
Fertility control in elk	Judged not reasonable or feasible in BEMP, primarily due to major technical, social, and financial hurdles[1]. For Step-Down Plan discussed primarily with regard to the difficult to harvest herd segment in Hunt Area 78 on private lands, where federal agencies have no jurisdiction.
Fertility control in bison	Impacts discussed at length in BEMP[2]. Not considered for Step-Down Plan because current hunting programs appear effective at slowly moving the herd toward the 500 animal herd objective.
Agency reduction of bison or elk	Not considered necessary or desirable on federal lands because current hunting programs that utilize sport hunters are effective at meeting herd objectives.
Altering rations of supplemental feed	Rejected as a strategy because reducing daily feed ration below 8 lbs./elk would be enough feed to encourage elk to remain on NER but would result in unacceptably high elk calf mortality rates.
Private Lands Hunting Coordinator	The WGFD contacted private landowners and ranchers in the Spring Gulch area and discussed this concept to enhance elk harvest of short distance migrants. Generally, landowner interest was low.

Notes:
[1] Page 77 at http://www.fws.gov/bisonandelkplan/Final%20EIS/Volume%201/4_Chapter_2_Alternatives.pdf
[2] USFWS and NPS 2007?

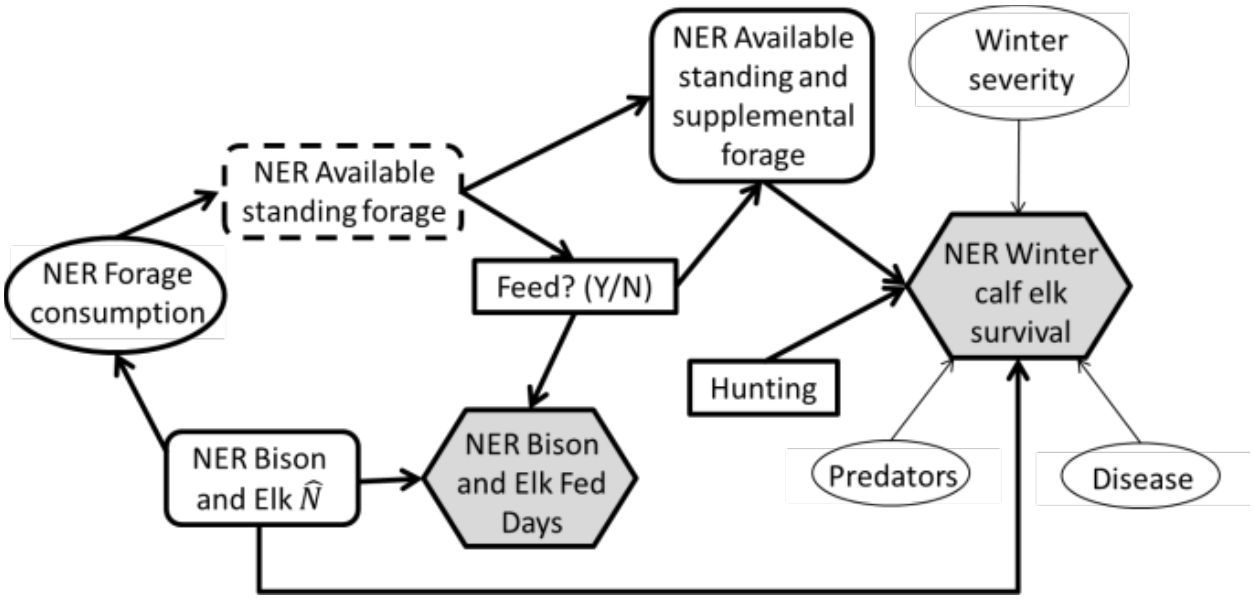


Figure 14. Diagram of factors influencing bison and elk-fed-days on the NER and elk calf winter survival

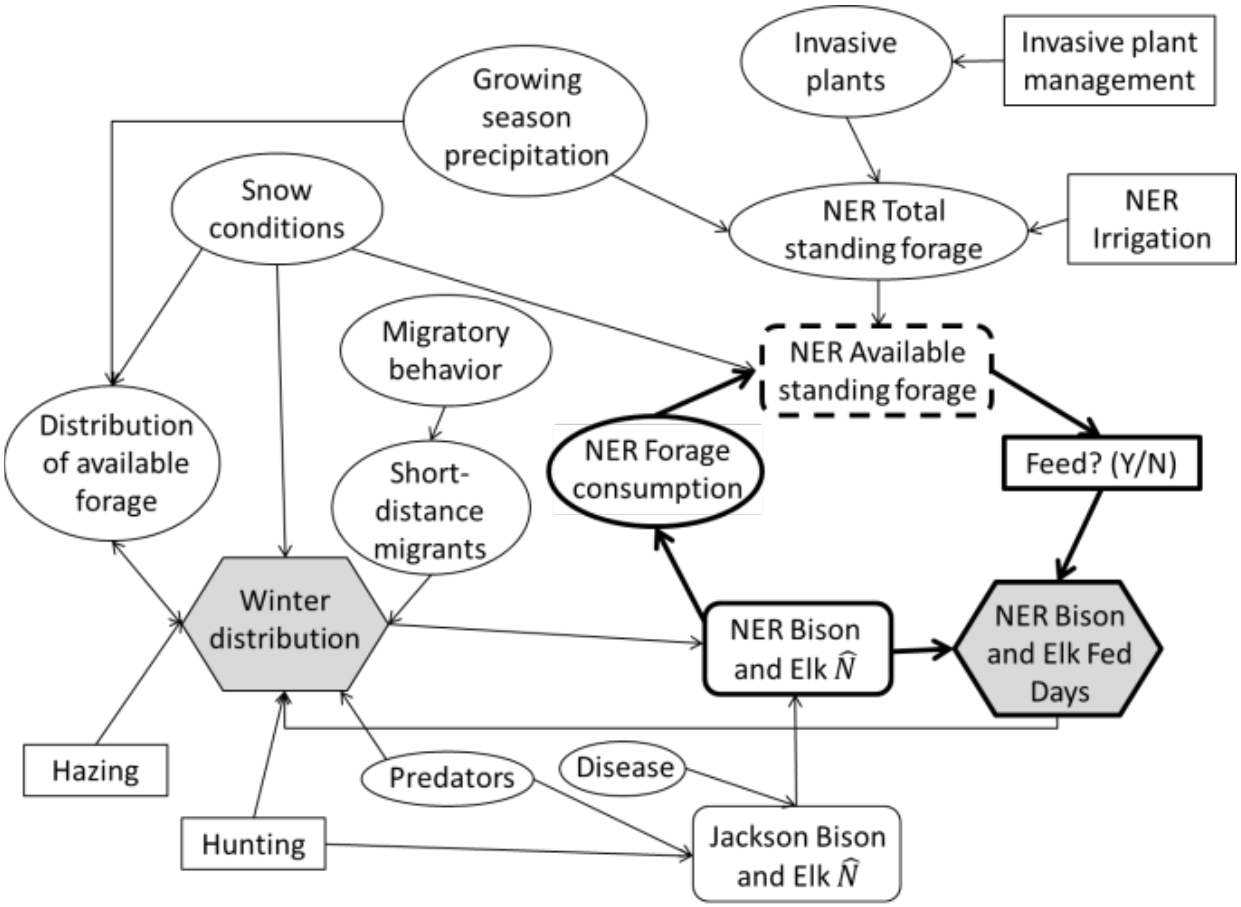


Figure 15. Diagram of outcome influences from BEMP (USFWS 2007a)

Monitoring

Feeding Initiation Monitoring

NER uses weekly field estimates of the amount of forage available to elk to determine feeding initiation date. Currently measurements are taken at key index sites representing areas preferred by elk on NER (see Appendix B). These methods will be enhanced by 1) increasing the number of sampled sites to better represent the total amount of forage available to elk on the southern half of NER; 2) increasing the precision of estimates at each site by increasing the number of observers; and 3) extending the monitoring period later in the winter to assess the relationship between available forage and elk and bison distribution.

To represent the total amount of forage available on the southern half of NER, a subsample of current key index sites will be retained to facilitate comparison with historic data, but additional random sample sites stratified by elk habitat preference will be added. Historic elk distribution mapping and elk GPS collar data (NER unpublished data) suggest that the areas most preferred by elk on southern NER are associated with moderate to high forage production and green vegetation. Because the distribution of forage production and greenness characteristics vary annually based on irrigation and precipitation patterns, we will annually map areas preferred and not preferred by elk and sample sites will be randomly selected within each of these mapped categories. At least three historic key index sites, three random sites in areas preferred by elk, and three sites in areas not preferred by elk will be sampled each week from late December through the initiation of supplemental feeding.

Currently the NER biologist is the only person trained in the techniques used to estimate available forage (see Appendix B). At least two additional personnel will be trained in these techniques. This will provide a backup in the event of future personnel changes and will facilitate error estimates of the available forage measurements at each site.

Currently NER and WYGFD biologists monitor available forage conditions at least weekly from late December until average available forage at key index sites nears the threshold level of 300 lbs. per acre and feeding is initiated. The principal Step-Down Plan strategy is to delay the initiation of supplemental feeding after average forage production reaches the 300 lbs./ac level at key index sites. Therefore, the monitoring period will be extended to include this period of delayed feeding.

Proportion of Elk Wintering on NER

A principal Step-Down Plan goal is to reduce the number of elk wintering on NER. Our strategy will be to effect redistribution of elk to native winter range from NER over time via shortening the duration of the feed season, and slowly conditioning elk to seek food elsewhere. As feeding periods are shortened, the probability of younger elk age classes discovering NER feeding grounds will be reduced, and, hypothetically, that proportion of the Jackson elk herd that utilizes NER feeding grounds will decline over time. We will measure this effect by examining changes in the winter distribution of the Jackson elk herd. WGFD annual trend/classification count data

provide a multi-year baseline data set to measure changes in the winter distribution of the Jackson elk herd and categorizes observations by location. In each year, we will calculate the proportion of total classified elk in the Jackson elk herd that are classified on NER feeding grounds. We will compare the 3-year running average post Step-Down Plan implementation to the pre-implementation baseline. The pretreatment baseline will be comprised of data from 2008 2016, a period that represents BEMP implementation prior to Step-Down Plan actions (Figure 16).

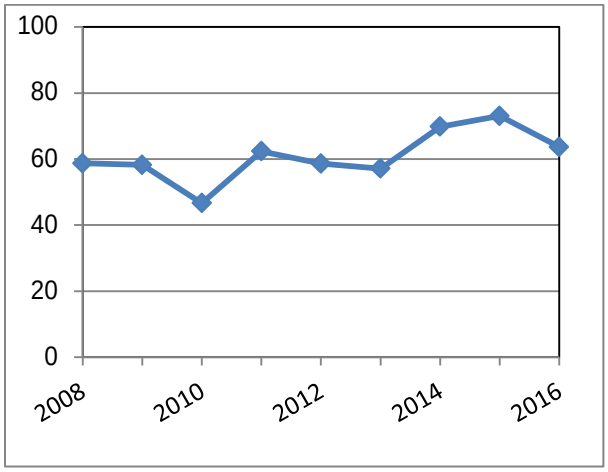


Figure 16. Proportion of Jackson elk herd on NER feeding grounds during BEMP implementation

Elk Fed Days and Bison Fed Days

The BEMP and Step-Down Plan implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feeding grounds and the number of days they are fed. We further assume the variables elk-fed-days (EFD) and bison-fed-days (BFD) are a proxy for these conditions. EFD and BFD will be calculated annually for each species based on the following formulas:

EFD= ∑ Total elk counted on feed during daily feeding ground counts for duration of feed season

BFD= ∑ Total bison counted on feed during daily feeding ground counts for duration of feed season

Because EFD and BFD are influenced by feed season length and the number of animals on feed, the Step-Down Plan strategy of delaying the initiation of supplemental feeding will inherently reduce the number of EFD and BFD through a reduction in average feed season length. We believe that EFD will be further reduced by encouraging a greater proportion of the Jackson elk herd to winter on native winter range, thereby reducing the number of elk occupying NER feeding grounds. We will evaluate changes in EFD and BFD by comparing the 3-year running average post Step-Down Plan implementation compared to mean EFD and BFD from 2008–2015. The running average is an appropriate comparison because it will help account for wide annual variation in EFD and BFD associated with winter severity (Figure 17).

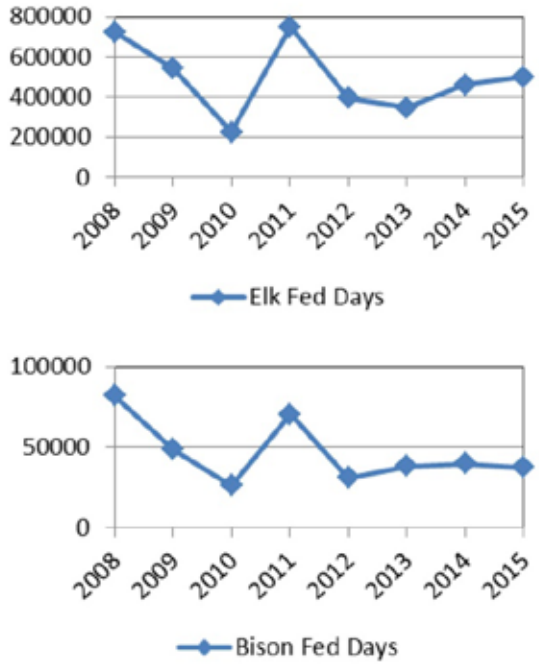


Figure 17. Elk-fed-days (EFD) and Bison-fed-days (BFD) after implementation of the BEMP but prior to the implementation of the Step-down plan

Elk Winter Mortality Monitoring

NER has used consistent methods to monitor winter elk mortality since 1982. Each winter NER biologists and other refuge staff conduct a survey of all non-hunting related winter elk mortalities that occur on NER from November through April. Mortalities are tallied by age/sex class and percent mortality is calculated using the corresponding number of elk classified on NER feeding grounds as the denominator. We will continue to monitor elk winter mortality using the same methods post-Step-Down Plan implementation, which will allow trend comparisons to the pre Step-Down Plan baseline (Figure 18). Under the Step-Down Plan framework, we believe the 3-year running averages for total and elk calf winter mortality will be within the range of variation exhibited by the pre Step-Down Plan baseline. Historic monitoring suggests that calf and total mortality are sensitive to winter severity and disease outbreaks, and that winter mortality occasionally exceeds >3% total mortality and >10% calf mortality. Post-Step-Down Plan mortality in excess of these levels may warrant shortening the feeding initiation delay in subsequent years.

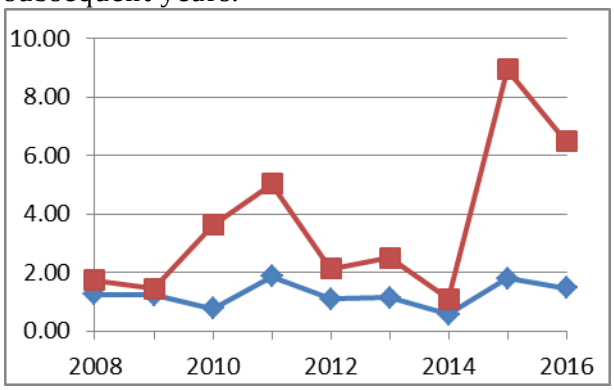


Figure 18. Total elk (blue) and calf (red) winter mortality, percent

Elk Collaring

One of the Step-Down Plan's principal strategies is to shorten the length of the feed season to encourage elk use of native winter range, but we anticipate that this strategy will also result in an increase in elk conflicts on surrounding private land in the town of Jackson and the Spring Gulch areas, potentially including large groups of elk. To quantify this effect and provide real-time information to WGFD and NER managers to facilitate a response, we propose maintaining a sample of 50 GPS-collared elk that winter on NER throughout the Step-Down Plan implementation period. Forty-five elk represents approximately 0.5% (1 in 200) of the NER winter elk population. This sample size will not be sufficient to detect all elk movements from NER to surrounding private lands, particularly movements by small groups of mature bull elk, but it will be sufficient to detect and quantify significant movements of cow/calf/yearling elk groups compared to pre-Step-Down Plan baseline data.

NER has elk GPS-collar data available from the 2008-2013, which represents the post-BEMP, pre-Step-Down Plan baseline period. We hypothesize that elk movements from NER to surrounding private lands will increase during the Step-Down Plan implementation period compared to the pre-treatment baseline. This will be tested by comparing the number of incidents that elk left NER for surrounding private lands (per elk/per year), and the proportion of elk GPS fixes on NER versus private lands during time periods of interest. The principal period of interest is late December–March because this represents the period after the NER elk hunting season, and prior to, and during, NER feeding operations. This is the season when changes to the NER feeding program would likely result in elk distribution changes.

Thirty adult cow elk were captured on NER feeding grounds in February 2016 and Telonics Iridium GPS collars were deployed with a 90-minute fix interval. Collars will be deployed on up to 50 additional adult cow elk in February-March 2017. Given 83% annual survival for adult cow elk in the Jackson elk herd (Cole and Foley et al. 2015) and 3-year collar life, approximately 10 additional elk will need to be collared each year in winter 2018 and 2019 to maintain the 50 elk desired sample size over the life of the Step-Down Plan implementation period.

Ancillary data that will be collected and analyzed during the elk capture and collar data analysis includes brucellosis seroprevalence, pregnancy rate, and elk summer range determination for comparison to the findings of Cole and Foley et al. (2015).

Disease

The primary purpose of limiting reliance on supplemental feeding is to reduce the prevalence of endemic elk and bison diseases and mitigate transmission risk associated with the introduction of novel diseases. We hypothesize that brucellosis seroprevalence will decline post Step-Down Plan implementation. There are no recent brucellosis seroprevalence data for elk on the NER, but >50 elk will be captured during elk collaring operations in winter 2016, and each elk will be tested for brucellosis exposure. The 2016 Brucellosis seroprevalence rate will be the pre-treatment baseline to evaluate post Step-Down Plan change. Chronic wasting disease (CWD) has been monitored in the Jackson elk herd since 1997, and since 2008, it has been monitored with sufficient sample size to detect 1% prevalence with 95% confidence. No CWD positive cases have been detected in the Jackson elk herd, which given the long term persistence of the disease, provides overwhelming evidence that CWD is not currently endemic to the Jackson elk herd. However, most evidence suggests that the distribution of CWD is increasing and that its introduction to the Jackson elk herd is inevitable. Early detection is critical to ensure a management response; therefore, ongoing monitoring at sample sizes sufficient to detect 1% CWD prevalence with 95% confidence is necessary. CWD is sampled by testing tissues collected primarily from hunter-harvested elk, and experience suggests that two full time technicians working from September-December are necessary to ensure minimum sample size. Typical costs associated with two technicians are $32,000 per year.

Data Collected for Modeling

To facilitate modeling, we will collect data on the following associated variables (Table 6). The table lists variables and how they relate to our efforts to use modeling to explain changes in elk distribution and elk calf mortality relative to our principal action of reducing feed season length.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Consequently, we anticipate that the strategies outlined in this plan will be in place for a minimum of 5 years, after which an initial evaluation of the program will be made. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented at an annual management Step-Down Plan update/report, completed by NER staff by the end of March for the previous year.

Consistent with objectives outlined in the BEMP, the long-term goal of this plan is reduce the reliance of bison and elk on intensive supplemental feeding, using adaptive management principles through a structured framework of management actions, to achieve a desired condition of animals relying predominately on native habitat on NER, GRTE, and USFS lands, and on NER cultivated forage. However, because there is no precedent for what this plan proposes, there are few responses to proposed management actions that can be predicted to a degree of certainty commensurate with establishing definable thresholds or other objective criteria for success in the short term.

Frequently Asked Question:
Question:
Why is the Step-Down Plan vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?
Response:
This is the first time that the strategy of delaying feed season initiation has been employed to reduce reliance on supplemental feeding. There is uncertainty regarding the effects of this strategy on elk and bison distribution and elk winter mortality; therefore, it is important to maintain flexibility in plan implementation to avoid significant unintended negative consequences. Unintended negative consequences the Step-Down Plan seeks to avoid include 1) elk or bison moving to areas where they damage property, risk human safety, or commingle with livestock, and 2) elk winter mortality levels significantly higher than baseline levels.

Factors that will be considered in evaluating the success of the program will include the trend of EFD and BFD, type and frequency of private lands conflicts, the proportion of the Jackson elk herd wintering on the NER, presence or absence of CWD and other infectious diseases, elk and bison population size and distribution, elk calf winter mortality, and public support. These complex, dynamic, and interwoven components make up the framework for decreasing reliance on supplemental feeding. As such, the effects of changing biological, social, and political conditions on these components will be part of the evaluation process.

In the context of this larger framework, however, we believe evaluation of the trend in EFD and BFD will be most important after the first 5 years of Step-Down Plan implementation. The direction and magnitude of the trend observed will provide a preliminary basis for evaluation and decisions about continued management actions. Initial success with reduced feeding will be associated with a declining trend in EFD and BFD, with greater magnitudes indicating higher degrees of success. However, determinations of overall program success will necessarily include evaluation of all system components. For example, gains in reduced feeding come could be accompanied by an increase in private land conflicts, which would affect overall success determinations. While the overriding strategy will be to decrease feeding as aggressively as possible while gauging effects on other system components, overall measures of program success through time will necessarily involve evaluating a matrix of effects. These evaluations will be included in annual Step-Down Plan reports.

As proposed and new management strategies are implemented and evaluated under this plan, at some point in the future it may become apparent that meeting reduced feeding goals will not possible without reducing elk and/or bison population objectives.

Population objectives for both herds are set by Wyoming Game and Fish Commission and are evaluated regularly by WGFD personnel, including public review through annual season setting meetings. The BEMP supported the State herd objectives of 500 bison and 11,000 elk due to NEPA requirements, any further consideration of reduced herd sizes by the NER or GRTE are beyond the scope of this plan. However, Wyoming Game and Fish Commission changes to Jackson bison or elk herd objectives are not constrained by the BEMP.

Investigating the potential effects of climate change on elk and bison management will also be important in the long-term. During implementation of this plan, we will collect a variety of data that could be drawn upon for this purpose.

Table 6. Elk winter distribution and elk calf mortality variables			
Variable	**Source**	**Elk Winter Distribution Model**	**Elk Calf Mortality Model**
Proportion Jackson Elk Herd on NER Feeding grounds	WGFD/NER Jackson Elk Herd February Classification Count	Yes	No
Proportion Jackson Elk Herd from South Snake River summer segment	Determined from elk GPS collar data for elk captured on NER	Yes	No
Number of wolf packs in the Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated total wolf numbers in Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated number of wolves using NER in winter	NER observations	Yes	Yes
Total NER herbaceous forage biomass	NER forage production survey data	Yes	Yes
Snow Water Equivalent	NOAA snowtell site data	Yes	Yes
NER Elk Winter Mortality (calf)	NER elk winter mortality survey	No	Yes
Snow Depth	NOAA Snowtell sites and NER measurements	Yes	Yes
Available Forage	NER and GTNP monitoring in winter months	Yes	Yes
NER Elk and Bison Fed Days	NER feeding records and daily feeding ground estimates of elk and bison	Yes	Yes
NER Feeding Start Date	NER feeding records	Yes	Yes
Gros Ventre Feeding Start date	WGFD feeding records	Yes	No
Elk Hunting Pressure by Hunt Area	Estimated number of hunter days from WGFD completion reports	Yes	Yes

Public Outreach and Education

The practice of winter feeding is inexorably woven into the historic fabric of Jackson Hole. Elk are identified with the rich and unique legacy for which Jackson Hole is known around the world. De-emphasizing the supplemental feeding program will be a major paradigm shift for the residents of Jackson Hole, Teton County, and the State of Wyoming.

An effective Public Outreach and Education program is essential for effective Step-Down Plan implementation. The practice of feeding elk evokes passionate responses from those that oppose and those that support this practice. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the Step-Down Plan in order to gain general consent to modify longstanding elk/bison herd management methods.

A detailed communication plan to guide outreach and education efforts can be found in Appendix C.

Schedule

Table 7. Proposed implementation schedule for the Step-Down Plan	
Action	**Date**
Public outreach and education	November 2016
Initiate private lands conflicts mitigation contacts/actions	January 2017
Implement enhanced forage monitoring	January 2017
Initiate changes in supplemental feeding protocol	January/February 2017
GPS Collar 30-40 elk (Iridium platform)	March 2017
Monitoring/Evaluation/Annual Report	June 2017

Budget

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.					
	Year				
Agency / Activity	1	2	3	4	5
National Elk Refuge:					
Monitoring:					
Seasonal Biological Technician (0.5 FTE, GS-7)	$24,000	$25,000	$26,000	$27,000	$28,000
Bison/elk fed days					
Mid-winter census					
Elk summer herd segment distribution1					
Expanded standing forage estimates1					
Chronic Wasting Disease, 2 seasonal bio.-techs	$32,000	$32,000	$32,000	$32,000	$32,000
Winter bison/elk distribution					
Irrigation					
50 Elk radio telemetry collars; Iridium Platform	$115,000	$25,000	$25,000	$25,000	$25,000
Bison barrier maintenance at NER south entrance	$500	$500	$500	$500	$500
Step Down Management Plan annual reporting	$2,000	$2,000	$2,000	$2,000	$2,000
Private lands:					
Easements / Leases (Private Foundations)	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000
Conflict mitigation technicians (WGFD)	$91,000	$91,000	$91,000	$91,000	$91,000
Hazing (helicopter)	$6,000	$6,000	$6,000	$6,000	$6,000
Vegetation restoration/protection1					
Public Outreach and Education	$11,000	$1,000	$1,000	$1,000	$1,000
Subtotal					
Grand Teton National Park:					
Monitoring:					
Summer elk classification/distribution	$10,000	$11,000	$12,000	$13,000	$14,000
Collaborative elk monitoring (GRTE portion)	$5,000	$5,000	$5,000	$5,000	$5,000
Vegetation Restoration/Protection					
Monitoring	$16,000	$16,000	$18,000	$18,000	$12,000
Temporary bison fencing	$24,000				
Temporary fence maintenance	$6,000	$8,000	$8,000	$4,000	
Hayfields restoration	$84,000	$70,000	$70,000	$31,000	
Exotic plant mitigation	$50,000	$52,000	$46,000	$32,000	$16,000
Elk Reduction Program (subject to annual review)					

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.					
	Year				
Agency / Activity	1	2	3	4	5
Hunter harvest evaluation	$1,500	$1,500	$1,500	$1,500	$1,500
Harvest age distribution	$2,000	$2,000	$2,000	$2,000	$2,000
CWD monitoring (0.15 FTE, GS-6)	$7,000	$7,000	$7,000	$7,000	$7,000
Law Enforcement and Visitor Protection (0.15 FTE for 20 LE and support staff; supplies, and permitting)3	Unknown				
Subtotal					
Wyoming Game and Fish Department:2					
Subtotal					
Grand Total					

Notes:

[1]See detail in Appendix

[2] Dependent on size of elk reduction program; current annual expenditures are approx. $295,000 for 0.15 FTE for 20 LE and support staff; supplies, and permitting.

[3]Through Interagency Agreement

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Frequently Asked Questions

Question

Why is the Step-Down Plan vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?

Response

This is the first time that the strategy of delaying feed season initiation has been employed to reduce reliance on supplemental feeding. There is uncertainty regarding the effects of this strategy on elk and bison distribution and elk winter mortality; therefore, it is important to maintain flexibility in plan implementation to avoid significant unintended negative consequences. Unintended negative consequences the Step-Down Plan seeks to avoid include 1) elk or bison moving to areas where they damage property, risk human safety, or commingle with livestock, and 2) elk winter mortality levels significantly higher than baseline levels.

Question

Why were reductions to the Jackson Elk Herd and Jackson Bison Herd population objectives not considered as a strategy to reduce reliance on supplemental feeding?

Response

The BEMP has clear population objectives of 5,000 elk wintering on NER and 500 wintering bison. Modifying those population objectives would require additional NEPA analysis. The BEMP also agreed to support State elk herd objectives. The WGFD completed a public process in 2016 to set the population objective for the overall Jackson Elk Herd, and that objective remains unchanged at 11,000 elk.

Question

The BEMP has an objective of 5,000 elk wintering on NER. Why has that objective not been achieved through increased elk harvest?

Response

The overall Jackson Elk Herd population has declined and is currently close to the 11,000 elk objective, but the number of elk wintering on NER has been well above the 5,000 elk objective since implementation of the BEMP in 2007 (mean =7,100 elk). When the analysis was conducted for the BEMP, elk winter distribution data suggested that 5,000 elk could winter on NER while still maintaining 11,000 elk in the Jackson Elk Herd overall. However, the proportion of the Jackson Elk Herd that winters on NER has increased significantly over time, and based on current elk distribution it is no longer possible to winter 5,000 elk on NER and maintain 11,000 elk in the overall Jackson Elk Herd. Although increasing elk harvest above current levels would likely allow us to achieve the 5,000 elk objective for NER, it would also reduce the overall Jackson Elk Herd population below the 11,000 objective. If increasing elk harvest in not plausible, the only other option to meet the 5,000 elk objective on NER is to change winter

elk distribution, which is the principal strategy of the Step-Down Plan.

Question

Why is your principal strategy to delay the start of the feed season?

Response

By delaying the start of the supplemental feed season we decrease the probability that elk that use native winter range or state feed grounds will discover NER feed grounds. Because elk use of feed grounds is a learned behavior, over time this could increase the proportion of elk that winter on native winter range, reduce the number of elk that move from the Gros Ventre drainage to NER, and decrease the NER wintering elk population. The resulting shift in elk distribution would allow us to achieve the 5,000 elk objective for NER. Because 5,000 elk and 500 bison is close to the estimated carrying capacity of NER habitat, less feeding will be necessary at these population levels.

Question

Will delaying the start of the feed season result in elk starvation?

Response

Our goal is to delay elk feeding a sufficient amount of time to affect elk distribution without causing an increase in elk mortality.

Appendix A

Summary of Potential Impacts

Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007).

Populations

- Jackson elk herd objective of 11,000 would be maintained.
- New Jackson bison herd objective of 500 established.

Winter Feeding

- Supplemental feeding could be delayed or could occur earlier compared to current practices.
- Changes [to feeding program could] include alterations in the timing of feeding and providing supplemental feed in fewer years.
- Ration or pellet composition might need to be changed.
- Supplemental feeding would be initiated according to established criteria, including pre-winter forage production, assessments of forage utilization (done jointly by WGFD and NER personnel), elk condition and movements, and potentially on the January 1 index of winter severity calculations for elk (Farnes, Heydon, and Hansen 1999).
- Mechanical means could be used to increase forage access for elk after snow crusting events.
- Changes in the refuge supplemental feeding program could begin to affect elk nutrition (negligible adverse effect on NER elk from lower nutrition).
- Displacement of elk by bison during competition for standing forage would decrease as the bison herd is reduced.
- Aggressive social interactions involving competition for food among elk and bison would increase overall as feeding periods are reduced.

Winter Distribution

- Elk densities on the NER would decline due to more reliance on standing forage and wider distribution.
- Elk use of lands surrounding the NER would increase, including:
  - USFS lands east of the NER
  - Gros Ventre feedgrounds possibly
  - Southern GRTE
  - State feedgrounds south of the NER

- Most of winter distribution shift would involve elk in the Yellowstone, Teton Wilderness, and Gros Ventre segments.
- As ungulate numbers decreased and supplemental feeding was reduced, competition and aggressive social interactions on the refuge would also be reduced.
- Elk and bison distribution would increase as the animals relied more on native winter range.
- Fewer animals would be present on the refuge.

Mortality

- As supplemental feeding is reduced, natural factors such as climate and native forage availability would have a greater influence on numbers, movements, distribution, and mortality.
- More elk would be subject to natural factors affecting mortality, including loss of body condition, predation, and starvation.
- Increased mortality on and off the refuge would mainly affect older elk and calves, and some prime bulls entering the winter energetically stressed due to rut activities.
- Late winter calf ratios could decrease as a result of higher winter calf mortality
- Average winter mortality on the refuge would increase from 1%–2% annually to an estimated 1%–5%.
- Overall, a higher total winter mortality rate of approximately 5% could be expected.

Disease

- Reductions in supplemental feeding or elk numbers would reduce the potential for impacts due to tuberculosis, septicemic pasturelosis, and CWD.
- The health and sustainability of the Jackson elk herd would be increased gradually as supplemental feeding was reduced and there was greater reliance on standing forage and wider ungulate distribution.
- Health and sustainability of the Jackson elk herd would be enhanced in the long term.
- Wider distribution of elk would result in moderate reductions in both the prevalence and potential transmission of brucellosis, as well as potential for spread of diseases not yet in the population.

Private Lands

- The agencies would work closely with the WGFD and landowners, including livestock producers, to coordinate actions that would prevent conflicts due to elk dispersal and to defray costs of managing potential conflicts. Preventing access to food/hay rewards on private lands would be vital for effective management.
- Private land conservation easements within NER boundaries would promote wider distribution.

Appendix B

Monitoring Supplemental Materials

Feeding Initiation Methods

At each sample site, 10 subplots will be measured at every 5 steps along the random bearing determined for each site. At each subplot a 13.27" diameter metal sampling ring will be placed on the ground. The amount of forage available to elk within the sampling ring (dry weight in grams) will be visually estimated. The 13.27" diameter subplot allows easy conversion from grams to lbs. per acre (each gram is equivalent to 100 lbs. per acre). During annual forage production sampling, refuge biologist Eric Cole has made approximately 1,000 of these visual estimates per year for 17 years, and 33% of Cole's estimates have been verified by clipping and weighing. Therefore, Cole will be the principal estimator, but additional personnel will be trained in these techniques to provide redundancy in the event of personnel changes and to increase the number of observers to facilitate estimation of error.

Estimating available forage within the sample ring at each subplot is relatively straightforward when snow cover is limited, but estimating how much of the forage is accessible to elk when snow is dense, deep and crusted can be subjective. To decrease the subjectivity of the estimation process, if the area under the sample ring is covered with snow, only forage that can be exposed with a gloved hand will be included in the estimate of available forage. Forage that is fouled with manure and/or flush with the ground due to trampling and/or encrusted in ice will not be included in the estimate of available forage.

At each subplot the estimate of available forage (dry weight g) will be converted to an equivalent lbs./acre value (1 gram=100 lbs./acre). The arithmetic mean of available forage (lbs./acre) for the 10 subplots provides an estimate of available forage for each index site. There are 3 sample site categories: 1) Historic Key Index Sites that have been used since 2007, 2) New randomly selected sites within areas preferred by elk, and 3) New randomly selected sites in areas not preferred by elk. Historic key index sites were not randomly selected, but were instead selected to represent areas most preferred by elk on the south end of NER. These were the sites used to determine when supplemental feeding would be initiated from 2007 until the implementation of the Step-Down Plan. To facilitate comparison with pre-Step-Down Plan data, we will continue to use mean lbs. per acre across historic key index sites to determine the 300 lbs. per acre threshold. However, post Step-Down Plan implementation we will delay feeding initiation by 2 weeks once the 300 lbs./acre level has been reached. We will concurrently sample at randomly selected sites stratified on an annual basis between areas highly preferred and not highly preferred by elk. This will enable us to quantify the relationship between mean forage availability at historic key index sites and random sites over time.

Appendix C

Communication Plan

Communication Goals

PRIOR TO THE STEP-DOWN PLAN'S IMPLEMENTATION

- Utilize a variety of outreach methods to inform the public on the goals and timing of the Step-Down Plan implementation and possible effects on wintering herds.
- Utilize a variety of outreach methods to inform the public on public comment opportunities.
- Identify and coordinate key messages and outreach with USFWS regional and national offices, State and federal agency partners, non-profits, elected officials, and other identified audiences.

DURING THE STEP-DOWN PLAN'S IMPLEMENTATION

- Continue to utilize a variety of outreach methods to describe current management actions as well as measurable and noticeable changes on the landscape, in animal behavior, or in animal health.
- Provide a comprehensive overview of the Step-Down Plan by providing links and references to previous outreach and background information.

Communication Objectives

- Work with current media contacts to promote news of the Step-Down Plan via print, radio, Web, and social media platforms.
- Utilize new media and social media tools to provide information on why the Step-Down Plan was developed, what public comment opportunities exist, and how the plan is being implemented.
- Plan, coordinate, and execute public meetings to allow for public comment and questions on the plan.
- Develop and provide methods for the public to submit written comments on the Step-Down Plan.
- Monitor print media on Refuge elk and bison management to see how the Step own Plan objectives and reactions are being portrayed to the public.

Current Outreach Resources

- National Elk Refuge web site
- National Elk Refuge news release list
- (approximately 300 contacts)

- National Elk Refuge Twitter site (1,039 followers)
- Bison and Elk Management Plan web site (http://www.fws.gov/bisonandelkplan/)
- Space for an 11" x 17" poster in the Visitor Center on Refuge management topics
- Display panels in the Visitor Center theater for temporary displays

Available Supporting Outreach Resources

- USFWS Mountain–Prairie External Affairs staff
- USFWS Mountain–Prairie web site, including the
- "Top Stories" feature
- USFWS Mountain–Prairie Twitter site USFWS Mountain-Prairie Region Facebook page
- USFWS National Wildlife Refuge System
- Facebook page
- USFWS Facebook page

Previous Outreach Efforts

- NER routinely writes and disseminates news releases on Refuge management activities, including the Comprehensive Conservation Plan, supplemental feeding, herd health monitoring, and forage production.
- Post the above news stories as Content.
- Management System (CMS) articles.
- Post CMS news story promos so they prominently appear on the home page, linking readers to the articles.
- Send out Twitter messages linking viewers back to the news stories.
- Prepare, upload and provide links to Adobe PDF versions of news stories with additional photos where additional images are available and/or help understand or visualize the content.
- Utilized the Conservation link on the web Content
- Management System to post information about
- the Bison and Elk Management Plan and the draft Comprehensive Conservation Plan.
- Retained and provided a link to the original Bison and Elk Management web page (http://www.fws. gov/bisonandelkplan/) that was developed during the planning process. The web site includes links to the Final Plan/EIS, Record of Decision, Federal Register Notice of Availability for both the Record of Decision and Final Plan/EIS, associated news releases, public meeting highlights, and other related documents. Note: the National Elk Refuge does not manage the site.

Additional Outreach Opportunities

- Public meetings in Jackson and other identified locations.
- Service produced video; video could be posted to the National Elk Refuge's multimedia web page, or USFWS Mountain–Prairie home page "Top Video" feature.
- Live radio interview on KHOL (Jackson, WY radio)
- Wyoming Public Radio interview with Refuge management staff

- Interviews with local print media sources
- Updates at community leader meetings such as Rotary Club, Jackson Hole Chamber of Commerce board meetings, and interagency breakfast meetings (with Federal agencies and local elected officials).

Target Audiences

INTERNAL

- Regional and National USFWS Leadership
- Refuge permanent staff
- Refuge seasonal staff
- Refuge volunteers

EXTERNAL

- Congressional representatives
- State of Wyoming leadership
- Federal agency partners, particularly Grand Teton National Park and the Bridger–Teton National Forest
- Wyoming Game & Fish Department
- Other NER partners, including county and town agencies and local nonprofit organizations
- Local elected officials
- Private landowners in proximity to the National
- Elk Refuge or neighboring Federal lands
- Tribes
- Local and state media
- Local public

Key Outreach Topics

- Overview of BEMP objectives
- Strategy to change elk/bison behavior
- Threat of disease
- Natural mortality rates
- Anticipated winter distribution changes for bison/elk
- Mitigate negative effects on private lands
- Change elk behavior and distribution while avoiding increased mortality.
- Explain the historic reasons a supplemental feeding program began and why it was continued.
- Explain the NER's limited large ungulate carrying capacity and the disproportionate impact of bison on available forage; 1 bison is equivalent to 3 elk.

Appendix D

Models

Elk Winter Distribution Models

The proportion of the JEH that winter on the NER will be linked to factors hypothesized to influence elk winter distribution using a generalized linear mixed effects model (GLMM). A GLMM can account for a proportional response variable (i.e., constrained to the interval 0–1) using a log link and binomially-distributed errors. A GLMM also includes fixed and random effects, with the latter capturing residual model variance otherwise not explained by fixed effects. Year will be including as a random effect, providing several benefits. First, we don't assume years are independent and comprise all of the factor levels of interest. Instead, the effect of year is treated as a random variable, with individual year effects realizations of that distribution. This allows inference to non-sampled factor levels, i.e. years, by estimating a latent population-level proportion of elk expected to winter on the NER regardless of fixed effect influences. The random year effect can be considered a latent variable describing elk behavior manifested as observed winter distribution. Second, because year effects are not treated as independent, estimated effects of year on the proportion of JEH elk wintering on the NER are dependent on all factor levels, leading to greater precision when estimating individual year effects (Kéry 2010).

The full GLMM incorporating fixed effects for each factor identified as influencing elk winter distribution is:

$$P_t = \beta_{0(t)} + \beta_1 * AFI_t + \beta_2 * SDM_t + \beta_3 * WP_t + \beta_4 * GSP_t + \beta_5 * SWE_t + \varepsilon_t$$

where the random intercept and residual model variance are

$B_{0(t)} \sim N(\mu_{\beta_0}, \sigma^2_{\beta_0})$, and

$\varepsilon_t \sim N(0, \sigma^2)$, respectively.

Fixed effects include 1) per capita available forage at initiation of winter feeding (AFI) , 2) proportion of the JEH that are short-distance migrants (SDM), 3) number of wolf packs present on JEH native winter range (WP), 4) growing season (May–August) precipitation for the Wyoming Snake Drainage climate division (GSP; a proxy for available forage on native winter range), and 5) snow water equivalent on 1 January at Thumb Divide (SWE; a proxy for early winter severity).

Elk calf winter survival and forage deficits

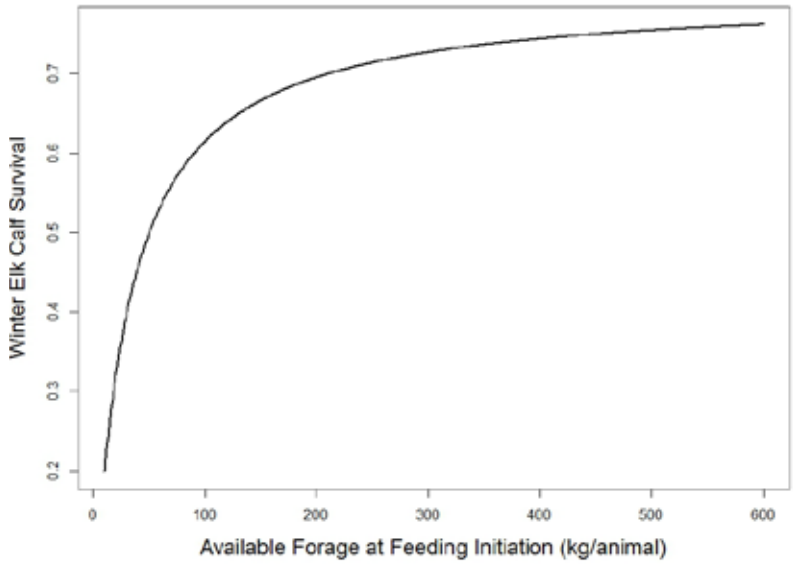
The Forage Accounting Model of Hobbs et al. (2003) has as an output weekly available forage biomass for the NER (sum of predictions for 30 × 30 m cells). These predictions account for snow conditions using a proxy of SWE and decrement total available biomass by 35% to account for unpalatable plants within the total estimate.

While calf survival is a function of multiple factors the primary management action influencing calf survival is supplemental winter feeding. Current winter feeding initiation criteria lead to calf survival generally higher than in unfed populations. Proposed feeding initiation criteria will result in later initiation of supplemental feed, which will be most influential to calf survival. There is currently little understanding regarding the relationship between initiation of winter feeding and calf survival, except that current feeding initiation criteria result in high calf survival. We believe a threshold level of available forage at initiation of winter feeding exists such that winter calf survival reaches an asymptote. Below this threshold, calf survival is hypothesized to decline quickly with reductions in available forage at winter feeding initiation. Available forage at the initiation of winter feeding will be related to on elk calf winter survival using a saturating function (i.e., Holling type-II functional response; Fig. 6) by

$$S_t = \frac{aAFI_t}{b + AFI_t}.$$

The parameters a and b determine how calf survival is related to available forage. Maximum calf survival is a, and b represents the value of available forage to an individual when survival is 50% of a (Hilborn and Mangel 1997).

Although this approach doesn't capture forage deficits per se, it does provide a potentially sensitive proxy for this concept. It is assumed that a forage deficit for calves would occur at a point on the curve of the relationship between calf survival and available forage at initiation of supplemental feeding. Modeling the response of winter calf elk survival to changes in feeding initiation criteria facilitates our ability to maximize the influence of feeding initiation criteria on winter distribution while minimizing the likelihood of a large mortality event.



Hypothesized relationship between winter survival of elk calves and per capita available forage at initiation of winter feeding on the National Elk Refuge.

From:	Danielle Stevens
To:	Steve Kallin
Cc:	Eric Cole
Subject:	NER Step-Down Plan
Date:	Friday, October 07, 2016 11:52:25 AM
Attachments:	Draft_NER_Stepdown_092216.docx Draft_NER_Stepdown_100716.pdf

---

Hi Steve and Eric,
Attached are the final Draft versions of the Step-down plan.
An item to note:
I've included several blank page for pagination and printing purposes, use caution when/if you decide to edit the Word file.

If you need hard copy prints, let me know. I can send the file to our local printer here in Denver, I just need four to six business days to get them produced.

Thanks,
Danielle

Danielle Stevens, Writer-Editor
"Whatever you are, be a good one." ~Abraham Lincoln
"The truth of the matter is that you always know the right thing to do. The hard part is doing it." ~ H. Norman Schwarzkopf
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Draft Step-Down Plan
Bison and Elk Management

A Structured Framework for Reducing Reliance on Supplemental Winter Feeding

National Elk Refuge

Grand Teton National Park

Wyoming

October 2016

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CITATION

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Summary

Overview

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and NPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP) (USFWS and NPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands, focused on four broad goals:

1) habitat conservation;
2) sustainable populations;
3) numbers of elk and bison; and
4) disease management.

The final Bison and Elk Management Plan directed the NER and GRTE (in conjunction with the Wyoming Game and Fish Department [WGFD]) to maintain the state's elk herd objective of 11,000; establish a bison population objective of 500; restore habitat on the NER and in GRTE; continue hunting bison and elk on the NER; continue the elk reduction program, when necessary, in GRTE; allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available; and develop a dynamic, structured framework and Step-Down Plan for decreasing the need for supplemental feeding on the NER. This Step-Down Plan for Bison and Elk Management was developed specifically to address the criteria for a structured framework referenced in the Record of Decision.

Background

Winter feeding of elk in Jackson was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. The loss of available winter range in Jackson Hole due to new ranching operations and a growing town resulted in significant numbers of elk dying during several severe winters in the late 1800s and early 1900s. This prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, established the National Elk Refuge. Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding.

Bison were hunted to near-extinction outside Yellowstone National Park (YNP) by the mid-1880s but in 1948 were reintroduced to Jackson Hole when 20 bison from YNP were released near Moran, Wyoming. The herd remained small until discovering elk feedlines in 1980, when the population began sustained population growth. Bison and elk that winter on the NER are migratory and occupy summer ranges predominantly to the north.

While there have been many benefits associated with wintering large numbers of elk and bison on the NER (Boyce 1989), high animal concentrations have created an unnatural situation that has contributed to an increased risk for major outbreaks of exotic diseases (Murie 1951, Franson and Smith 1988, Samuel et al. 1991), currently demonstrated by the high level of brucellosis in the elk and bison herds (Cross et al. 2010, Kamath et al. 2016). It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands (Smith et al. 2004), thereby reducing other wildlife associated with woody vegetation.

The BEMP and this step-down plan implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feeding grounds and the number of days they are fed. The potential risk of catastrophic disease outbreaks and the need to mitigate this threat is a vital component in achieving the BEMP Sustainable Populations Goal.

Objectives

This Step-Down Plan addresses several objectives under a broader BEMP goal of sustainable populations, which directed the agencies to: 1) develop a dynamic, structured framework for reducing NER supplemental feeding; 2) implement a phased reduction of animals on feed: a) Phase 1, to 5,000 elk and 500 bison, and b) Phase 2, elk and bison rely predominantly on native habitat; 3) maintain natural elk bull-to-cow ratios in park summer herd; and 4) enhance public outreach/education. The BEMP further stated that consideration criteria for implementing the 2nd phase of reduced feeding would include some or all of:

1) the level of forage production and availability on the National Elk Refuge;
5) desired herd sizes and age/sex ratios,
6) effective mitigation of bison and elk co-mingling with livestock on private lands;
7) winter distribution patterns of elk and bison;
8) prevalence of brucellosis, chronic wasting disease, and other wildlife diseases; and
9) public support.

In short, the overall objective of this plan is to provide a path for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on freestanding forage, while maintaining population and herd ratio objectives and public support.

Strategies

Elk have been fed for some period during nearly every winter on the National Elk Refuge since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during a time of year when natural forage is typically most limited is powerful to both species, and their knowledge of its existence has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Attempting to modify this behavior on a large scale is unprecedented and will necessarily require investigation; constant evaluation; and adaptive modifications to the approach; and repeated trials.

The Step-Down Plan's primary focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with landowners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into the three broad categories of

1) timing and intensity of winter feeding,
10) timing and intensity of hunting, and
11) overall and herd segment specific harvest levels.

Measuring the success of Step-Down Plan strategies will require knowledge of several bison and elk herd attributes. Because we are interested in reducing the intensity of elk and bison feeding throughout the entire winter season, which includes both the number of animals on feed and the duration of feeding, we will use measurements of elk-fed-days (EFD; the total number of elk fed per day per season derived from daily feeding ground estimates) and bison-fed-days (BFD; the total number of bison fed per day derived from daily feeding ground estimates) to evaluate feeding intensity. For example, if 5,000 elk were fed for 100 days during a given winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD. Average baseline feeding intensity during the post-BEMP to pre-Step-Down Plan period from 2008-2016 was 487,838 EFD (range = 223,614-746,800), and 45,224 BFD (range = 26,035-82,124). Reductions in EFD and BFD compared to these baselines will represent progress in meeting feeding reduction objectives under the Step-Down Plan. Reductions in EFD and BFD could be achieved by reducing the length of the feed season, reducing the number of elk and bison on feed, or some combination of both factors.

Initial success of Step-Down Plan implementation will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP did not provide specific measurement criteria for the definition of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage" we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. These levels of reduction are consistent with elk and bison predominantly relying on freestanding forage rather than supplemental feed.

Similarly, there are population-specific objectives derived from the BEMP and Phase 1 of the Step-Down Plan for 5,000 elk wintering on NER and 500 bison wintering in the Jackson Hole area. Progress towards these objectives will be measured using annual classification counts and the average number of elk and bison counted during daily feeding ground estimates.

CHRONIC WASTING DISEASE

As of 2016, chronic wasting disease (CWD) has been detected within 40 miles of the Jackson Elk Herd (Jackson elk herd) in moose, within 35 miles in deer, and within 175 miles in elk. Continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence will take place. Some aspects of CWD response planning could change based on implementation of WGFD's CWD management plan (WGFD 2016).

WINTER FEEDING

Currently, the initiation of supplemental winter feeding occurs when available forage drops to 300 lbs./acre along transects in areas with highly preferred grasses. This protocol will change to delay the initiation of feeding.

The strategy of delaying the start of supplemental feeding is to encourage elk and bison to use native winter range, especially those individuals that have not previously received a food reward on the Refuge. Over time, it is anticipated a cohort of animals will develop that are not conditioned to the Refuge supplemental feeding program, which will reduce herd concentrations and the risk of disease transmission.

To reduce supplemental feeding overall, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk and bison fed days, the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years of Step-Down Plan implementation, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding and identify private land conflict areas that may require focused mitigation measures.

As bison and elk behavioral responses are better understood, feeding delays will be extended to encourage a redistribution of elk and bison to native winter range. However, other factors outside of the scope of this plan such as wolf numbers and distribution could reduce the effectiveness of this strategy.

Variables that influence feeding initiation date will be considered (Table 4, Figure 9). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the Step-Down Plan, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Finally, the distribution of animals, particularly on private, livestock producing lands, would be considered prior to delaying feeding initiation date.

Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If Step-Down Plan implementation results in elk winter mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years.

In the early years of Step-Down Plan implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management, feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date as the Step-Down Plan is implemented.

HARVEST/HUNTING

Few options for manipulating elk hunting are currently available because the Jackson elk herd is at or near the 11,000 WGFD objective. Proposed changes include allowing limited any elk permits; allowing a bow season near developments on the NER; delaying the elk hunting season to coincide with migration timing; and alternating open and

closed areas to encourage animal movements or facilitate harvest.

Based on summer bull ratios in GRTE that were chronically below 35 bulls : 100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded hunting opportunities is considered.

The proportion of the Jackson Elk Herd that winters on NER has increased in the past 2 decades. This trend is correlated with a decline in elk use of native winter range and an increase in the proportion of NER elk that occupy winter ranges immediately adjacent to the Refuge. If efforts to encourage increased use of native winter range are unsuccessful, agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future Jackson elk herd population objective. This will provide a level of harvest flexibility more commensurate with addressing changes in herd distribution.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later hunt end dates commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution or discouraging bison from attempting to leave the NER via the south boundary into the town of Jackson.

The effectiveness of NER late-season harvest regimes is influenced by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could help reduce winter elk numbers on the Refuge. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1st.

PRIVATE LANDS MITIGATION

Several strategies would be employed to mitigate likely changes in bison and elk distribution, including providing incentives for non-breeding cattle operations, increased fencing in limited areas to separate elk and bison from livestock feed lines, hazing elk and bison away from livestock feed lines, and purchasing private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal wildlife conflict technician positions supervised by WGFD.

VEGETATION RESTORATION

Various approaches to restore the Kelly Hayfields in GRTE (4,500 acres) were initiated in 2008. Work will likely be complete in 2035. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and providing visitor opportunities to enjoy wildlife viewing within a natural setting. The restoration process involves removal of non-native vegetation, collecting and propagating native seeds and plants, as well as the seeding of native plants.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres are currently under restoration treatment and 3,265 acres remain non-native pasture. Maintenance of restored ecological conditions will require management efforts in perpetuity to keep non-native species from colonizing restored areas. The park will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

Strategies Considered but Rejected

Strategies considered but rejected include fertility control in elk and bison, agency reduction of either elk or bison, and altering rations of supplemental feed. These strategies were rejected because they were not included in the BEMP preferred alternative and/or because they were not supported by cooperating agencies.

Models and Monitoring

Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix C). Over time, this will allow us to assess whether changes in elk

distribution were the result of our management actions or due to factors outside of our control.

A robust monitoring program will be necessary to track the effects of actions implemented under this plan. Critical monitoring components will include: 1) enhanced forage production and availability sampling; 2) measuring animal abundance and distribution including differences in some sex and age classes; 3) determining elk and bison fed days each feeding season; 4) estimating winter mortality; 5) brucellosis seroprevalence rates; and 6) CWD surveillance. In many cases, attribute baselines for the period preceding implementation of this plan have been developed for comparison after the plan is implemented.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Actions completed each year, the results of monitoring programs, and any proposed changes in management direction will be presented in an annual Step-Down Plan update/report, completed by NER staff by the end of June.

Public Outreach / Education

De-emphasizing the supplemental feeding program will be a major paradigm shift especially for the residents of Jackson Hole and Teton County, but will also be of interest to others in Wyoming and across the nation familiar with the long history of feeding elk on the National Elk Refuge. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the Step-Down Plan in order to gain general consent to modify longstanding elk and bison herd management methods. A detailed communication plan has been developed that identifies key messages and utilizes a variety of outreach methods, including print, video, and voice material, utilizing social media, and meetings with elected officials, state and local governments, agency and tribal partners, community organizations, stakeholders, and the general public.

Schedule

GPS collars were deployed on 30 adult cow elk in February 2016. Assuming adequate funding, additional GPS collars will be deployed in winter 2017. Public outreach, private lands conflict mitigation and contacts, and enhanced forage monitoring will occur in fall 2016 through January 2017. Reductions in feed season length will begin in winter 2017.

Introduction

In 2007, the National Elk Refuge (NER) and Grand Teton National Park (GRTE) published a Record of Decision (ROD; USFWS and NPS 2007a) for a bison and elk management plan. The Bison and Elk Management Plan (BEMP; USFWS and NPS 2007b) was developed to guide management of the Jackson bison and elk herds on NER and GRTE lands. It included directives for forthcoming development of adaptive management practices to address several objectives in the plan, including a desired future condition of elk and bison relying predominantly on native forage. This Step-Down Plan has been developed expressly for that purpose.

Bison and Elk Populations

While Jackson Hole is probably best known for the splendor and ruggedness of the Teton Range, the Jackson bison and elk herds rank among the top characterizing features of the valley. Both figure prominently in Jackson Hole's history and culture, although bison were absent from the valley for about 100 years between the mid-1800s and mid-1900s.

The Jackson elk herd occupies approximately 8,000 km^2 in the upper Snake River watershed north of the town of Jackson (see Figure 1). Much of the herd is migratory, moving between distinct wintering and summer ranges. Primary wintering areas include the Buffalo Valley, lower elevations of the Gros Ventre River drainage, the NER, and areas adjacent to the NER on Bridger-Teton National Forest (BTNF) lands. Summering areas occur throughout the herd's range and for convenience are divided into five geographic regions that include GRTE, Yellowstone National Park (YNP), the Gros Ventre drainage, Teton Wilderness, and Southwest Boundary area, which includes private and public lands in the vicinity of GRTE's southwest boundary.

In the late 1800s, when elk populations all over North America were being hunted to near-extinction, the residents of Jackson Hole protected elk from "tusk hunters" and large-scale commercial hunting operations. Elk are just as important to today's residents of the valley. Thousands of people each year have the opportunity to see elk at close range on the refuge while riding on horse-drawn sleighs. Thousands of pounds of shed elk antlers are sold at an annual antler auction each spring in the town square. Elk are important to backcountry users as well as to people that never leave the road. Jackson Hole is a popular destination for instate and out-of-state elk hunters. The draw of elk to visitors contributes significantly to the local economy.

Winter feeding of elk in Jackson Hole began in 1910 and was originally initiated to reduce winter mortality of elk and minimize depredation of ranchers' hay. According to historical reports, before Euro-American settlement some Jackson elk wintered in the southern portion of Jackson Hole (present location of the NER town of Jackson) and may have used areas outside Jackson Hole, including the Green River and Wind River basins to the south and east, respectively, and the Snake River basin to the southwest in what is now eastern Idaho (Allred 1950; Anderson 1958; Blair 1987; Barnes 1912; Sheldon 1927). Radio-collar studies have documented small numbers of Jackson elk wintering in each of these areas in recent times as well (NER and GRTE, unpublished data). Over time, changes in land use and development in these areas, over hunting, and establishment of feeding grounds probably reduced the use of these areas by Jackson elk.

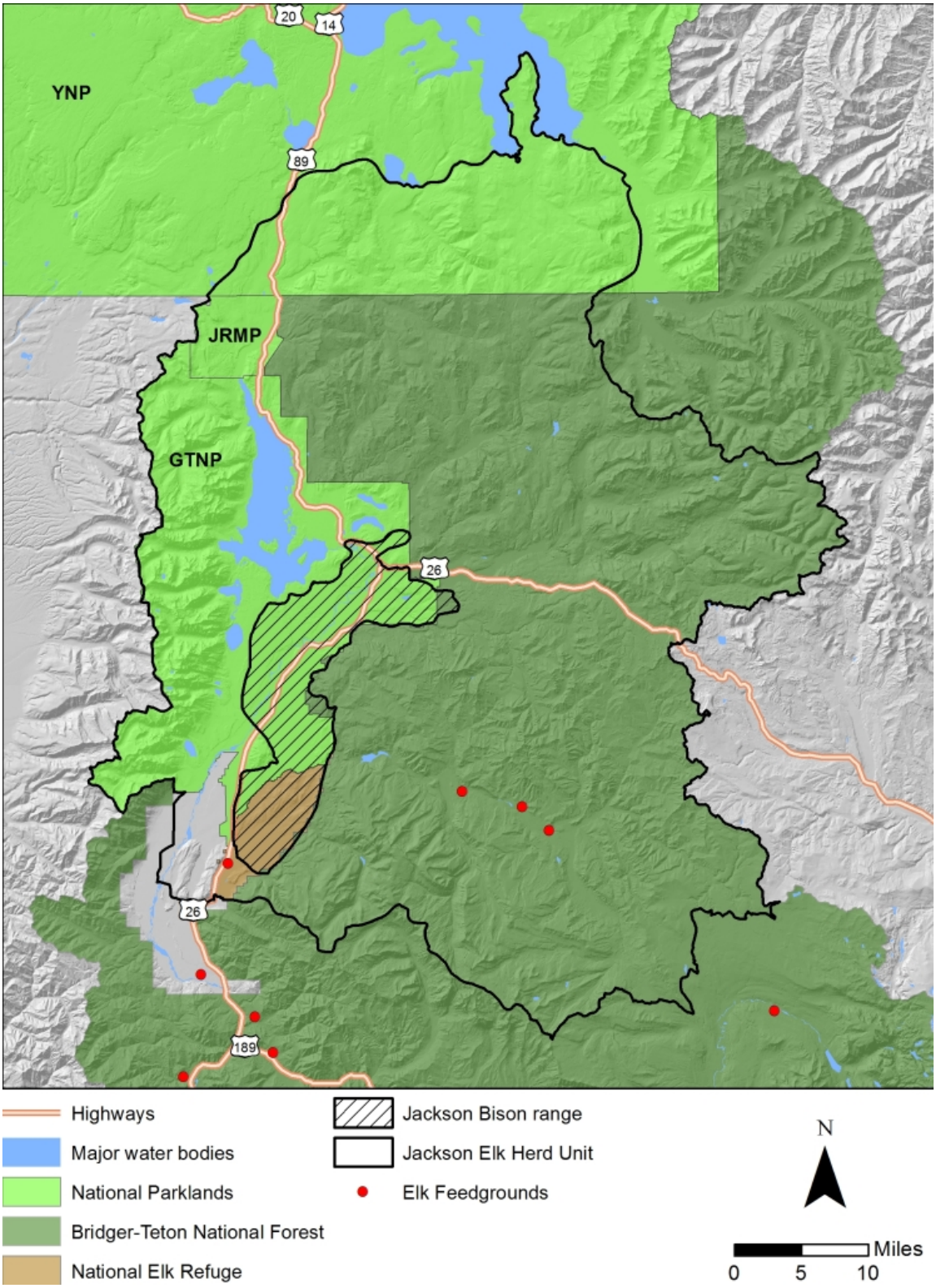


Figure 1. Jackson elk and bison herd ranges, including the National Elk Refuge, Grand Teton and Yellowstone National Parks, and Bridger-Teton National Forest.

By the end of the 19th century, the Jackson elk herd was believed to be largely confined to Jackson Hole and the immediately surrounding area, where wintering conditions are often harsh. Significant numbers of elk died during several severe winters in the late 1800s and early 1900s. The primary reasons for these mortality events included the loss of available winter range in Jackson Hole due to new ranching operations and an expansion of Jackson. The expansion prompted local citizens and organizations, as well as state and federal officials in Jackson Hole, to begin feeding elk in the winter of 1910–11. Congress heeded the appeals for assistance and on August 10, 1912, appropriated $45,000 for the purchase of lands and maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first winter census in the area was conducted in 1912 and showed about 20,000 elk residing in Jackson Hole and the Hoback River drainage (the latter is not within the Jackson elk herd's range).

Today, the need for the refuge's winter elk feeding program is a direct result of reduced access to significant parts of elk native winter range, loss of historic migration patterns, behavioral conditioning of elk to winter feeding, and the desire to maintain a population objective established in the context of supplemental feeding. In recent times, the population has fluctuated near the herd objective of 11,000 that was adopted by the WGFD (see Figure 2).

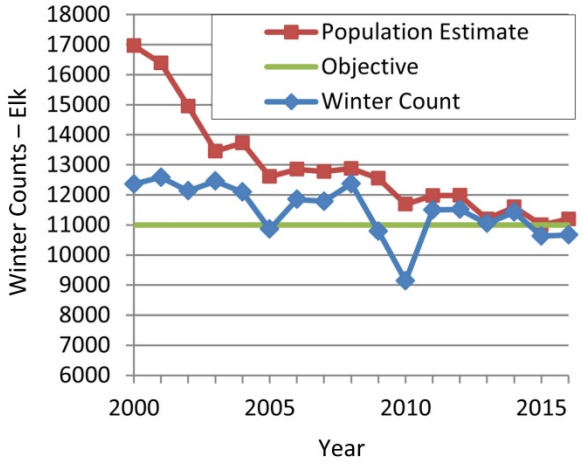


Figure 2. Winter Counts, population estimates, and herd objective for the Jackson elk herd, 2000-2016.

An iconic symbol of the American West, bison are also popular with visitors and residents. Because so few opportunities remain to see bison in the wild, viewing and photographing them in GRTE with the Teton Range in the background is a treasured opportunity for many of the valley's visitors. Similar to elk, there is also a high level of interest in bison hunting. Bison are of particular interest to nearby American Indian tribes and tribes in other parts of the United States because the animals are central to their culture and tradition.

Bison are native to Jackson Hole, as evidenced by the presence of prehistoric bison remains throughout the valley, but were hunted to near-extinction outside Yellowstone National Park by the mid-1880s. In 1948, 20 bison from YNP were reintroduced to the 1,500-acre Jackson Hole Wildlife Park near Moran. The Jackson Hole Wildlife Park was a private, non-profit organization sponsored by the New York Zoological Society, the Jackson Hole Preserve, Inc., and the WGFD. A population of 15–30 bison was maintained in a large enclosure there until 1963, when brucellosis was discovered in the herd (likely transferred with the original 20 animals from YNP). At that time, all the adult animals were destroyed, but four vaccinated yearlings and five vaccinated calves were retained. In 1964, twelve certified brucellosis free bison from Theodore Roosevelt National Park were added to the herd. In 1968, the herd (down to 11 animals) escaped the confines of the wildlife park, and a year later, the decision was made to allow them to range freely. The expansion of GRTE in 1950 had enveloped the Wildlife Park, and this allowed the bison to range freely and was consistent with National Park Service wildlife management policy. The herd remained small and wintered mostly in the Snake River bottoms in GRTE until 1975, when it followed the winter environmental gradient to the NER and began wintering there. The use of standing forage by bison on the NER was viewed as natural behavior and acceptable to managers. In 1980, bison discovered and utilized supplemental feed provided to elk in winter, and they have continued to do so ever since.

The discovery of supplemental feed by bison has had several consequences, including a significant increase in the population's growth rate (see Figure 3). Bison on the elk feedlines have at times disrupted feeding operations and displaced and injured elk. To minimize conflicts between bison and elk, managers have provided separate feedlines for bison since 1984. As the population has grown, separating elk and bison on feedlines has become increasingly difficult, and a variety of feeding strategies are employed to help reduce displacement of elk.

As the herd has grown it has maintained stable movement patterns, wintering almost entirely on the NER and summering within GRTE and adjacent lands on the BTNF (see figure 1).

While there have been many benefits associated with wintering large numbers of elk and bison on the NER, high animal concentrations have created an unnatural situation that has contributed to an increased risk for potentially major outbreaks of exotic diseases, which is demonstrated in the high level of brucellosis in the elk and bison herds. It has also resulted in damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands and thereby reducing availability of these habitats to other wildlife as well as unusually low winter mortality, which has affected predators and other species and has required intensive hunting programs.

PLANNING HISTORY

Jackson's bison and elk populations have been the subject of previous planning efforts. Elk management and research has been guided by the Jackson Hole Cooperative Elk Studies Group since it was established in 1958. The group consists of biologists and agency administrators from the NER, GRTE, YNP, BTNF, and WGFD, who meet at least annually to coordinate management of the population and its habitat. Coordination of bison management began soon after they started frequenting the NER in 1976 and using supplemental feed provided to elk in 1980 (Figure 3). Release of an "Interim" plan that called for maintaining a herd of 90-110 bison while data were gathered for a long-term plan occurred in 1988. It was followed by implementation of a sport hunt outside GRTE, administered by WGFD. This plan was halted after litigation in which the plan's violation of NEPA was successfully argued by plaintiffs.

In 1996, after considerable herd growth, a new long-term management plan and environmental assessment for the Jackson bison herd was released (Fig 3). This plan had strong support and called for maintaining a herd size of 350-400 bison, but it was shelved a year later when plaintiffs from the earlier litigation successfully argued that, because the plan failed to consider the effects of feeding elk on bison management, it also violated NEPA and was not sufficient. This led to development of the draft bison and elk management plan and environmental impact statement from 2000-2006 and release of the final plan in 2007 (see Figure 3).

The 2007 Bison and Elk Management Plan (BEMP; USFWS 2007) considered six alternatives for bison and elk management focused on four broad goals related to: 1) habitat conservation; 2) sustainable populations; 3) numbers of elk and bison; and 4) disease management. The primary management scenarios presented in the alternatives included the status quo, terminating elk and bison hunting on the NER and the elk reduction program in GRTE, brucellosis vaccination options, restoring habitat, improving forage, and decreasing or phasing out supplemental winter feeding.

The final BEMP (USFWS 2007; www.fws.gov/bisonandelkplan) which set management direction for 15 years or until a subsequent plan is developed, proposed to maintain the state's elk herd objective of 11,000, establish a bison population objective of 500, restore habitat in the NER and GRTE, continue hunting bison and elk on the NER, continue the elk reduction program in GRTE in concert with the parks enabling legislation, allow the WGFD to continue to vaccinate elk and bison for brucellosis using existing vaccines until more effective vaccines become available, and develop a dynamic framework of management actions which adaptively decrease the need for supplemental feeding on the NER.

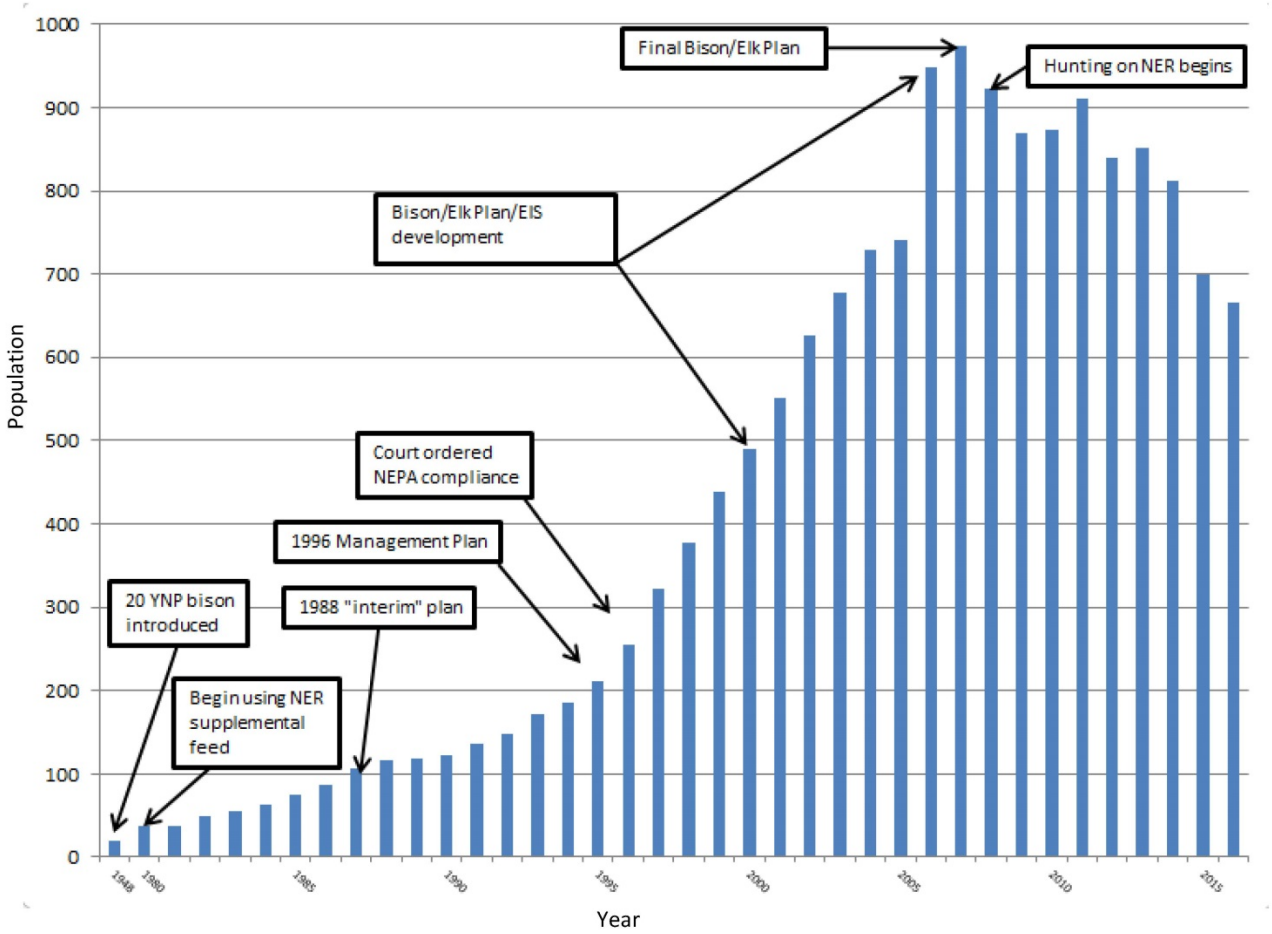


Figure 3. Population growth and planning history for the Jackson bison herd, 1948-2016

This Bison and Elk Management Step-Down Plan was developed to address the latter and specifically addresses the criteria for a structured framework listed on page 5 of the Record of Decision (see Figure 4). It does not address other on-going bison and elk management actions already prescribed by the BEMP.

The BEMP scheduled the completion of the Step-Down Plan for 2008. However, litigation challenging the BEMP in 2008 led to the decision to postpone its development until litigation was resolved. As of March 2015, two court rulings have upheld the 2007 BEMP and ROD. In a lawsuit against the BEMP and its author agencies (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2010), plaintiffs argued that the BEMP violated the National Wildlife Refuge System Improvement Act (National Wildlife Refuge System Improvement Act 1997) by disrupting the biological integrity of the Refuge, and that the plan and the accompanying EIS violated NEPA because they were insufficiently detailed to allow a reasonably complete discussion of mitigation. The crux of the plaintiff's argument was that the plan did not set a specific date for the cessation of supplemental feeding. In response, the agencies argued that the plan constituted a valid exercise of discretion and that it and the EIS were sufficiently detailed to satisfy the requirements of NEPA. In March 2010, the United States District Court for the District of Columbia sided in favor of the agencies in this case. In 2011, the plaintiffs appealed this ruling to the United States Court of Appeals for the District of Columbia Circuit. This Court affirmed the District Court ruling (Defenders of Wildlife et al. v. the U.S. Department of Interior and State of Wyoming 2011).

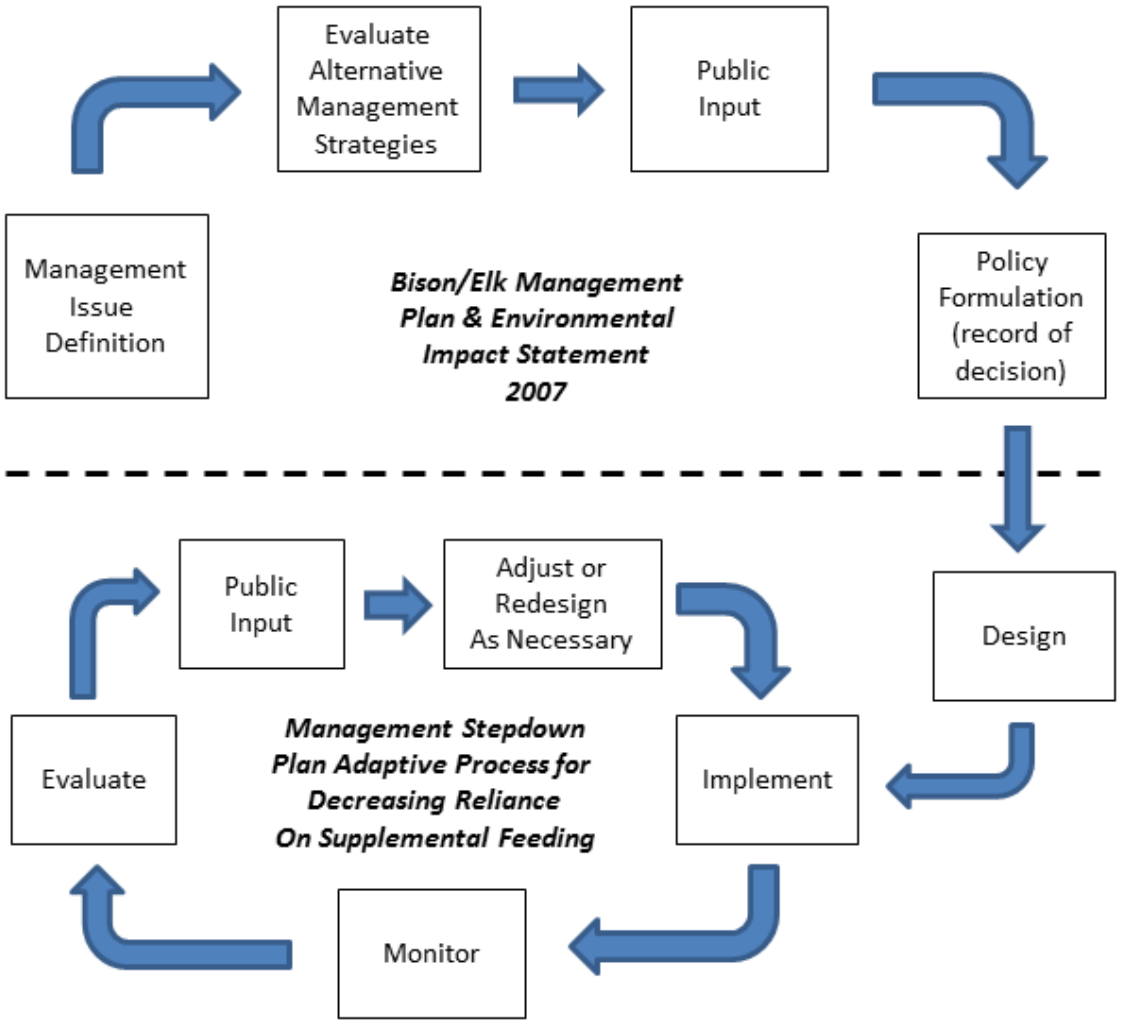


Figure 4. Step-down planning on the National Elk Refuge as it relates to the BEMP

National Environmental Protection Act Compliance

The 2007 BEMP/EIS and ROD satisfied NEPA requirements for current bison and elk management through a detailed analysis of alternative management actions and their likely effect on the environment, and substantial involvement of the public in the process. This step-down plan does not duplicate or add to this process. It is a tier of the BEMP to be used as a dynamic implementation guide to one part of the preferred alternative outlined in the BEMP ROD. As such, references to NEPA covered in the BEMP will be included where necessary in this document, and the discussion of any action that would require additional NEPA compliance will be explicitly stated as such in that context.

Step-Down Planning

The use of adaptive management plans has gained popularity in natural resource management planning because, by definition, they allow modifications of strategy based on monitoring results and outcomes toward reaching specific goals

or objectives. Four elements generally included in an adaptive management approach include:

1) well defined and mutually agreed upon objectives;
2) knowledge (including descriptive models) of the dynamics of the system being managed;
3) clearly articulated management actions and strategies; and
4) a monitoring program to evaluate responses of the system to management actions (Walters 1986).

This Step-Down Plan utilizes adaptive management planning principles but is not intended to include all of the adaptive management planning elements outlined in the Department of Interior Adaptive Management Technical Guide (2007). This Step-Down Plan is more accurately described as a "structured framework" of adaptive management actions that progressively transitions from supplemental winter feeding to greater reliance on freestanding forage (BEMP ROD p.5).

Table 1. 2007 Bison/Elk Management Plan Goals and Objectives
Goal: Habitat Conservation
Objectives:
• Conserve important private lands. • Increase forage production. • Minimize non-native plants. • Protect sagebrush grasslands. • Restore willow, aspen, and cottonwood. • Perpetuate natural mosaic of plant communities.
Goal: Sustainable Populations
Objectives (BEMP pages 135-136):
• Develop structured framework for reducing NER supplemental feeding.* • Phase reduction of animals on feed: 1) to 5,000 elk and 500 bison, and 2) elk and bison rely predominantly on native habitat.* • Maintain 35:100bull-to-cow ratios in park summer elk herd.* • Ensure a genetically viable bison herd with close to an even sex ratio. • Enhance public outreach/education.*
Goal: Elk and Bison Numbers
Objectives:
• Maintain state elk herd objective of 11,000. • Maintain a genetically viable bison population of about 500 animals.
Goal: Disease Management
Objectives:
• Manage brucellosis transmission risk from elk and bison to livestock. • Manage feeding to reduce brucellosis transmission among bison and elk. • Educate hunters about wildlife disease human health hazards.
Note: * Step-down plan objective

Objectives

The management direction and desired conditions stated in the BEMP called for the NER and GRTE staffs to work with others (agencies, partners, etc.) to "adaptively manage elk and bison in a manner that contributes to the State's herd objectives yet allows for the biotic integrity and environmental health of the resources to be sustained," so that the public can enjoy a variety of compatible wildlife-dependent recreational opportunities. Under the BEMP's four primary goals, 20 associated objectives were identified (see table 1). This Step-Down Plan addresses four objectives under the goal of sustainable populations (see Figure 5).

The reduction of animals on feed at the NER was proposed to be spread over two phases. In Phase 1, the aim is to reduce the average number of elk on feed to 5,000 (while maintaining WGFD's 11,000 elk herd objective), and reduce the winter population of bison to the BEMP recommended, and WGFD adopted, objective of 500. In Phase 2, the overall objective is to reduce the reliance of bison and elk on supplemental feed (USFWS and NPS 2007a). Desired conditions include animals relying predominantly on native habitat and cultivated forage on NER. Important consideration criteria for implementing Phase 2 will include: 1) the level of forage production and availability on the NER and adjacent winter ranges; 2) maintenance of desired herd sizes and age/sex ratios; 3) the ability to effectively mitigate bison and elk livestock conflicts; such as co-mingling on private lands during high risk disease transmission periods; 4) maintaining desirable winter distribution patterns of elk and bison; 5) the prevalence of brucellosis, chronic wasting disease, and other wildlife diseases; and 6) public support. In short, the overall objective of this plan is to outline a framework for progressively transitioning from winter feeding of elk and bison on the NER to greater reliance on freestanding forage, while maintaining population and herd ratio objectives.

This Plan focuses on management actions to achieve Phase 1 objectives. However, if successful, these actions will continue to be used to achieve the Phase 2 objective of reducing reliance on supplemental feeding while considering the six criteria listed above.

Management Actions and Strategies

BACKGROUND

The principal goal of reducing reliance on supplemental feeding is to limit transmission of density dependent diseases in elk and bison while simultaneously minimizing winter mortality in elk. We will attempt to achieve this goal by experimentally reducing feed season length and closely monitoring elk and bison distribution and winter mortality.

Elk have been fed on the NER each year in all but 9 winters since 1912, and bison have been fed there since 1980. The attraction of highly nutritious, easily accessible food during winter months is powerful to both species, and their knowledge of NER feeding grounds has been passed down through generations. As a result, elk and bison have been strongly conditioned to seek supplemental food on the NER, even when natural forage is available and even abundant during some years. Because use of feeding grounds is a learned behavior, decreasing feed season length will potentially reduce the likelihood of elk that winter on native range finding NER feeding grounds. Over time, this could result in a greater percentage of elk using native winter range relative to NER feeding grounds. Because it is largely unprecedented,

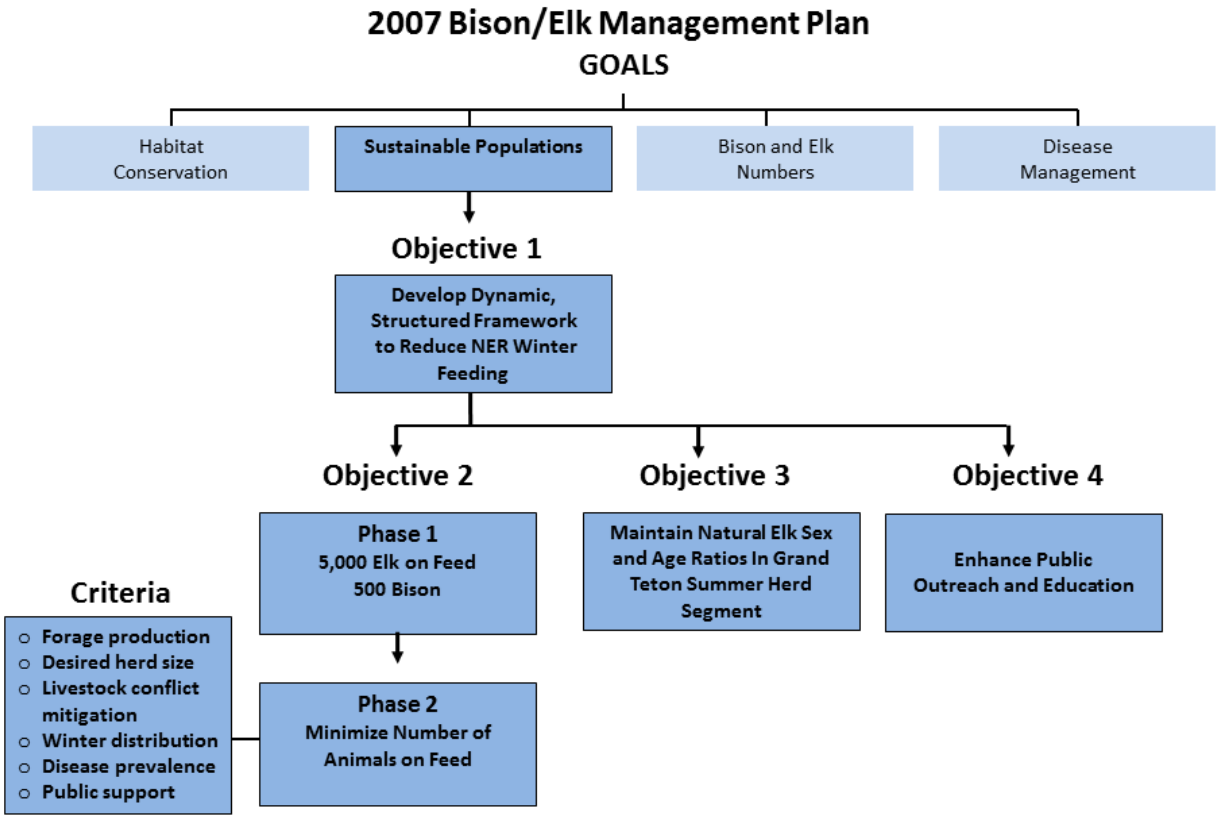


Figure 5. Relationship of the Step-Down Plan to the BEMP goals, phasing of objectives, and consideration criteria for Phase 2

the concept of modifying this behavior on such a large scale is daunting and poses questions for which there are no immediate answers. In some cases, the likelihood a specific management strategy's success will only be able to be roughly estimated, and unanticipated results are likely. Closely monitoring forage availability, elk and bison distribution, and elk mortality will allow us to evaluate the effectiveness of management actions and adjust management actions as needed should unintended negative consequences arise.

Since this plan is centrally tied to supplemental winter feeding on the NER, its focus will be on lands under NER authority. However, some strategies will also incorporate activities in GRTE, and on non-federal lands in collaboration with landowners and WGFD. Primary management practices that can be altered to achieve reduced reliance of bison and elk on supplemental feed fall into three broad categories: 1) timing and duration of winter feeding, 2) timing and intensity of hunting, and 3) overall and herd segment specific harvest levels.

IMPORTANT CHANGES SINCE 2007

The BEMP was developed based on data collected and knowledge that existed up until its ROD. Since then, important changes have taken place, some of which are advantageous to this effort and some of which are not.

A primary change that will facilitate meeting objectives under this plan is the reduction of the bison population from nearly 1,200 animals in 2007 to about 675 during winter 2015-2016 (Figure 3) through hunting programs administered by WGFD. Licensing changes enacted in 2014 included a reduction in the bison cow/calf license fee (from $416 to $263 for residents and $2522 to $1022 for non-residents) and eliminating the once-in-a-lifetime restriction on a successful bison hunter to only those that successfully harvested a bull. Continued progress toward the 500 animal herd objective will require sustained harvest success.

During the same period, the Jackson Elk Herd has declined from nearly 13,000 to its objective of 11,000, but because the proportion of the Jackson

elk herd that winters on NER has increased dramatically (see figure 6), this will make achieving the Phase I objective of 5,000 elk on feed and any future elk population reductions more difficult.

Frequently Asked Question

Question:

The BEMP has an objective of 5,000 elk wintering on NER. Why has that objective not been achieved through increased elk harvest/hunting?

Response

The overall Jackson Elk Herd population has declined and is currently close to the 11,000 elk objective, but the number of elk wintering on NER has been well above the 5,000 elk objective since implementation of the BEMP in 2007 (Mean =7,100 elk). When the analysis was conducted for the BEMP, elk winter distribution data suggested that 5,000 elk could winter on NER while still maintaining 11,000 elk in the Jackson Elk Herd overall. However, the proportion of the Jackson Elk Herd that winters on NER has increased significantly over time, and based on current elk distribution it is no longer possible to winter 5,000 elk on NER and maintain 11,000 elk in the overall Jackson Elk Herd. Although increasing elk harvest above current levels would likely allow us to achieve the 5,000 elk objective for NER, it would also reduce the overall Jackson Elk Herd population below the 11,000 objective. If increasing elk harvest is not plausible, the only other option to meet the 5,000 elk objective on NER is to change winter elk distribution, which is the principal strategy of the Step-down plan.

Preliminary analysis suggests that the increasing proportion of the Jackson elk herd wintering on NER has been associated with 1) Declines in elk use of native winter range and movements of elk from State feed-grounds in the Gros Ventre drainage to NER, and 2) increasing numbers of elk that summer immediately adjacent to NER (Cole and Foley et al. 2015).

Refuge-wide herbaceous forage production averaged 14,387 (SD = 4,125) tons during 1998–2013. In recent years, irrigation of approximately 3,600 acres has increased refuge-wide forage production by approximately 10% compared to what would have been produced with precipitation alone, and by 15% in the southern portion of NER that receives the greatest use by elk and bison.

Since 2007, the general awareness of climate change among the public has greatly increased. A strong, credible body of scientific evidence shows that climate change is occurring, is caused largely by human activities, and poses significant risks for a broad range of human and natural systems (National Academy of Science 2010). Ecological systems in the GYE are likely to be affected and associated changes may have implications for elk and bison

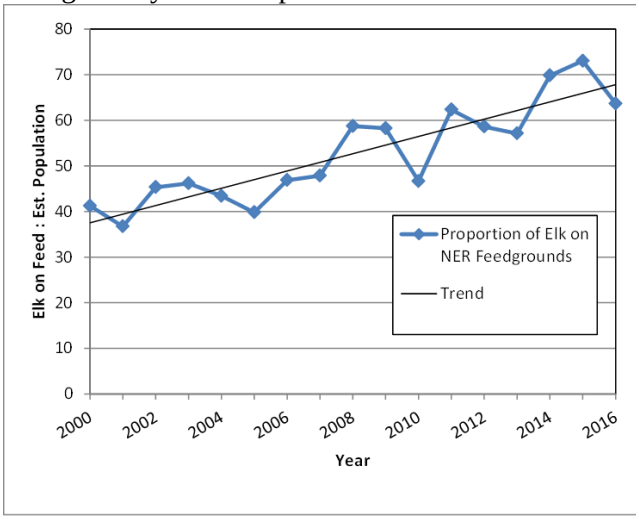


Figure 6. Trend of National Elk Refuge elk on supplemental feed as a proportion of the Jackson elk herd

management. Moderate to long-term effects of climate change in Jackson Hole will likely include increases in average temperature, a reduction in the duration and distribution of snow cover, an increase in the number of frost free days, increased wildfire frequency, and changes in plant community composition and structure including loss of forest and shrub cover and an increase in invasive plants (Riginos and Newcomb 2015). The net effect of these changes relative to the implementation of the Step-Down Plan remains uncertain.

CURRENT MANAGEMENT

Ongoing primary management actions on the NER include winter feeding, harvest, irrigation, and hazing. In GRTE, harvest of elk during the Elk Reduction Program takes place, when necessary, in collaboration with WGFD, and restoration of previously cultivated and irrigated sagebrush-grasslands is ongoing. Fundamental components of each of these will be briefly described below to provide a basis for comparison to Step-Down Plan strategies that will follow.

CHRONIC WASTING DISEASE

Supplemental feeding has occurred in all but 9 winters on NER since 1912, and although this strategy minimizes winter elk mortality from starvation, contributes to Wyoming state elk herd objectives, eliminates commingling with livestock, and keep elk off adjacent roadways, elk occur at numbers and densities well in excess of carrying capacity (Smith et al. 2004, Lubow and Smith 2004). Considerable evidence suggests that Chronic Wasting Disease (CWD) transmission and prevalence are density dependent (Peters et al. 2000, Williams et al. 2002). Monello et al. (2014) found that elk densities of 15-110/km2 (0.06 to 0.45/ac) in Rocky Mountain National Park were associated with 13% CWD prevalence, and they predicted elk population declines when CWD prevalence exceeded 13%. NER elk densities range from 77-16,850/km2 (0.31-68/ac; NER unpublished data), which suggests that the introduction of CWD to NER elk would have significant negative population effects over time.

WINTER FEEDING

Initiation of feeding has the primary objectives of 1) minimizing elk winter mortality, focusing on calves since they are the most susceptible age class, and 2) minimizing comingling of elk with cattle on nearby adjacent private lands. Winter feeding begins when available forage reaches approximately 300 lbs./ac. Historic radio telemetry data and observations of elk movements indicate that when available forage declines below 300 lbs./ac., some elk leave NER for surrounding private lands. Therefore, the purpose of this feeding "trigger" is to keep elk on the NER and prevent them from searching for forage off the NER, which would increase the potential of comingling with cattle causing damage to private lands, and moving across Highway 89 where the risk of vehicles hitting elk is high. This trigger is not a warning that a significant nutritional deficit threshold has been reached. Available winter forage for elk and bison on the NER is determined by biomass of forage produced during the previous growing season, rate of forage consumption during fall and winter, and snow conditions.

Index sites are used to sample forage biomass and determine when feeding should be initiated. These sites are selected annually to represent plant communities that are highly preferred by elk due to plant species composition and the persistence of green vegetation. Weekly sampling begins in late December to estimate available forage biomass at each index site. When average available forage across index sites is below 300 lbs./ac, biologists typically recommend that supplemental feeding be initiated.

During 1995–2013, the average initiation of winter feeding in NER occurred 28 January (range = 30 December–28 February), and feeding was terminated on 3 April (range = 20 March–20 April). Variation in feeding initiation and termination dates has been based on winter conditions and a desire to avoid elk-cattle comingling on nearby private lands. Coordination of winter feeding dates on the NER and WGFD-operated Gros Ventre drainage feeding grounds (Alkali, Patrol Cabin, and Fish Creek) occurs annually to help minimize movement of elk between these areas. This coordination will continue regardless of the management strategy employed. The relationship of recent elk numbers and objectives for NER and WGFD-operated feeding grounds and native range is shown in Table 2.

Table 2. Annual distribution of wintering elk from the Jackson elk herd during February classification counts relative to the current objective, 2011-2016

	Objective	2011	2012	2013	2014	2015	2016	Mean
NER	5,000	7,746	7,360	6,285	8,296	8,390	7,290	7,561
Gros Ventre	3,500	2,775	3,265	2,982	2,326	1,162	1,667	2,362
Native Range[1]	2,500	982	894	1,784	801	913	1,711	1,180
Total	11,000	11,503	11,519	11,051	11,423	10,465	10,668	11,105

[1]Excludes objectives for native range adjacent to Gros Ventre feeding grounds.

Bison discovered refuge feeding operations in 1980, and since that time, they have been fed each year to help minimize disruption to elk feeding operations. Because bison displace elk from

feedlines, NER staff attempt to feed most bison in the northernmost refuge feeding ground and provide a heavy feed ration, which helps keep them in this area. This strategy prevents bison from mingling with elk and prevents bison from moving to areas where conflicts with humans are more likely.

HARVEST

Total hunter harvest of the Jackson elk herd was gradually reduced over the last decade as the population neared objective (see Figure 7). Elk hunting on the NER (Hunt Area 77) typically begins in mid-October and ends in mid-December, with peak harvest in recent years occurring in late November to early December. From 2005 to 2015, 422 ± 102 (mean ± SD, range = 329-612) hunters harvested 196 ± 95 (range = 126-457) elk per year during the NER hunt.

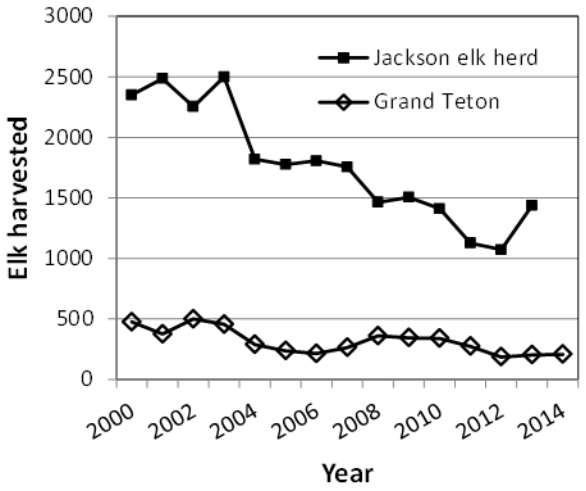


Figure 7. Estimated elk harvests for the whole Jackson elk herd and the portion that occurs in Grand Teton National Park, 2000-2014

The 1950 legislation that created GRTE provided for a controlled reduction of elk, when necessary, in specific portions of the park, primarily east of the Snake River. Elk reduction programs have taken place in the park each year since 1950 except two (1959 and 1960), when GRTE and WGFD officials agreed a reduction was not necessary (Figure 8). Season dates have varied over the years but recently have run from mid-October to early-December. The GRTE harvest accounts for about 25% of the overall Jackson elk herd harvest, and has been an important factor in regulating the population. Increased predation, likely a result of increases in grizzly bears and wolves over the last 20 years, has decreased the need for large harvests in GRTE.

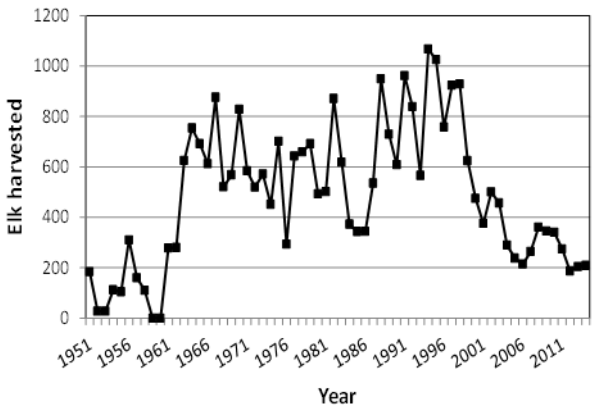


Figure 8. Elk harvest in Grand Teton National Park, 1950-2015

Bison hunting begins 15 August and ends in early to mid-January. Most harvest occurs on the NER, with some additional harvest on private and BTNF lands. Since resuming the bison hunt in 2007, harvest has been 210 ± 45.5 (range 139-301) bison per year. This level of harvest has been sufficient to arrest the exponential growth of the population; reducing bison numbers from the peak in 2007 to about 700 animals in winter 2015 (see Figure 3). Tribal bison harvest of up to five animals for ceremonial purposes was authorized in the BEMP. Translocation of wild bison to lands outside of Teton County is not currently permitted due to brucellosis concerns.

Bison hunting is not allowed in GRTE because of long-standing NPS policy that prohibits most hunting in national parks. Bison quickly learned to take advantage of the safety of GRTE, which has made hunter harvest goals difficult to achieve. Many bison stay in GRTE during the hunting season, with only occasional short-term movements to the NER, until severe winter conditions occur. In response, NER and WGFD managers have attempted to extend the hunt to late January while minimizing the conflict with the initiation of winter feeding. The unpredictable nature of winter conditions that time of year makes this challenging, and has (or could) result in the use of emergency season extensions or reductions.

HAZING

NER staff haze elk and bison to conserve winter forage, prevent year-round use of winter range, and in some cases to prevent elk and bison from moving to private lands or other areas where conflicts with humans are likely. Hazing using ATVs has proven most effective. The strategy is typically employed

during 3 time periods: 1) in May to move elk and bison off NER that are lingering on NER winter range; 2) in July when some bison typically return to NER; and 3) in the period just prior to feeding initiation when elk and bison are most likely to leave NER for private lands. Hazing of elk and bison by WGFD staff also occurs on private lands adjacent to NER periodically throughout the year.

VEGETATION RESTORATION AND PROTECTION

The BEMP identified approximately 4,500 acres of previously irrigated and cultivated grasslands in GRTE in need of restoration to native sagebrush grasslands community. Objectives of ecological restoration include restoring abandoned hayfields to native plant communities to improve wildlife forage and habitat, and visitor opportunities to enjoy wildlife viewing within a natural setting. After 2 years of research and field studies, restoration efforts began in 2008. The restoration process involves several steps including removal of non-native vegetation through repeated herbicide applications, collection, and propagation of native grass, forb and shrub seeds, and finally native seeding. Repeated herbicide treatments have been warranted prior to native seed planting as well as spot treatments of invasive weed species subsequent to native seeding. Substantial progress in this endeavor has been made since 2008, including 1,235 acres of previously cultivated lands under restoration treatment. Of the 1,235 acres undergoing treatment, 745 acres has been seeded with native grass, shrub, and select forb mixes, and 89 acres is considered fully restored. Two-hundred and seventy-five of these acres are currently fenced to reduce grazing pressure of early native vegetation establishment from bison and other ungulates. An additional 490 acres are targeted for native seeding in 2016 once removal of the invasive vegetation is successful. All treatments are monitored for native plant establishment and invasive plant infestations and treatments will be adjusted as necessary. Invasive plant treatments may have to continue indefinitely. GRTE will continue to seek funding for restoration of the remaining areas as well as maintenance of the restored pastures.

PRIVATE LANDS MITIGATION

Fencing of haystacks and livestock feedlines has been historically used to mitigate particularly difficult conflicts on private lands. Targeted fencing of golf course greens and sand traps fall through spring has also been successful in some situations for mitigating elk and bison presence and associated damage in these areas. It is important to note that the county has a “wildlife-friendly” fence policy and does not support extensive fencing that is impermeable to wildlife in residential areas.

COMMON METHODS, ASSUMPTIONS, AND CONSTRAINTS

Measuring the success of strategies toward objectives will require knowledge of several bison and elk herd attributes, particularly population sizes. Measurements of the Jackson bison herd will be based on the annual mid-winter census and sex and age classification survey performed by NER, GRTE, and WGFD biologists. This survey occurs one day in February and includes ground counts of animals on feed at the NER and aerial counts of outlying bison across their winter ranges on the refuge, park, and Bridger-Teton National Forest.

Elk population estimates will also be based on mid-winter aerial and ground counts. However, the mid-winter counts are undertaken during a single survey period and do not necessarily represent either peak or cumulative abundance of elk on feed. Rather than basing progress toward the number of elk on feed for the entire season on those present during the day of the survey only, we will use a more meaningful measurement. Since we are more interested in the intensity of elk feeding throughout the entire feeding period, which includes both the number of animals on feed and the duration of feeding, we will use a measurement of elk-fed-days (EFD; the total number of elk fed per day per season) as a gauge of feeding intensity (see monitoring section). For example, if 5,000 elk were fed for 100 days during the winter, feeding intensity for that winter would equal 5,000 elk X 100 days = 500,000 EFD, whereas if 5,000 elk were fed for 50 days, EFD would equal 250,000.

We determined feeding intensity benchmarks for bison and elk-fed based on an actual average of 64 days of feeding from 1995-2007. Based on the Phase I objectives of 500 bison and 5,000 elk, fed-days benchmarks would be 64 x 500 = 32,000 for bison and 64 x 5,000 = 320,000 for elk. These values will assist in determining efficacy of strategies toward reducing reliance of both species on supplemental winter-feeding.

Initial success of the Step-Down Plan will be a consistent decline in the 3-year running average of elk and bison fed days from the established baseline. While the BEMP does not provide specific measurement criteria to determine when the NER has successfully attained the objective of "transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage", we will consider this objective met when the 3-year running average of elk and bison fed days is <50% of baseline for 5 years in a row. This level was chosen to define success because it indicates that elk and bison will predominately be foraging on freestanding natural and cultivated plants on NER and adjacent winter ranges rather than on supplemental feed.

Several management constraints are common to the strategies discussed below (Table 3). Many law and policy constraints are applicable but we include here only those most pertinent. Endangered Species Act (16 USC 1531 et seq.) requirements for wolves, grizzly bears, lynx, and others apply. Lynx requirements for maintaining certain habitat types could limit methods used and areas considered for habitat improvements in GRTE and the BTNF. Such improvements could increase elk and bison use of native winter range off the Refuge while simultaneously reducing use of feedlines. Similarly, compliance with the 2015 sage grouse amendment to the 1990 Bridger-Teton National Forest Land and Resource Management Plan and the Wyoming greater sage-grouse core area protection executive order (2011-5 and supplement 2013-3) could affect habitat manipulations. NEPA compliance conducted as part of the BEMP/EIS constrains what federal actions can be taken as a part of this plan. State regulations constrain late (winter) hunt and carcass disposal timing to protect against brucellosis contamination, since February-April represent the period bison and elk are most likely to transmit the disease. Restrictions on hunting timing also result from BTNF winter range closures, immediately east of the NER and elsewhere, December 1 to April 30. Additional details about these and other constraints will be included in discussions about specific strategies that follow.

Table 3. Summary of potential step-down plan constraints

Policy

- ESA[1] Lynx – limits on habitat impacts
- Greater Sage Grouse – core area protection
- 2007 BEMP/EIS (federal actions/lands)
    - No fertility control
    - No test and slaughter
    - Limited tribal ceremonial take
- Bison/elk hunt end date (Feb. 1st)
    - WGFD, brucellosis safety
- Carcass disposal (Feb. 15th)
    - WGFD, brucellosis safety
- Forest Service winter closure (Dec. 1st – April 30th)
- Easement limitation (NER boundary)

Winter Feeding

- Only during non-hunting periods

Harvest

- State regulations

Vegetation Restoration/Protection

- Bison/elk distribution
- Exotic plant species management

Private Lands

- Owner agreements

Table 3. Summary of potential step-down plan constraints

Social

- Hunter density (safety; hunt quality)
- Elk/bison winter mortality levels
- Public safety (ungulate/vehicle collisions)
- Disease
- Land-use conflicts (agricultural and residential)

Biological

- Disease (bison/elk/cattle commingling)
- Sage grouse habitat conflicts
- Fencing/wildlife conflicts
- Elk herd distribution
    - summer segment distribution goals

Funding

- Easement purchase
- Plan implementation

Note: [1]Endangered Species Act

Strategies

This section describes the management action this Step-Down Plan proposes to implement. As such, it unveils the heart of management changes proposed to begin the process of transitioning to greater reliance of bison and elk on native forage during winter. Fundamentally, the strategies discussed in this plan represent an experiment designed to achieve Phase I objectives of 5,000 elk and 500 bison on NER and are a first step towards reducing reliance on supplemental feeding while meeting the sustainable population goals identified in the BEMP.

Initial strategies for achieving sustainable population goals identified in the BEMP (Table 1) are presented by the objectives below. The primary management actions available to the agencies to achieve Phase I objectives are modifications to winter feeding and hunting seasons. To a lesser extent, vegetation protection and restoration can be important, particularly for improving long-term ecological function and enhancing natural production of native forage. Private lands are also an integral component as changes in elk and bison distribution occur and new challenges develop. The likely consequences of implementing these strategies were evaluated in the BEMP. The most relevant of these are summarized in Appendix A.

OBJECTIVE

1) Implement a phased reduction of animals on NER feed to 5,000 elk and 500 bison, and,
2) influence elk and bison to rely predominantly on native habitat (Table 1).

The first phase will be to reduce the number of elk on NER feed to approximately 5,000 and achieve a target population of about 500 bison. The second phase will be to manage bison and elk populations to achieve desired conditions, with animals relying predominately on available native habitat (NER, GRTE, and USFS lands) and cultivated forage (NER).

As previously mentioned, reducing winter feeding after more than 100 years of the practice; and the associated behavioral conditioning of elk and bison to its presence; represents a formidable challenge that must be approached cautiously and systematically. Efforts to scale back elk supplemental feeding operations in other parts of North America have been rare and fraught with controversy (Smith 2001). The strategies discussed below have been developed in this context, with appropriate feedback mechanisms through rigorous monitoring and frequent evaluation. Inability to meet this objective under the strategies presented

here would trigger a thorough evaluation and consideration of more aggressive strategies when the BEMP is updated in 2022.

Chronic Wasting Disease

Since 1997, NER has cooperated with WGFD to conduct intensive surveillance for CWD in the JACKSON ELK HERD unit. GRTE has also collaborated with WGFD to collect samples from the ERP and from road-killed cervids. Although this effort indicates that CWD is not currently found in the Jackson elk herd, continued surveillance at sample sizes sufficient to detect 1% prevalence with 95% confidence annually will be critical to ensure a timely management response and limit the long-term population effects of the [USFWS and NPS, 2007b]. Given that CWD has been detected within 40 miles of the Jackson elk herd in moose, within 35 miles in deer, and within 175 miles in elk, this level of surveillance is warranted.

In 2016, the WGFD cooperated with federal agencies and other stakeholders to revise the 2006 Wyoming CWD Management Plan. The NER and USFWS Region 6 Wildlife Health Office staff participated in several meetings associated with this effort. The Wyoming CWD Plan lists several management responses for consideration if CWD is detected on or adjacent to State or NER elk feeding grounds. Early detection of CWD in the Jackson elk herd is essential to allow implementation of management responses.

The BEMP (2007) identifies the management response to the arrival of CWD as following the State of Wyoming CWD Plan in effect in 2007. The Wyoming CWD Plan was updated and significantly changed in 2016. In light of changes in the Wyoming State CWD Plan, and the results of CWD Studies completed since 2007, the NER management response to CWD will be reviewed and updated in a NER Disease Contingency Plan, as identified in the NER Comprehensive Conservation Plan (2016). The CWD section of the NER Disease Contingency Plan will remain consistent with the goals of the BEMP. The NER Disease Contingency Plan is scheduled to be completed in 2017.

Winter Feeding

Winter feeding actions that could be modified include starting date, ending date, and daily ration. To modify elk and bison behavior in the end, delaying initiation of feeding is likely to have the greatest impact by gradually conditioning animals to "expect" feed to be available later in the winter; this could build cohorts of animals that rely primarily on native winter range. To reduce supplemental feeding, ending feeding early would also help decrease the amount of feed provided per animal per year. Both would help decrease the total elk/bison fed days, which is the parameter we will use to measure progress toward reducing reliance on supplemental feeding.

During the first several years, the initiation of feeding will be delayed for short durations of time (days). This will provide an opportunity to monitor elk and bison behavioral responses to delayed feeding (Figure 9) and identify private land conflict areas that may require assistance with focused mitigation measures.

As bison and elk behavioral responses are better understood, and targeted mitigation on private lands is achieved as needed, feeding delays will be extended depending on several variables (see Table 4, Figure 10). During the last 20 years, feeding initiation dates, which have been based on forage availability, have varied from December 30 to February 28. Under the Step-Down Plan, the magnitude of the delay in feeding initiation date will be influenced by seasonality. For example, delaying feeding by two weeks in January is likely to be more successful in dispersing

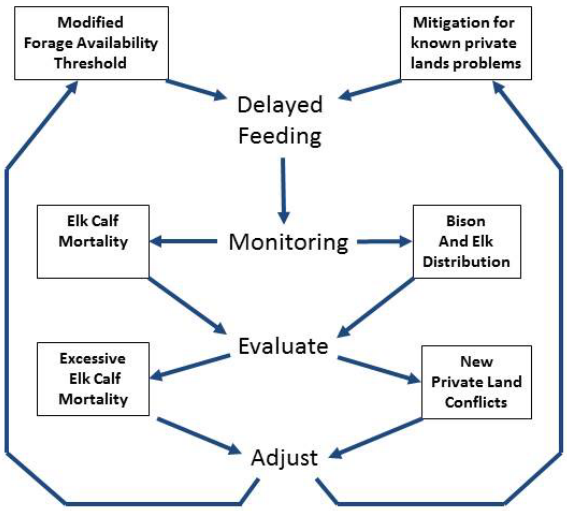


Figure 9. Framework for delayed feeding strategy under the step-down plan

Frequently Asked Question

Question:

Why is your principal strategy to delay the start of the feed season?

Response:

By delaying the start of the supplemental feed season, we decrease the probability that elk that use native winter range or state feeding grounds will discover NER feeding grounds. Because elk use of feeding grounds is a

learned behavior, over time this could increase the proportion of elk that winter on native winter range, reduce the number of elk that move from the Gros Ventre drainage to NER, and decrease the NER wintering elk population. The resulting shift in elk distribution would allow us to achieve the 5,000 elk objective for NER. Because 5,000 elk and 500 bison is close to the estimated carrying capacity of NER habitat, less feeding will be necessary at these population levels.

animals to native range than doing so in February, when food stress and the potential for animals to move to private lands is greater. Forage availability could also have an influence on feeding initiation date, particularly if a freeze-thaw event resulted in an acute and large reduction in available forage. Forage availability would also be affected by the numbers of elk and bison on the NER. Finally, the distribution of animals, particularly on private, livestock producing lands would be considered in determining feeding initiation date.

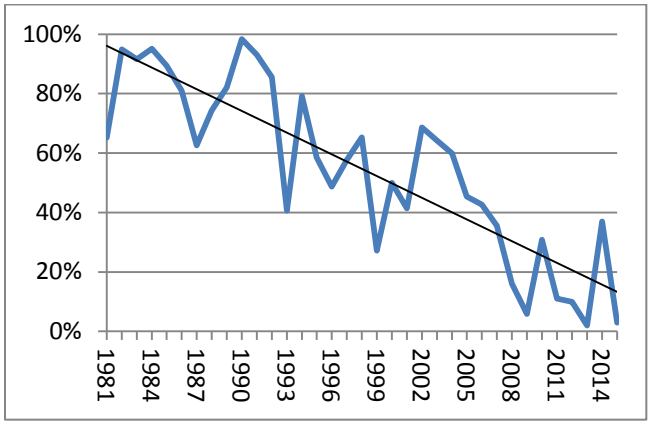


Figure 10. The percentage of elk that wintered on NER as of December 1; showing a progressively later annual fall/winter arrival over the past several decades

A primary concern of manipulating feeding is elk winter mortality, particularly among calves. For example, research on unfed elk populations in Yellowstone National Park suggested an average elk calf winter mortality of 28%, with the majority of cases caused by malnutrition (Singer et al. 1997). Similarly, Smith and Anderson (1998) found unfed winter elk calf mortality of 29% compared to 11% for elk calves using feeding grounds. As food becomes limited in winter, calves are usually the first to experience nutritional deficit and winter mortality because they are displaced by animals that are more dominant, they have limited fat reserves, and are more susceptible to cold temperatures than larger animals. Monitoring programs will include measures of elk calf winter mortality on NER. The BEMP anticipated that total elk winter mortality (currently 1-2%) could increase up to 3 percentage points under the preferred alternative, with most of the increase in elk mortality occurring amongst very old age classes and calves. If Step-Down Plan implementation results in winter elk mortality levels in excess of these levels, adaptive action could be taken to mitigate these effects in future years (Appendix A).

In the early years of Step-Down Plan implementation, the seasonal termination of feeding is expected to occur about a week earlier than current conditions (current average end date 2 April; range = 24 March – 20 April). Under current management, feeding termination date has been based on a snow cover index and a subjective evaluation of available forage and forage greenness. We will develop methods to quantify these variables and objectively determine feeding termination date during the period of Step-Down Plan implementation.

The Step-Down Plan winter feeding strategy would include the establishment of additional key forage index sites and on-going measurements at those sites throughout the winter.

Harvest

Currently the Jackson elk herd is at the Wyoming Game and Fish Commission established objective of 11,000 animals, which means there is less flexibility in manipulation of harvest regimes than there would be if the herd was above objective. Initially there would be little change in elk harvest programs on the NER, with the exception of allowing a limited number of any elk permits throughout the season, considering allowing bow hunting near developed areas (roads and buildings) and shifting the season about a week later (Table 4). Allowing a limited number of any elk permits would be consistent with providing sport hunting recreation on National Wildlife Refuges (NWRS Improvement Act; 1997) and the NER CCP [USFWS, 2015] and possibly encourage more hunters to participate in antlerless elk hunts. Monitoring programs and consideration of bull ratios in the GRTE summer segment (since most park bulls migrate to the NER) would help inform levels of proposed take. Bow hunting in areas currently closed to firearms will likely increase harvest by eliminating “no-hunt” areas, which can become sanctuaries for large numbers of elk.

Shifting the hunt one week later is consistent with later migrations and will improve harvest effectiveness (see Figure 10).

General elk harvest patterns in GRTE would continue to be based on need for harvest, summer segment population estimates, herd status relative to population objective, herd demographic parameters, herd-wide distribution of harvest, and mitigation for impacts on other resources and visitor activities.

Elk herd population objectives are reviewed every five years by the Wyoming Game and Fish Commission and adjusted as necessary. Agencies will collaborate with the WGFD in the public process of reviewing and adjusting the future Jackson elk herd population objective. Lowering the population would help compensate for reduced use of traditional native winter range and increased growth of short-distance migrants, which has led to significant increases of winter elk concentrations on the NER.

The annual fall/winter arrival of elk to the NER during the past several decades has been occurring progressively later. This trend may necessitate extending the elk-hunting season later into the year to achieve harvest objectives.

Bison hunts on the NER (bison hunting is prohibited in GRTE) would see little initial change (Table 4). Consideration would be given to later end dates that are commensurate with delayed feeding, and possible escorted hunting in the South Unit to help with distribution. Special limited hunts designed to discourage bison from attempting to leave the NER via the south boundary into the town of Jackson will also be considered. If progress toward reaching the herd objective of 500 animals continues and the objective is reached, WGFD will adjust harvest quotas in the context of the objective, as necessary, to address population changes through time.

A cattle guard was installed on the Refuge Road near the east end of Broadway Avenue to help

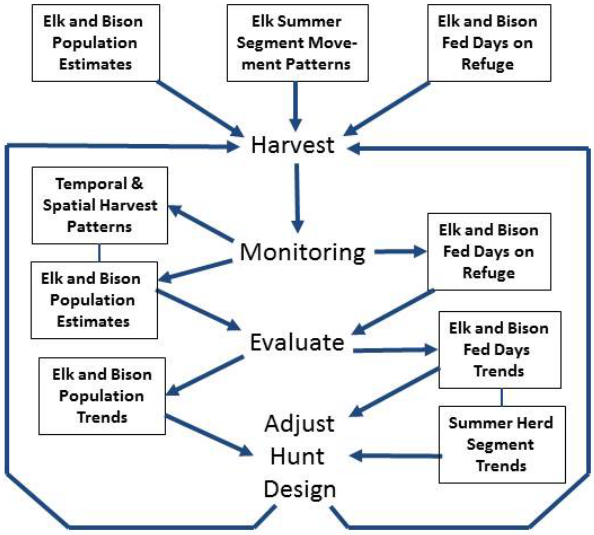


Figure 11. Framework for harvest strategy under the step-down plan

prevent bison and elk herds from entering the Town of Jackson. This will reduce the potential for dangerous human/wildlife interactions.

Currently, the effectiveness of NER late-season harvest regimes is affected by December 1st winter closures immediately east of the refuge on BTNF lands. Extensive elk telemetry data suggest that delaying the winter closures could aid elk management objectives, but also that elk are sensitive to hunting pressure that can cause elk movements to areas that cause management issues for WGFD. NER officials will work with BTNF and WGFD officials to explore the possibility of allowing hunting in limited areas after December 1 in the future.

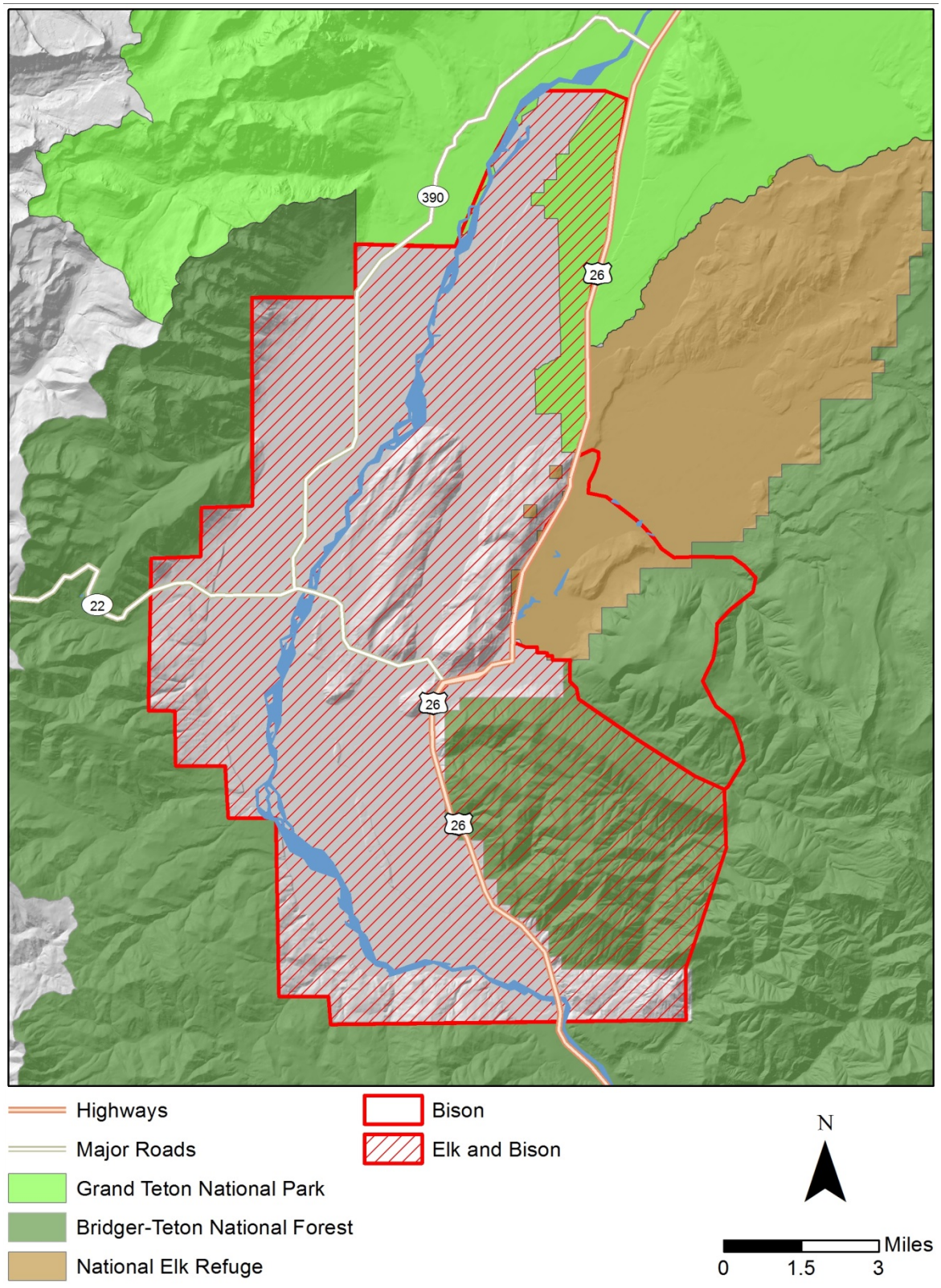


Figure 12. Areas with high potential for conflict of elk and bison with human activities. Significant elk or bison movements to these areas from NER during winter months could result in changes and/or review of the step-down plan.

Annual herd-wide population estimates, elk summer herd segment estimates in GRTE and NER, temporal and spatial harvest patterns, and animal-fed-days would be monitored, and the resulting information would be used to inform ongoing evaluation of elk and bison management harvest programs (Figs. 9 and 11).

Hazing

No change in hazing practices is anticipated initially under this Step-Down Plan framework.

Private Lands Mitigation

Delaying the onset of NER, feeding is likely to result in changes in bison and elk distribution (Appendix A). Some elk or bison may move to private lands in search of forage. Of greatest concern is the potential for elk or bison to commingle with cattle of cow/calf operations, where brucellosis transmission could have considerable consequences, such as requiring depopulation of the cattle herd.

Several strategies would be employed to mitigate potential problems (Table 4), including providing incentives for non-breeding cattle operations (because brucellosis transmission to slaughter-bound cattle is not economically important), increased fencing in some limited areas to separate elk/bison from livestock feed lines, haze elk/bison away from livestock feed lines and purchase private lands easements or leases to prevent co-mingling. A vital component in implementing these mitigation measures is to establish three seasonal Wildlife Conflict Technician positions that are supervised by the WGFD. These Technicians are also critical to the success of an expanded monitoring program vital to the Step-Down Plan (see Monitoring section below).

A database will be established to track non-agricultural conflicts on private lands to determine trends that will help evaluate the effectiveness of Step-Down Plan mitigation efforts.

Preventing elk and especially bison from entering the Town of Jackson is essential in maximizing public safety and minimizing private property conflicts. Currently, bison are hazed northward when they drift south of Miller Butte. A cattle guard was installed on the Refuge Road just north of Broadway Avenue. This barrier is designed to prevent elk/bison from entering the Town of Jackson.

Vegetation Restoration/Protection

The varied approaches to restore the Kelly Hayfields in GRTE (4,500 acres) was initiated in 2008 following 2 years of research and field studies (Moeny 2008) (see Figure 13).

The approach to ecological restoration includes serial treatments to

1) remove non-native species (e.g., herbicide application and prescribed burning);
2) seed native shrub, grass, and forb species; and
3) treat subsequent invasive plants by applying herbicides and, where appropriate, construct temporary fences to protect recently seeded pastures from colonization of non-native species and damage from large herbivores during early phases of restoration.

Of the 4,500 acres targeted for ecological restoration in the Kelly Hayfields of GRTE, 1,235 acres within 7 pasture units are currently under restoration treatment and 3,265 acres remain non-native grass pasture (as of 2016; Figure 13). The non-native grass pastures are divided into 13 pasture treatment areas and are projected to be restored by 2035. As of 2016, approximately 745 acres are seeded with native vegetation, and 89 acres are considered fully restored. Maintenance of restored ecological conditions, however, will likely require management efforts in perpetuity to keep non-native species from colonizing restored areas. All 1,235 acres that are underway toward ecological restoration are being monitored for native plant establishment, invasive plant infestations, including cheatgrass spread. Park staff will continue to monitor and adaptively adjust treatments and restoration strategies according to our results.

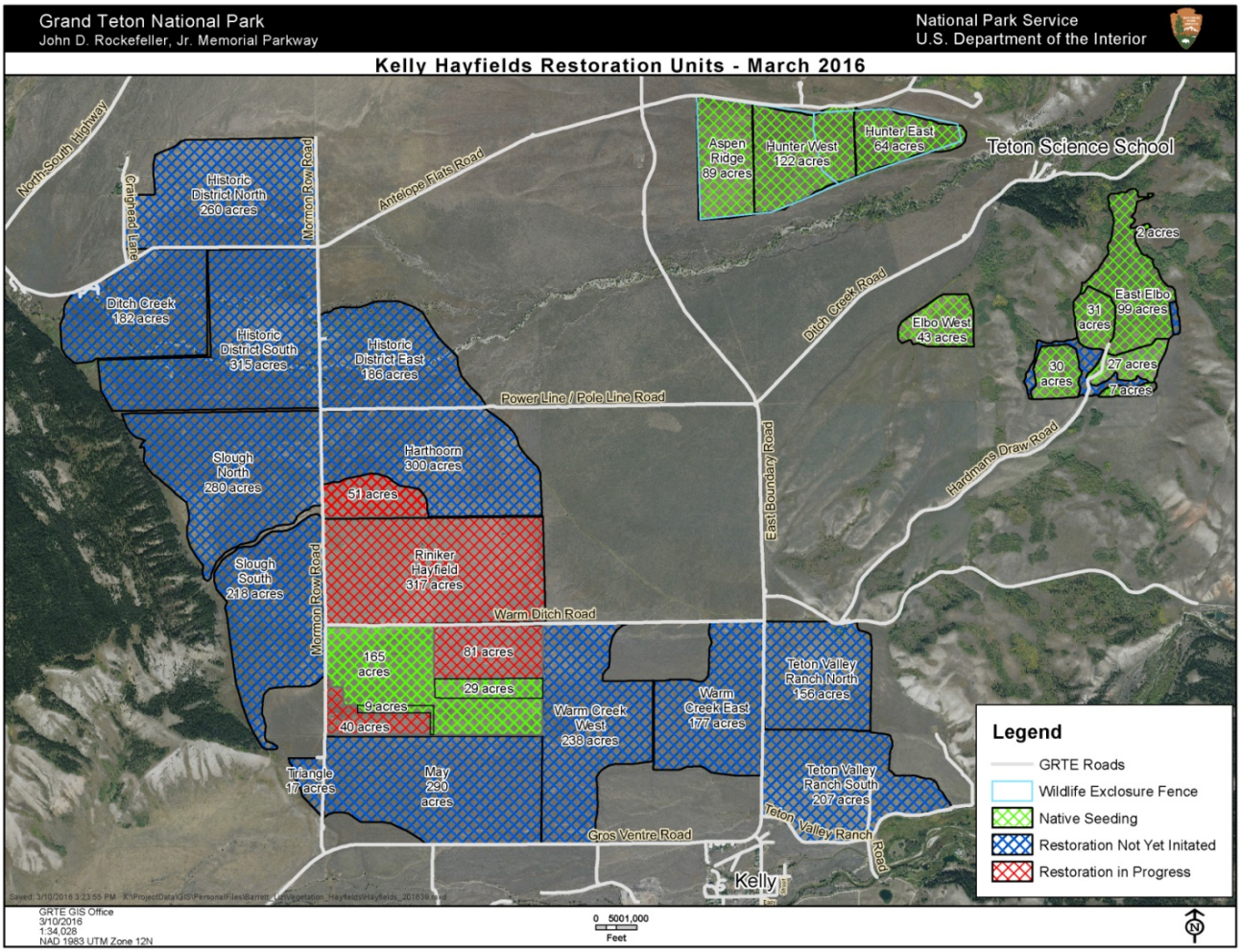


Figure 13. Units and status of the Kelly Hayfields ecological restoration effort in Grand Teton National Park, March 2016

OBJECTIVE

1) Maintain bull-to-cow ratios in park summer herd (Table 1).

National Park Service management policy (NPS 2006) provides guidance for maintaining naturally regulated wildlife populations, free from the impacts of humans, to the greatest extent possible. The final BEMP identified a goal of maintaining park elk bull:cow ratios (a common way of expressing sex and age ratios in wild ungulate populations) near 35 adult bulls per 100 adult cows, based on estimates of what this ratio would be in a herd free from the effects of human harvest. The sex and age ratios of most North American elk populations are affected by sport hunting and herd managers generally maintain lower bull ratios.

Harvest

Based on summer bull ratios for elk in GRTE that were chronically below 35 bulls:100 cows, permit types for the park's elk reduction program (ERP) went to "antlerless only" in 2012. Additionally, the "antlerless only" hunt structure aligns with primary objective and intent of the ERP. ERP permit structures in the park will likely remain antlerless. Park and refuge officials will work together to support this goal as expanded refuge hunting opportunities are considered.

Table 4. Comparison of current and primary step-down plan components and parameters			
Action	Current Management	Management	Comment
Winter Feeding:			
Feed	Pelleted alfalfa	Pelleted alfalfa	No change
Ration	Full ration average: 8-12 lbs./day/elk	No Change	No change, to minimize calf mortality. Note average daily ration over the entire feed season is lower than a full ration because feed rate is gradually increased at the beginning of the feed season and gradually reduced at the end to facilitate rumen acclimation
	20-22 lbs./day/bison	20 lbs./day/bison	
Start criteria:			
Available standing forage	300 lbs./acre, as measured at traditional key index sites	Generally later; index sites to be increased in number and distribution	Influencing factors: -time of season -forage availability -number of elk/bison on NER -elk/bison distribution
End criteria:			
Available forage	Based on a snow cover index and subjective estimate of when residual or new forage is adequate	Generally 1 week earlier than current management	Ongoing development of more objective criteria for future implementation
Monitoring:			
Animals on feed	Mid-winter census	Elk/bison fed days[1]	
Proportion of JEH on NER	Mid-winter census	Mid-winter census	
feed			
Calf mortality	2008-2015 Average: 3.3% (range 1.1-9.0%)	Potentially higher than current levels but less than native winter range	
Elk/bison distribution – collars	Almost no documented use of private lands during feeding operations	Unknown, but likely higher use of private lands than current management	
Elk Winter mortality (all age classes)	2008-2015 Average:	<=3%	
	1.2% (range 0.6-1.9%)		

Table 4. Comparison of current and primary step-down plan components and parameters			
Action	Current Management	Management	Comment
Elk summer range segment Proportions for NER wintering elk	Approximately -40% GTNP North of Moose -35% South Snake River -10% Gros Ventre/Flat Creek -10% Teton Wilderness -5% Southern Yellowstone	Unknown, but will be monitored based on summer distribution of radio collared elk	Based on summer distribution of elk that were randomly radio collared on NER.
Harvest, National Elk Refuge elk:			
Frequency	Annual	Annual	
Begin Date	2nd week October	No Change	Modified as necessary
End Date	3nd week December	No Change	Modified as necessary
Structure	- 1 week initial drawing	- 1 week initial drawing	
	- 1 week left over 1st served	- 1 week left over 1st served	
	- partial week alternate	- partial week alternate	
	-daily 1st served alternates	- daily 1st served alternates	
Refuge permit types	- 1st week any elk	- Primarily antlerless only	
	- Antlerless only remainder of season	- limited any elk permits throughout season	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries		Consider expanding to allow bow hunting near developed areas	
Harvest, National Elk Refuge bison:			
Frequency	Annual	Annual	
Begin date	August 15th	August 15th	Modified as necessary
End date	2nd or 3rd week January	Consider later dates as appropriate	Modified as necessary
Hunting Season Structure	As per WGFD	As per WGFD	
Refuge permit types	Any bison or cow/calf per state license	Any bison or cow/calf per state license	
Access	Restrict access to specific locations	Restrict access to specific locations	
Hunt area boundaries	Limited to north of Nowlin Creek area	Consider escorted hunting in South Unit as needed	Guided hunts in South Unit when authorized
Harvest, Grand Teton NP elk:			

Table 4. Comparison of current and primary step-down plan components and parameters			
Action	Current Management	Management	Comment
Frequency	As needed	As needed	
Begin Date	3rd week October	3rd week October	Modified as necessary
End Date	2nd week December	2nd week December	Modified as necessary
License types	Antlerless only	Antlerless only[2]	
Special regulations:	Cartridge limits	Cartridge limits	
	Bear spray required	Bear spray required	
	Hunter safety card required	Hunter safety card required	
Harvest, Bridger-Teton NF, Elk Hunt Area 80:			
Begin Date			
End Date		15-Dec	Would require change in winter closure dates
Harvest, Elk Hunt Area 78			
Structure			Changes at discretion of WGFD
License Types			
Private Lands Mitigation:			
Cattle commingling		Incentives for non-breeding operation	
Hay depredation		Increased fencing	
Landscape damage			
Easement acquisition			
Vegetation Restoration/ Protection: Elk Refuge			
Vegetation Restoration/ Protection: Grand Teton	Herbicide treatments, prescribed burning, native seed propagation and planting, and protection and maintenance of restored pastures	Same as Current Management for remaining non-native grasslands in Kelly Hayfields	

Notes:
[1]Number elk and bison on feed per day, totaled by feeding season.
[2]Any elk licenses could be offered if bull ratios in the park consistently exceed BEMP criteria.

STRATEGIES CONSIDERED BUT REJECTED

The BEMP considered several additional strategies for elk and bison management that, for a variety of reasons, were not selected for implementation in the preferred alternative and Record of Decision. The agencies reconsidered a subset of these during the development of this Step-Down Plan (Table 5). Since they were not part of the ROD, additional NEPA compliance would be necessary to incorporate any of them into this Step-Down Plan, and they are not being considered at this time.

Models of System Dynamics

Models provide a simplified representation of the biological system being managed. We will use modeling to quantify the effects of our management actions on two key responses of interest, elk distribution, and elk calf winter mortality. There are suites of possible factors that affect the proportion of elk on NER feeding grounds versus native winter range. Models will be used to identify the relative influence of our principal management strategy (a reduction in feed season length) and other factors on winter elk distribution (Appendix C). Over time, this will allow us to assess whether changes in elk distribution were the result of our management actions or due to factors outside of our control.

An increase in elk calf winter mortality is a potential result of reduced feed season length. Several factors influence elk calf winter survival on NER (Figure 14). Models will be used to assess the effects of available forage on elk calf winter survival (Appendix D). Over time, this will allow us to assess the effects of our principal management strategy (reducing feed season length) relative to elk calf winter survival.

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Table 5. Strategies considered but rejected

Strategy Considered	Reason Rejected
Fertility control in elk	Judged not reasonable or feasible in BEMP, primarily due to major technical, social, and financial hurdles[1]. For Step-Down Plan discussed primarily with regard to the difficult to harvest herd segment in Hunt Area 78 on private lands, where federal agencies have no jurisdiction.
Fertility control in bison	Impacts discussed at length in BEMP[2]. Not considered for Step-Down Plan because current hunting programs appear effective at slowly moving the herd toward the 500 animal herd objective.
Agency reduction of bison or elk	Not considered necessary or desirable on federal lands because current hunting programs that utilize sport hunters are effective at meeting herd objectives.
Altering rations of supplemental feed	Rejected as a strategy because reducing daily feed ration below 8 lbs./elk would be enough feed to encourage elk to remain on NER but would result in unacceptably high elk calf mortality rates.
Private Lands Hunting Coordinator	The WGFD contacted private landowners and ranchers in the Spring Gulch area and discussed this concept to enhance elk harvest of short distance migrants. Generally, landowner interest was low.

Notes:
[1] Page 77 at http://www.fws.gov/bisonandelkplan/Final%20EIS/Volume%201/4_Chapter_2_Alternatives.pdf
[2] USFWS and NPS 2007?

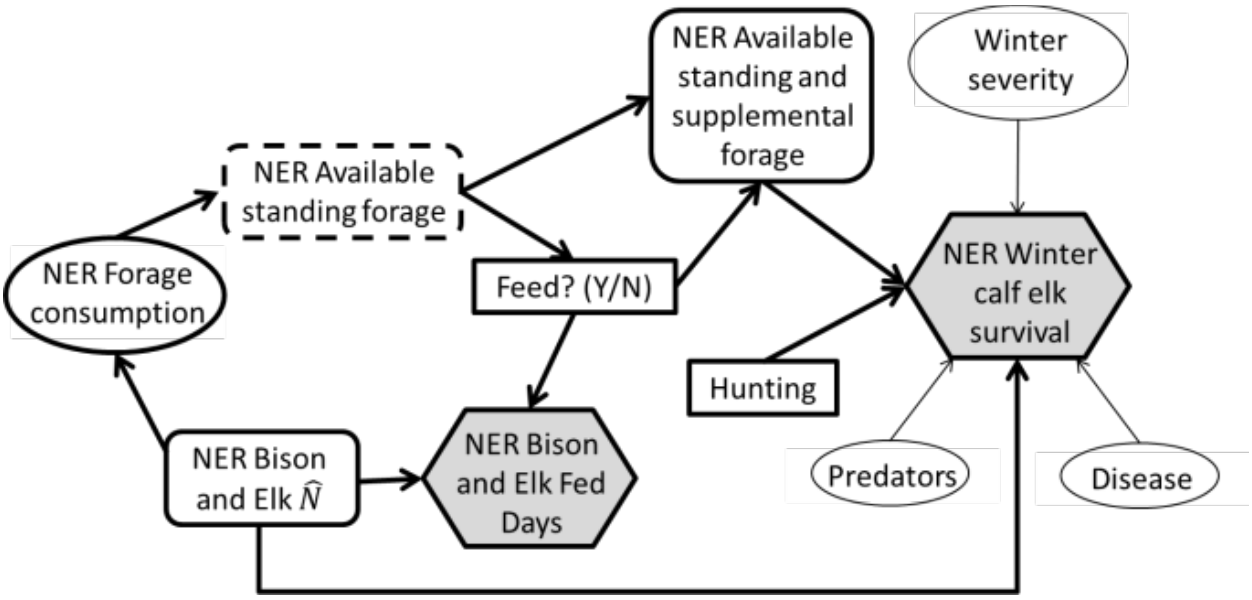


Figure 14. Diagram of factors influencing bison and elk-fed-days on the NER and elk calf winter survival

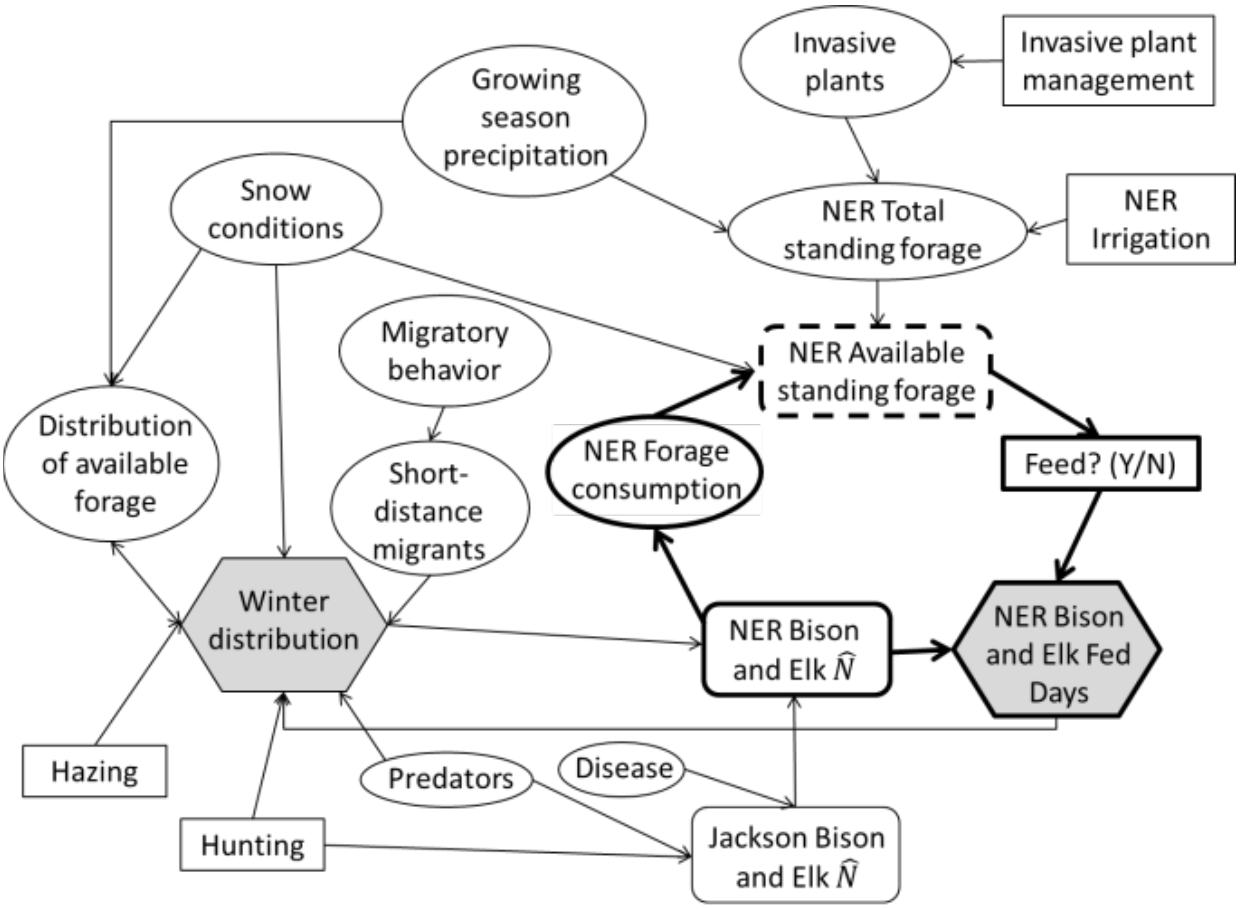


Figure 15. Diagram of outcome influences from BEMP (USFWS 2007a)

Monitoring

Feeding Initiation Monitoring

NER uses weekly field estimates of the amount of forage available to elk to determine feeding initiation date. Currently measurements are taken at key index sites representing areas preferred by elk on NER (see Appendix B). These methods will be enhanced by 1) increasing the number of sampled sites to better represent the total amount of forage available to elk on the southern half of NER; 2) increasing the precision of estimates at each site by increasing the number of observers; and 3) extending the monitoring period later in the winter to assess the relationship between available forage and elk and bison distribution.

To represent the total amount of forage available on the southern half of NER, a subsample of current key index sites will be retained to facilitate comparison with historic data, but additional random sample sites stratified by elk habitat preference will be added. Historic elk distribution mapping and elk GPS collar data (NER unpublished data) suggest that the areas most preferred by elk on southern NER are associated with moderate to high forage production and green vegetation. Because the distribution of forage production and greenness characteristics vary annually based on irrigation and precipitation patterns, we will annually map areas preferred and not preferred by elk and sample sites will be randomly selected within each of these mapped categories. At least three historic key index sites, three random sites in areas preferred by elk, and three sites in areas not preferred by elk will be sampled each week from late December through the initiation of supplemental feeding.

Currently the NER biologist is the only person trained in the techniques used to estimate available forage (see Appendix B). At least two additional personnel will be trained in these techniques. This will provide a backup in the event of future personnel changes and will facilitate error estimates of the available forage measurements at each site.

Currently NER and WYGFD biologists monitor available forage conditions at least weekly from late December until average available forage at key index sites nears the threshold level of 300 lbs. per acre and feeding is initiated. The principal Step-Down Plan strategy is to delay the initiation of supplemental feeding after average forage production reaches the 300 lbs./ac level at key index sites. Therefore, the monitoring period will be extended to include this period of delayed feeding.

Proportion of Elk Wintering on NER

A principal Step-Down Plan goal is to reduce the number of elk wintering on NER. Our strategy will be to effect redistribution of elk to native winter range from NER over time via shortening the duration of the feed season, and slowly conditioning elk to seek food elsewhere. As feeding periods are shortened, the probability of younger elk age classes discovering NER feeding grounds will be reduced, and, hypothetically, that proportion of the Jackson elk herd that utilizes NER feeding grounds will decline over time. We will measure this effect by examining changes in the winter distribution of the Jackson elk herd. WGFD annual trend/classification count data provide a multi-year baseline data set to measure changes in the winter distribution of the Jackson elk herd and categorizes observations by location. In each year, we will calculate the proportion of total classified elk in the Jackson elk herd that are classified on NER feeding grounds. We will compare the 3-year running average post Step-Down Plan implementation to the pre-implementation baseline. The pretreatment baseline will be comprised of data from 2008 2016, a period that represents BEMP implementation prior to Step-Down Plan actions (Figure 16).

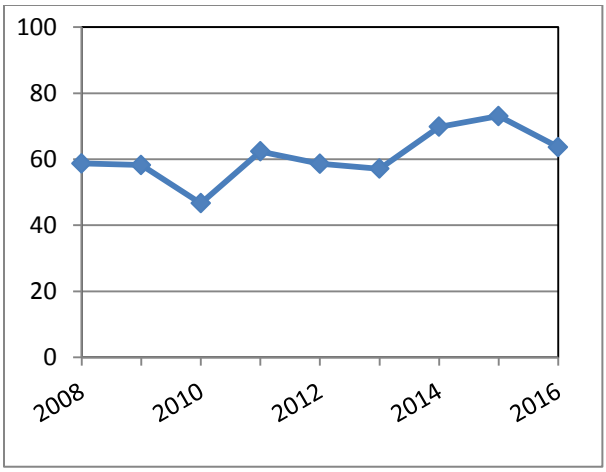


Figure 16. Proportion of Jackson elk herd on NER feeding grounds during BEMP implementation

Elk Fed Days and Bison Fed Days

The BEMP and Step-Down Plan implicitly assume that the transmission rate and prevalence of elk and bison diseases are density dependent and positively correlated with the number of elk and bison utilizing feeding grounds and the number of days they are fed. We further assume the variables elk-fed-days (EFD) and bison-fed-days (BFD) are a proxy for these conditions. EFD and BFD will be calculated annually for each species based on the following formulas:

EFD= ∑ Total elk counted on feed during daily feeding ground counts for duration of feed season

BFD= ∑ Total bison counted on feed during daily feeding ground counts for duration of feed season

Because EFD and BFD are influenced by feed season length and the number of animals on feed, the Step-Down Plan strategy of delaying the initiation of supplemental feeding will inherently reduce the number of EFD and BFD through a reduction in average feed season length. We believe that EFD will be further reduced by encouraging a greater proportion of the Jackson elk herd to winter on native winter range, thereby reducing the number of elk occupying NER feeding grounds. We will evaluate changes in EFD and BFD by comparing the 3-year running average post Step-Down Plan implementation compared to mean EFD and BFD from 2008−2015. The running average is an appropriate comparison because it will help account for wide annual variation in EFD and BFD associated with winter severity (Figure 17).

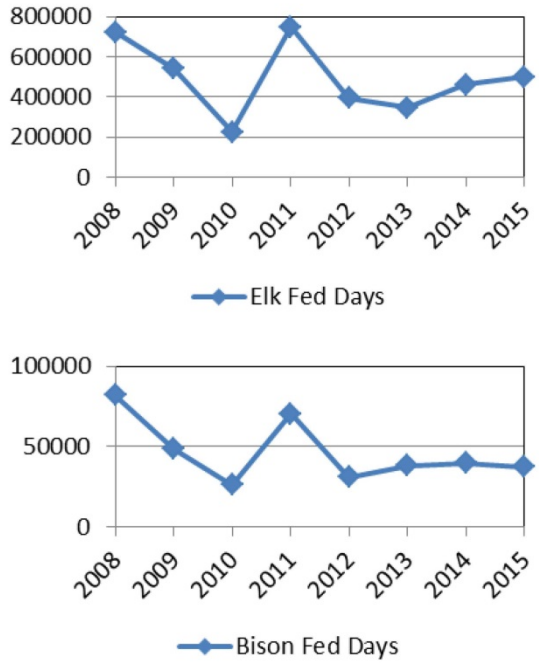


Figure 17. Elk-fed-days (EFD) and Bison-fed-days (BFD) after implementation of the BEMP but prior to the implementation of the Step-down plan

Elk Winter Mortality Monitoring

NER has used consistent methods to monitor winter elk mortality since 1982. Each winter NER biologists and other refuge staff conduct a survey of all non-hunting related winter elk mortalities that occur on NER from November through April. Mortalities are tallied by age/sex class and percent mortality is calculated using the corresponding number of elk classified on NER feeding grounds as the denominator. We will continue to monitor elk winter mortality using the same methods post-Step-Down Plan implementation, which will allow trend comparisons to the pre Step-Down Plan baseline (Figure 18). Under the Step-Down Plan framework, we believe the 3-year running averages for total and elk calf winter mortality will be within the range of variation exhibited by the pre Step-Down Plan baseline. Historic monitoring suggests that calf and total mortality are sensitive to winter severity and disease outbreaks, and that winter mortality occasionally exceeds >3% total mortality and >10%

calf mortality. Post-Step-Down Plan mortality in excess of these levels may warrant shortening the feeding initiation delay in subsequent years.

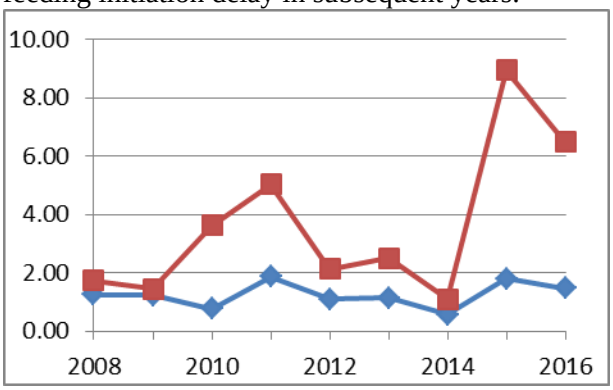


Figure 18. Total elk (blue) and calf (red) winter mortality, percent

Elk Collaring

One of the Step-Down Plan's principal strategies is to shorten the length of the feed season to encourage elk use of native winter range, but we anticipate that this strategy will also result in an increase in elk conflicts on surrounding private land in the town of Jackson and the Spring Gulch areas, potentially including large groups of elk. To quantify this effect and provide real-time information to WGFD and NER managers to facilitate a response, we propose maintaining a sample of 50 GPS-collared elk that winter on NER throughout the Step-Down Plan implementation period. Forty-five elk represents approximately 0.5% (1 in 200) of the NER winter elk population. This sample size will not be sufficient to detect all elk movements from NER to surrounding private lands, particularly movements by small groups of mature bull elk, but it will be sufficient to detect and quantify significant movements of cow/calf/yearling elk groups compared to pre-Step-Down Plan baseline data.

NER has elk GPS-collar data available from the 2008-2013, which represents the post-BEMP, pre-Step-Down Plan baseline period. We hypothesize that elk movements from NER to surrounding private lands will increase during the Step-Down Plan implementation period compared to the pre-treatment baseline. This will be tested by comparing the number of incidents that elk left NER for surrounding private lands (per elk/per year), and the proportion of elk GPS fixes on NER versus private lands during time periods of interest. The principal period of interest is late December−March because this represents the period after the NER elk hunting season, and prior to, and during, NER feeding operations. This is the season when changes to the NER feeding program would likely result in elk distribution changes.

Thirty adult cow elk were captured on NER feeding grounds in February 2016 and Telonics Iridium GPS collars were deployed with a 90-minute fix interval. Collars will be deployed on up to 50 additional adult cow elk in February-March 2017. Given 83% annual survival for adult cow elk in the Jackson elk herd (Cole and Foley et al. 2015) and 3-year collar life, approximately 10 additional elk will need to be collared each year in winter 2018 and 2019 to maintain the 50 elk desired sample size over the life of the Step-Down Plan implementation period.

Ancillary data that will be collected and analyzed during the elk capture and collar data analysis includes brucellosis seroprevalence, pregnancy rate, and elk summer range determination for comparison to the findings of Cole and Foley et al. (2015).

Disease

The primary purpose of limiting reliance on supplemental feeding is to reduce the prevalence of endemic elk and bison diseases and mitigate transmission risk associated with the introduction of novel diseases. We hypothesize that brucellosis seroprevalence will decline post Step-Down Plan implementation. There are no recent brucellosis seroprevalence data for elk on the NER, but >50 elk will be captured during elk collaring operations in winter 2016, and each elk will be tested for brucellosis exposure. The 2016 Brucellosis seroprevalence rate will be the pre-treatment baseline to evaluate post Step-Down Plan change. Chronic wasting disease (CWD) has been monitored in the Jackson elk herd since 1997, and since 2008, it has been monitored with sufficient sample size to detect 1% prevalence with 95% confidence. No CWD positive cases have been detected in the Jackson elk herd, which given the long term persistence of the disease, provides overwhelming evidence that CWD is not currently endemic to the Jackson elk herd. However, most evidence suggests that the distribution of CWD is increasing and that its introduction to the Jackson elk herd is inevitable. Early detection is critical to ensure a management response; therefore, ongoing monitoring at sample sizes sufficient to detect 1% CWD prevalence with 95% confidence is necessary. CWD is sampled by

testing tissues collected primarily from hunter-harvested elk, and experience suggests that two full time technicians working from September-December are necessary to ensure minimum sample size. Typical costs associated with two technicians are $32,000 per year.

Data Collected for Modeling

To facilitate modeling, we will collect data on the following associated variables (Table 6). The table lists variables and how they relate to our efforts to use modeling to explain changes in elk distribution and elk calf mortality relative to our principal action of reducing feed season length.

Evaluation/Future Management

Modifying elk and bison behavior while reducing supplemental feeding will require a long-term and sustained commitment. Change is unlikely to happen fast, and interpreting effects of management actions will be complicated by varying environmental conditions from year to year. Consequently, we anticipate that the strategies outlined in this plan will be in place for a minimum of 5 years, after which an initial evaluation of the program will be made. Actions completed each year, the results of monitoring programs, and any proposed changes in course will be presented at an annual management Step-Down Plan update/report, completed by NER staff by the end of March for the previous year.

Consistent with objectives outlined in the BEMP, the long-term goal of this plan is reduce the reliance of bison and elk on intensive supplemental feeding, using adaptive management principles through a structured framework of management actions, to achieve a desired condition of animals relying predominately on native habitat on NER, GRTE, and USFS lands, and on NER cultivated forage. However, because there is no precedent for what this plan proposes, there are few responses to proposed management actions that can be predicted to a degree of certainty commensurate with establishing definable thresholds or other objective criteria for success in the short term.

Frequently Asked Question:
Question:
Why is the Step-Down Plan vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?
Response:
This is the first time that the strategy of delaying feed season initiation has been employed to reduce reliance on supplemental feeding. There is uncertainty regarding the effects of this strategy on elk and bison distribution and elk winter mortality; therefore, it is important to maintain flexibility in plan implementation to avoid significant unintended negative consequences. Unintended negative consequences the Step-Down Plan seeks to avoid include 1) elk or bison moving to areas where they damage property, risk human safety, or commingle with livestock, and 2) elk winter mortality levels significantly higher than baseline levels.

Factors that will be considered in evaluating the success of the program will include the trend of EFD and BFD, type and frequency of private lands conflicts, the proportion of the Jackson elk herd wintering on the NER, presence or absence of CWD and other infectious diseases, elk and bison population size and distribution, elk calf winter mortality, and public support. These complex, dynamic, and interwoven components make up the framework for decreasing reliance on supplemental feeding. As such, the effects of changing biological, social, and political conditions on these components will be part of the evaluation process.

In the context of this larger framework, however, we believe evaluation of the trend in EFD and BFD will be most important after the first 5 years of Step-Down Plan implementation. The direction and magnitude of the trend observed will provide a preliminary basis for evaluation and decisions about continued management actions. Initial success with reduced feeding will be associated with a declining trend in EFD and BFD, with greater magnitudes indicating higher degrees of success. However, determinations of overall program success will necessarily include evaluation of all system components. For example, gains in reduced feeding come could be accompanied by an increase in private land conflicts, which would affect overall success determinations. While the overriding

strategy will be to decrease feeding as aggressively as possible while gauging effects on other system components, overall measures of program success through time will necessarily involve evaluating a matrix of effects. These evaluations will be included in annual Step-Down Plan reports.

As proposed and new management strategies are implemented and evaluated under this plan, at some point in the future it may become apparent that meeting reduced feeding goals will not possible without reducing elk and/or bison population objectives.

Population objectives for both herds are set by Wyoming Game and Fish Commission and are evaluated regularly by WGFD personnel, including public review through annual season setting meetings. The BEMP supported the State herd objectives of 500 bison and 11,000 elk due to NEPA requirements, any further consideration of reduced herd sizes by the NER or GRTE are beyond the scope of this plan. However, Wyoming Game and Fish Commission changes to Jackson bison or elk herd objectives are not constrained by the BEMP.

Investigating the potential effects of climate change on elk and bison management will also be important in the long-term. During implementation of this plan, we will collect a variety of data that could be drawn upon for this purpose.

Table 6. Elk winter distribution and elk calf mortality variables			
Variable	**Source**	**Elk Winter Distribution Model**	**Elk Calf Mortality Model**
Proportion Jackson Elk Herd on NER Feeding grounds	WGFD/NER Jackson Elk Herd February Classification Count	Yes	No
Proportion Jackson Elk Herd from South Snake River summer segment	Determined from elk GPS collar data for elk captured on NER	Yes	No
Number of wolf packs in the Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated total wolf numbers in Jackson Elk Herd unit	GTNP and WGFD wolf monitoring data	Yes	Yes
Estimated number of wolves using NER in winter	NER observations	Yes	Yes
Total NER herbaceous forage biomass	NER forage production survey data	Yes	Yes
Snow Water Equivalent	NOAA snowtell site data	Yes	Yes
NER Elk Winter Mortality (calf)	NER elk winter mortality survey	No	Yes
Snow Depth	NOAA Snowtell sites and NER measurements	Yes	Yes
Available Forage	NER and GTNP monitoring in winter months	Yes	Yes
NER Elk and Bison Fed Days	NER feeding records and daily feeding ground estimates of elk and bison	Yes	Yes
NER Feeding Start Date	NER feeding records	Yes	Yes
Gros Ventre Feeding Start date	WGFD feeding records	Yes	No
Elk Hunting Pressure by Hunt Area	Estimated number of hunter days from WGFD completion reports	Yes	Yes

Public Outreach and Education

The practice of winter feeding is inexorably woven into the historic fabric of Jackson Hole. Elk are identified with the rich and unique legacy for which Jackson Hole is known around the world. De-emphasizing the supplemental feeding program will be a major paradigm shift for the residents of Jackson Hole, Teton County, and the State of Wyoming.

An effective Public Outreach and Education program is essential for effective Step-Down Plan implementation. The practice of feeding elk evokes passionate responses from those that oppose and those that support this practice. The general public and especially key stakeholder groups must understand the biological needs for and strategies of the Step-Down Plan in order to gain general consent to modify longstanding elk/bison herd management methods.

A detailed communication plan to guide outreach and education efforts can be found in Appendix C.

Schedule

Table 7. Proposed implementation schedule for the Step-Down Plan	
Action	**Date**
Public outreach and education	November 2016
Initiate private lands conflicts mitigation contacts/actions	January 2017
Implement enhanced forage monitoring	January 2017
Initiate changes in supplemental feeding protocol	January/February 2017
GPS Collar 30-40 elk (Iridium platform)	March 2017
Monitoring/Evaluation/Annual Report	June 2017

Budget

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.					
	Year				
Agency / Activity	1	2	3	4	5
National Elk Refuge:					
Monitoring:					
Seasonal Biological Technician (0.5 FTE, GS-7)	$24,000	$25,000	$26,000	$27,000	$28,000
Bison/elk fed days					
Mid-winter census					
Elk summer herd segment distribution1					
Expanded standing forage estimates1					
Chronic Wasting Disease, 2 seasonal bio.-techs	$32,000	$32,000	$32,000	$32,000	$32,000
Winter bison/elk distribution					
Irrigation					
50 Elk radio telemetry collars; Iridium Platform	$115,000	$25,000	$25,000	$25,000	$25,000
Bison barrier maintenance at NER south entrance	$500	$500	$500	$500	$500
Step Down Management Plan annual reporting	$2,000	$2,000	$2,000	$2,000	$2,000
Private lands:					
Easements / Leases (Private Foundations)	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000	Est. Above $1,000,000
Conflict mitigation technicians (WGFD)	$91,000	$91,000	$91,000	$91,000	$91,000
Hazing (helicopter)	$6,000	$6,000	$6,000	$6,000	$6,000
Vegetation restoration/protection1					
Public Outreach and Education	$11,000	$1,000	$1,000	$1,000	$1,000
Subtotal					
Grand Teton National Park:					
Monitoring:					
Summer elk classification/distribution	$10,000	$11,000	$12,000	$13,000	$14,000
Collaborative elk monitoring (GRTE portion)	$5,000	$5,000	$5,000	$5,000	$5,000
Vegetation Restoration/Protection					
Monitoring	$16,000	$16,000	$18,000	$18,000	$12,000
Temporary bison fencing	$24,000				

Table 8. Estimated Step Down Management Plan budget above current expenditures, years 1-5.					
	Year				
Agency / Activity	1	2	3	4	5
Temporary fence maintenance	$6,000	$8,000	$8,000	$4,000	
Hayfields restoration	$84,000	$70,000	$70,000	$31,000	
Exotic plant mitigation	$50,000	$52,000	$46,000	$32,000	$16,000
Elk Reduction Program (subject to annual review)					
Hunter harvest evaluation	$1,500	$1,500	$1,500	$1,500	$1,500
Harvest age distribution	$2,000	$2,000	$2,000	$2,000	$2,000
CWD monitoring (0.15 FTE, GS-6)	$7,000	$7,000	$7,000	$7,000	$7,000
Law Enforcement and Visitor Protection (0.15 FTE for 20 LE and support staff; supplies, and permitting)3	Unknown				
Subtotal					
Wyoming Game and Fish Department:2					
Subtotal					
Grand Total					

Notes:
[1]See detail in Appendix
[2] Dependent on size of elk reduction program; current annual expenditures are approx. $295,000 for 0.15 FTE for 20 LE and support staff; supplies, and permitting.
[3]Through Interagency Agreement

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Frequently Asked Questions

Question

Why is the Step-Down Plan vague regarding the magnitude in the reduction of feeding days and specific triggers that would lead to either more aggressive or conservative reduction in feeding days?

Response

This is the first time that the strategy of delaying feed season initiation has been employed to reduce reliance on supplemental feeding. There is uncertainty regarding the effects of this strategy on elk and bison distribution and elk winter mortality; therefore, it is important to maintain flexibility in plan implementation to avoid significant unintended negative consequences. Unintended negative consequences the Step-Down Plan seeks to avoid include 1) elk or bison moving to areas where they damage property, risk human safety, or commingle with livestock, and 2) elk winter mortality levels significantly higher than baseline levels.

Question

Why were reductions to the Jackson Elk Herd and Jackson Bison Herd population objectives not considered as a strategy to reduce reliance on supplemental feeding?

Response

The BEMP has clear population objectives of 5,000 elk wintering on NER and 500 wintering bison. Modifying those population objectives would require additional NEPA analysis. The BEMP also agreed to support State elk herd objectives. The WGFD completed a public process in 2016 to set the population objective for the overall Jackson Elk Herd, and that objective remains unchanged at 11,000 elk.

Question

The BEMP has an objective of 5,000 elk wintering on NER. Why has that objective not been achieved through increased elk harvest?

Response

The overall Jackson Elk Herd population has declined and is currently close to the 11,000 elk objective, but the number of elk wintering on NER has been well above the 5,000 elk objective since implementation of the BEMP in 2007 (mean =7,100 elk). When the analysis was conducted for the BEMP, elk winter distribution data suggested that 5,000 elk could winter on NER while still maintaining 11,000 elk in the Jackson Elk Herd overall. However, the proportion of the Jackson Elk Herd that winters on NER has increased significantly over time, and based on current elk distribution it is no longer possible to winter 5,000 elk on NER and maintain 11,000 elk in the overall Jackson Elk Herd. Although increasing elk harvest above current levels would likely allow us to achieve the 5,000 elk objective for NER, it would also reduce the overall Jackson Elk Herd population below the 11,000 objective. If increasing elk harvest in not plausible, the only other option to meet the 5,000 elk objective on NER is to change winter elk distribution, which is the principal strategy of the Step-Down Plan.

Question

Why is your principal strategy to delay the start of the feed season?

Response

By delaying the start of the supplemental feed season we decrease the probability that elk that use native winter range or state feed grounds will discover NER feed grounds. Because elk use of feed grounds is a learned behavior, over time this could increase the proportion of elk that winter on native winter range, reduce the number of elk that move from the Gros Ventre drainage to NER, and decrease the NER wintering elk population. The resulting shift in elk distribution would allow us to achieve the 5,000 elk objective for NER. Because 5,000 elk and 500 bison is close to the estimated carrying capacity of NER habitat, less feeding will be necessary at these population levels.

Question

Will delaying the start of the feed season result in elk starvation?

Response

Our goal is to delay elk feeding a sufficient amount of time to affect elk distribution without causing an increase in elk mortality.

Appendix A

Summary of Potential Impacts

Summary of primary potential impacts associated with reduced supplemental feeding, as identified in alternative 4 environmental consequences section of the Final Bison and Elk Management Plan/Environmental Impact Statement (USFWS and USNPS 2007).

Populations

- Jackson elk herd objective of 11,000 would be maintained.
- New Jackson bison herd objective of 500 established.

Winter Feeding

- Supplemental feeding could be delayed or could occur earlier compared to current practices.
- Changes [to feeding program could] include alterations in the timing of feeding and providing supplemental feed in fewer years.
- Ration or pellet composition might need to be changed.
- Supplemental feeding would be initiated according to established criteria, including pre-winter forage production, assessments of forage utilization (done jointly by WGFD and NER personnel), elk condition and movements, and potentially on the January 1 index of winter severity calculations for elk (Farnes, Heydon, and Hansen 1999).
- Mechanical means could be used to increase forage access for elk after snow crusting events.
- Changes in the refuge supplemental feeding program could begin to affect elk nutrition (negligible adverse effect on NER elk from lower nutrition).
- Displacement of elk by bison during competition for standing forage would decrease as the bison herd is reduced.
- Aggressive social interactions involving competition for food among elk and bison would increase overall as feeding periods are reduced.

Winter Distribution

- Elk densities on the NER would decline due to more reliance on standing forage and wider distribution.
- Elk use of lands surrounding the NER would increase, including:
    - USFS lands east of the NER
    - Gros Ventre feedgrounds possibly
    - Southern GRTE
    - State feedgrounds south of the NER
- Most of winter distribution shift would involve elk in the Yellowstone, Teton Wilderness, and Gros Ventre segments.

- As ungulate numbers decreased and supplemental feeding was reduced, competition and aggressive social interactions on the refuge would also be reduced.
- Elk and bison distribution would increase as the animals relied more on native winter range.
- Fewer animals would be present on the refuge.

Mortality

- As supplemental feeding is reduced, natural factors such as climate and native forage availability would have a greater influence on numbers, movements, distribution, and mortality.
- More elk would be subject to natural factors affecting mortality, including loss of body condition, predation, and starvation.
- Increased mortality on and off the refuge would mainly affect older elk and calves, and some prime bulls entering the winter energetically stressed due to rut activities.
- Late winter calf ratios could decrease as a result of higher winter calf mortality
- Average winter mortality on the refuge would increase from 1%–2% annually to an estimated 1%–5%.
- Overall, a higher total winter mortality rate of approximately 5% could be expected.

Disease

- Reductions in supplemental feeding or elk numbers would reduce the potential for impacts due to tuberculosis, septicemic pasturelosis, and CWD.
- The health and sustainability of the Jackson elk herd would be increased gradually as supplemental feeding was reduced and there was greater reliance on standing forage and wider ungulate distribution.
- Health and sustainability of the Jackson elk herd would be enhanced in the long term.
- Wider distribution of elk would result in moderate reductions in both the prevalence and potential transmission of brucellosis, as well as potential for spread of diseases not yet in the population.

Private Lands

- The agencies would work closely with the WGFD and landowners, including livestock producers, to coordinate actions that would prevent conflicts due to elk dispersal and to defray costs of managing potential conflicts. Preventing access to food/hay rewards on private lands would be vital for effective management.
- Private land conservation easements within NER boundaries would promote wider distribution.

Appendix B

Monitoring Supplemental Materials

Feeding Initiation Methods

At each sample site, 10 subplots will be measured at every 5 steps along the random bearing determined for each site. At each subplot a 13.27" diameter metal sampling ring will be placed on the ground. The amount of forage available to elk within the sampling ring (dry weight in grams) will be visually estimated. The 13.27" diameter subplot allows easy conversion from grams to lbs. per acre (each gram is equivalent to 100 lbs. per acre). During annual forage production sampling, refuge biologist Eric Cole has made approximately 1,000 of these visual estimates per year for 17 years, and 33% of Cole's estimates have been verified by clipping and weighing. Therefore, Cole will be the principal estimator, but additional personnel will be trained in these techniques to provide redundancy in the event of personnel changes and to increase the number of observers to facilitate estimation of error.

Estimating available forage within the sample ring at each subplot is relatively straightforward when snow cover is limited, but estimating how much of the forage is accessible to elk when snow is dense, deep and crusted can be subjective. To decrease the subjectivity of the estimation process, if the area under the sample ring is covered with snow, only forage that can be exposed with a gloved hand will be included in the estimate of available forage. Forage that is fouled with manure and/or flush with the ground due to trampling and/or encrusted in ice will not be included in the estimate of available forage.

At each subplot the estimate of available forage (dry weight g) will be converted to an equivalent lbs./acre value (1 gram=100 lbs./acre). The arithmetic mean of available forage (lbs./acre) for the 10 subplots provides an estimate of available forage for each index site. There are 3 sample site categories: 1) Historic Key Index Sites that have been used since 2007, 2) New randomly selected sites within areas preferred by elk, and 3) New randomly selected sites in areas not preferred by elk. Historic key index sites were not randomly selected, but were instead selected to represent areas most preferred by elk on the south end of NER. These were the sites used to determine when supplemental feeding would be initiated from 2007 until the implementation of the Step-Down Plan. To facilitate comparison with pre-Step-Down Plan data, we will continue to use mean lbs. per acre across historic key index sites to determine the 300 lbs. per acre threshold. However, post Step-Down Plan implementation we will delay feeding initiation by 2 weeks once the 300 lbs./acre level has been reached. We will concurrently sample at randomly selected sites stratified on an annual basis between areas highly preferred and not highly preferred by elk. This will enable us to quantify the relationship between mean forage availability at historic key index sites and random sites over time.

Appendix C

Communication Plan

Communication Goals

PRIOR TO THE STEP-DOWN PLAN'S IMPLEMENTATION

- Utilize a variety of outreach methods to inform the public on the goals and timing of the Step-Down Plan implementation and possible effects on wintering herds.
- Utilize a variety of outreach methods to inform the public on public comment opportunities.
- Identify and coordinate key messages and outreach with USFWS regional and national offices, State and federal agency partners, non-profits, elected officials, and other identified audiences.

DURING THE STEP-DOWN PLAN'S IMPLEMENTATION

- Continue to utilize a variety of outreach methods to describe current management actions as well as measurable and noticeable changes on the landscape, in animal behavior, or in animal health.
- Provide a comprehensive overview of the Step-Down Plan by providing links and references to previous outreach and background information.

Communication Objectives

- Work with current media contacts to promote news of the Step-Down Plan via print, radio, Web, and social media platforms.
- Utilize new media and social media tools to provide information on why the Step-Down Plan was developed, what public comment opportunities exist, and how the plan is being implemented.
- Plan, coordinate, and execute public meetings to allow for public comment and questions on the plan.
- Develop and provide methods for the public to submit written comments on the Step-Down Plan.
- Monitor print media on Refuge elk and bison management to see how the Step own Plan objectives and reactions are being portrayed to the public.

Current Outreach Resources

- National Elk Refuge web site
- National Elk Refuge news release list
- (approximately 300 contacts)
- National Elk Refuge Twitter site (1,039 followers)
- Bison and Elk Management Plan web site (http://www.fws.gov/bisonandelkplan/)
- Space for an 11" x 17" poster in the Visitor Center on Refuge management topics
- Display panels in the Visitor Center theater for temporary displays

Available Supporting Outreach Resources

- USFWS Mountain–Prairie External Affairs staff
- USFWS Mountain–Prairie web site, including the
- "Top Stories" feature
- USFWS Mountain–Prairie Twitter site USFWS Mountain-Prairie Region Facebook page
- USFWS National Wildlife Refuge System
- Facebook page
- USFWS Facebook page

Previous Outreach Efforts

- NER routinely writes and disseminates news releases on Refuge management activities, including the Comprehensive Conservation Plan, supplemental feeding, herd health monitoring, and forage production.
- Post the above news stories as Content.
- Management System (CMS) articles.
- Post CMS news story promos so they prominently appear on the home page, linking readers to the articles.
- Send out Twitter messages linking viewers back to the news stories.
- Prepare, upload and provide links to Adobe PDF versions of news stories with additional photos where additional images are available and/or help understand or visualize the content.
- Utilized the Conservation link on the web Content
- Management System to post information about
- the Bison and Elk Management Plan and the draft Comprehensive Conservation Plan.
- Retained and provided a link to the original Bison and Elk Management web page (http://www.fws.gov/bisonandelkplan/) that was developed during the planning process. The web site includes links to the Final Plan/EIS, Record of Decision, Federal Register Notice of Availability for both the Record of Decision and Final Plan/EIS, associated news releases, public meeting highlights, and other related documents. Note: the National Elk Refuge does not manage the site.

Additional Outreach Opportunities

- Public meetings in Jackson and other identified locations.
- Service produced video; video could be posted to the National Elk Refuge's multimedia web page, or USFWS Mountain–Prairie home page "Top Video" feature.
- Live radio interview on KHOL (Jackson, WY radio)
- Wyoming Public Radio interview with Refuge management staff
- Interviews with local print media sources
- Updates at community leader meetings such as Rotary Club, Jackson Hole Chamber of Commerce board meetings, and interagency breakfast meetings (with Federal agencies and local elected officials).

Target Audiences

INTERNAL

- Regional and National USFWS Leadership
- Refuge permanent staff
- Refuge seasonal staff
- Refuge volunteers

EXTERNAL

- Congressional representatives
- State of Wyoming leadership
- Federal agency partners, particularly Grand Teton National Park and the Bridger–Teton National Forest
- Wyoming Game & Fish Department
- Other NER partners, including county and town agencies and local nonprofit organizations
- Local elected officials
- Private landowners in proximity to the National
- Elk Refuge or neighboring Federal lands
- Tribes
- Local and state media
- Local public

Key Outreach Topics

- Overview of BEMP objectives
- Strategy to change elk/bison behavior
- Threat of disease
- Natural mortality rates
- Anticipated winter distribution changes for bison/elk
- Mitigate negative effects on private lands
- Change elk behavior and distribution while avoiding increased mortality.
- Explain the historic reasons a supplemental feeding program began and why it was continued.
- Explain the NER's limited large ungulate carrying capacity and the disproportionate impact of bison on available forage; 1 bison is equivalent to 3 elk.

Appendix D

Models

Elk Winter Distribution Models

The proportion of the JEH that winter on the NER will be linked to factors hypothesized to influence elk winter distribution using a generalized linear mixed effects model (GLMM). A GLMM can account for a proportional response variable (i.e., constrained to the interval 0–1) using a log link and binomially-distributed errors. A GLMM also includes fixed and random effects, with the latter capturing residual model variance otherwise not explained by fixed effects. Year will be including as a random effect, providing several benefits. First, we don't assume years are independent and comprise all of the factor levels of interest. Instead, the effect of year is treated as a random variable, with individual year effects realizations of that distribution. This allows inference to non-sampled factor levels, i.e. years, by estimating a latent population-level proportion of elk expected to winter on the NER regardless of fixed effect influences. The random year effect can be considered a latent variable describing elk behavior manifested as observed winter distribution. Second, because year effects are not treated as independent, estimated effects of year on the proportion of JEH elk wintering on the NER are dependent on all factor levels, leading to greater precision when estimating individual year effects (Kéry 2010).

The full GLMM incorporating fixed effects for each factor identified as influencing elk winter distribution is:

$$P_t = \beta_{0(t)} + \beta_1 * AFI_t + \beta_2 * SDM_t + \beta_3 * WP_t + \beta_4 * GSP_t + \beta_5 * SWE_t + \varepsilon_t$$

where the random intercept and residual model variance are

$B_{0(t)} \sim N(\mu_{\beta_0}, \sigma^2_{\beta_0})$, and

$\varepsilon_t \sim N(0, \sigma^2)$, respectively.

Fixed effects include 1) per capita available forage at initiation of winter feeding (AFI) , 2) proportion of the JEH that are short-distance migrants (SDM), 3) number of wolf packs present on JEH native winter range (WP), 4) growing season (May–August) precipitation for the Wyoming Snake Drainage climate division (GSP; a proxy for available forage on native winter range), and 5) snow water equivalent on 1 January at Thumb Divide (SWE; a proxy for early winter severity).

Elk calf winter survival and forage deficits

The Forage Accounting Model of Hobbs et al. (2003) has as an output weekly available forage biomass for the NER (sum of predictions for 30 × 30 m cells). These predictions account for snow conditions using a proxy of SWE and decrement total available biomass by 35% to account for unpalatable plants within the total estimate.

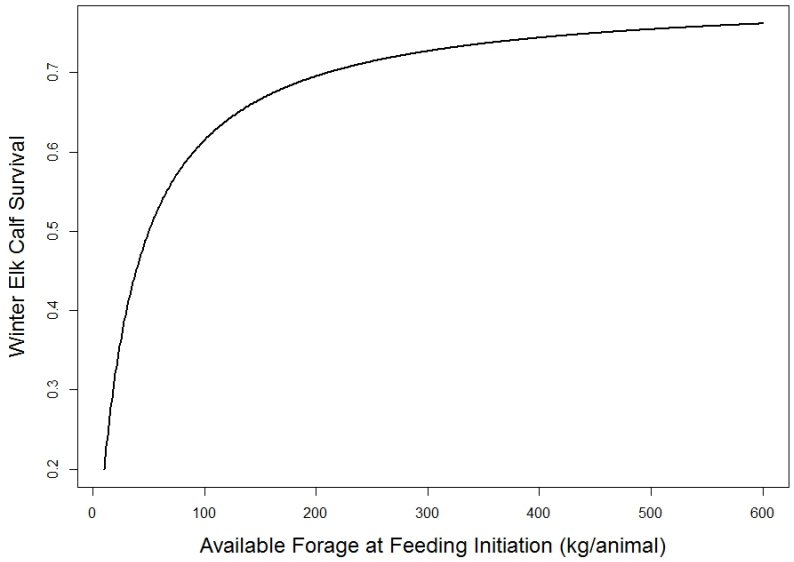
While calf survival is a function of multiple factors the primary management action influencing calf survival is supplemental winter feeding. Current winter feeding initiation criteria lead to calf survival

generally higher than in unfed populations. Proposed feeding initiation criteria will result in later initiation of supplemental feed, which will be most influential to calf survival. There is currently little understanding regarding the relationship between initiation of winter feeding and calf survival, except that current feeding initiation criteria result in high calf survival. We believe a threshold level of available forage at initiation of winter feeding exists such that winter calf survival reaches an asymptote. Below this threshold, calf survival is hypothesized to decline quickly with reductions in available forage at winter feeding initiation. Available forage at the initiation of winter feeding will be related to on elk calf winter survival using a saturating function (i.e., Holling type-II functional response; Fig. 6) by

$$S_t = \frac{aAFI_t}{b + AFI_t}.$$

The parameters a and b determine how calf survival is related to available forage. Maximum calf survival is a, and b represents the value of available forage to an individual when survival is 50% of a (Hilborn and Mangel 1997).

Although this approach doesn't capture forage deficits per se, it does provide a potentially sensitive proxy for this concept. It is assumed that a forage deficit for calves would occur at a point on the curve of the relationship between calf survival and available forage at initiation of supplemental feeding. Modeling the response of winter calf elk survival to changes in feeding initiation criteria facilitates our ability to maximize the influence of feeding initiation criteria on winter distribution while minimizing the likelihood of a large mortality event.



Hypothesized relationship between winter survival of elk calves and per capita available forage at initiation of winter feeding on the National Elk Refuge.

From:	Steve Kallin
To:	Will Meeks
Subject:	RE: Step Down Plan, Jackson Hole Media
Date:	Tuesday, October 11, 2016 10:11:05 AM

Hi Will:

I have a reporter contacting me for an interview for tomorrow's paper. If we don't make contact today, I suspect they will still run the story in the future.

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Will Meeks [mailto:Will_Meeks@fws.gov]
Sent: Thursday, October 06, 2016 2:22 PM
To: Steve Kallin; Mike Blenden
Cc: Maureen Gallagher; Cris Dippel; Lori Iverson; Eric Cole
Subject: RE: Step Down Plan, Jackson Hole Media

Thanks for the heads up Steve. I'll be in touch tomorrow.

Will Meeks
U.S. Fish and Wildlife Service
Mountain Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Thursday, October 06, 2016 12:00 PM
To: Mike Blenden
Cc: Will Meeks; Maureen Gallagher; Cris Dippel; Lori Iverson; Eric Cole
Subject: Step Down Plan, Jackson Hole Media

Mike:

This is a follow-up to our recent conversation about the BEMP Step Down Plan.

After being interviewed by the Jackson Hole News and Guide for the attached article, the news reporter asked me about the status of the Step Down Plan. I told him the decision was made to delay the process because of the election and for a longer discussion period with the public. He said the local rumor is that it was delayed due to the poor relationship between R-6 FWS Leadership and

the WGFD due to the Grizzly Bear delisting process. He asked if the Regional Office would give him the same reasons for the delay if he called them. I told him I believed the RO would tell him the same thing said and gave him your contact information. Yesterday, this same reporter called and said his paper wants him to do a story on the Step Down Plan for this next week's paper (Wednesday).

We are in an awkward position. A news release announcing that we are delaying the Step Down Plan process will surely anger many because this process has taken several years and they want to see us move forward. At the same time, a news release would likely motivate those opposed to any change, and trigger a blistering attack criticizing us for mismanagement and starving elk, similar to last year's "feedback". If we were following the Step Down Communications and Engagement Plans, we would be more proactive and better positioned to address the management criticism we all expect to occur again this year. However, for a number of reasons as I previously recommended, we should not follow these plans prior to the upcoming feed season if we are not going to start making changes to the upcoming feeding program.

I suggest that I do the interview with the reporter from the New & Guide and in addition to the reasons I initially gave him for the delay, that we add time separation between the CCP and the Step Down Plan to avoid confusion. What is the status of the CCP and when can we expect to release it?

Let me know your thoughts and be prepared for a call from this reporter.

Take care,

Steve Kallin
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Fax: (307) 733-9729
steve_kallin@fws.gov

From: Ryan Moehring
To: Anna Munoz (anna_munoz@fws.gov)
Cc: Roya Mogadam
Subject: Draft NER TPs - Any edits?
Date: Tuesday, October 11, 2016 4:12:00 PM

- In managing elk, bison, and other wildlife on the National Elk Refuge (NER), the U.S. Fish and Wildlife Service strives to create an environment where healthy and sustainable wildlife populations thrive.
- When unnaturally high concentrations of animals occur, the risk of disease transmission and the potential for a major disease outbreak increases. This is a scenario we are committed to working with the public and our partners to prevent.
- While we expect to release our Comprehensive Conservation Plan (CCP) sometime in October 2016, the Bison and Elk Management Plan (BEMP) will not be implemented this year. Before moving forward with that process, we feel it is critical to take time to engage with the local community, our partners, and other interested stakeholders to discuss the details of that plan and how it will affect the wildlife that rely on the NER, as well as the public.
- That engagement process will begin sometime in 2017. When we have a firm timetable we will advertise these engagement opportunities widely throughout the Jackson community and beyond.
- In the meantime, our focus will be on publishing our CCP and working on its implementation. Until the BEMP engagement process is complete, our supplemental feeding activities will continue as they have in the past.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

Web |Facebook | Twitter | Flickr | YouTube

From:	Ryan Moehring
To:	"Maureen Gallagher"
Cc:	Mike Blenden; Anna Munoz; Will Meeks; Roya Mogadam
Subject:	RE: NER
Date:	Tuesday, October 11, 2016 7:59:00 PM

Thanks, Maureen.

I'll call you tomorrow to discuss. In the interim, we wanted to share the below draft talking points to be used in the event we receive any further media inquiries prior to the CCP release. Any and all feedback is welcome.

-Ryan

- In managing elk, bison, and other wildlife on the National Elk Refuge (NER), the U.S. Fish and Wildlife Service strives to create an environment where healthy and sustainable wildlife populations thrive.

- When unnaturally high concentrations of animals occur, the risk of disease transmission and the potential for a major disease outbreak increases. This is a scenario we are committed to working with the public and our partners to prevent.

- While we expect to release our Comprehensive Conservation Plan (CCP) sometime in October 2016, the Bison and Elk Management Plan (BEMP) will not be implemented this year. Before moving forward with that process, we feel it is critical to take time to engage with the local community, our partners, and other interested stakeholders to discuss the details of that plan and how it will affect the wildlife that rely on the NER, as well as the public.

- That engagement process will begin sometime in 2017. When we have a firm timetable we will advertise these engagement opportunities widely throughout the Jackson community and beyond.

- In the meantime, our focus will be on publishing our CCP and working on its implementation. Until the BEMP engagement process is complete, our supplemental feeding activities will continue as they have in the past.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Maureen Gallagher [mailto:maureen_gallagher@fws.gov]
Sent: Tuesday, October 11, 2016 7:56 PM
To: Ryan Moehring

Cc: Mike Blenden; Anna Munoz; Will Meeks; Roya Mogadam
Subject: Re: NER

Mike is out all week and I was out of the office when I got this. I did try to contact Steve and left a message for him to send the reporter to Anna. I am back in Wednesday.

Sent from my iPhone

On Oct 11, 2016, at 2:55 PM, Ryan Moehring <ryan_moehring@fws.gov> wrote:

> Mike/Maureen,
>
> Anna shared some context with me this afternoon about a time-sensitive (COB today) NER-related media inquiry. I called you both to discuss, but could not reach you. Could one of you please call me at the number below at your earliest convenience? Thanks very much in advance for your help.
>
> Thanks,
> Ryan
>
> Ryan Moehring
> Public Affairs
> U.S. Fish and Wildlife Service
> Mountain-Prairie Region
> 303-236-0345
>
> Web |Facebook | Twitter | Flickr | YouTube

From: Ryan Moehring
To: Anna Munoz (anna_munoz@fws.gov)
Cc: Roya Mogadam
Subject: FW: NER CCP Surname Package
Date: Thursday, October 13, 2016 10:27:00 AM

Anna,

Now that the NER CCP outreach package is surnamed, I would like to send a note to all of the involved folks in Refuges to coordinate the timing of this release. Given all the discussions around this topic, I want to make sure everyone is on the same page before moving forward. I've tried multiple times to reach Maureen, but have not gotten a return call. Will and Blenden are on leave, so I thought an email would be appropriate. The email would inform the group that the package is surnamed, inquire about the status of the FR pub window, and solicit preferred timing re: distribution from the group. You, me, Roya, Will, Maureen, Blenden, Kallin, and Toni are probably the core group to include, unless you have other suggestions. Are you OK w/ this approach? Anything else I should consider?

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Sanchez, Denise [mailto:denise_sanchez@fws.gov]
Sent: Thursday, October 13, 2016 9:35 AM
To: Ryan Moehring
Subject: Re: NER CCP Surname Package

Hi Ryan,

Evidently, it was sitting in the EA mail slot and no one said anything :0

Matt Hogan surname with no edits. Good to go. I will leave the package/folder in your office.

On Thu, Oct 13, 2016 at 9:15 AM, Ryan Moehring <ryan_moehring@fws.gov> wrote:
Hi Denise,

I wanted to touch base to see if the National Elk Refuge CCP communications package has come back signed from the RD's office and if so, if there were any edits or comments. Thanks for checking!

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

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--

Denise Sanchez | Public Affairs Assistant
USFWS Mountain-Prairie Region External Affairs
134 Union Blvd, Lakewood, CO 80228
denise_sanchez@fws.gov | 303-236-2985

http://www.fws.gov/mountain-prairie



Flickr - Photos linked in this email.

From: Ryan Moehring
To: Denise Sanchez
Subject: RE: NER CCP Surname Package
Date: Thursday, October 13, 2016 10:31:00 AM

Thank you!!!!

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Sanchez, Denise [mailto:denise_sanchez@fws.gov]
Sent: Thursday, October 13, 2016 9:35 AM
To: Ryan Moehring
Subject: Re: NER CCP Surname Package

Hi Ryan,

Evidently, it was sitting in the EA mail slot and no one said anything :0

Matt Hogan surname with no edits. Good to go. I will leave the package/folder in your office.

On Thu, Oct 13, 2016 at 9:15 AM, Ryan Moehring <ryan_moehring@fws.gov> wrote:
Hi Denise,

I wanted to touch base to see if the National Elk Refuge CCP communications package has come back signed from the RD's office and if so, if there were any edits or comments. Thanks for checking!

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

Web |Facebook | Twitter | Flickr | YouTube

--

Denise Sanchez | Public Affairs Assistant
USFWS Mountain-Prairie Region External Affairs
134 Union Blvd, Lakewood, CO 80228
denise_sanchez@fws.gov | 303-236-2985

http://www.fws.gov/mountain-prairie



Flickr - Photos linked in this email.

National Elk Refuge

Jackson, Wyoming

Nestled below the majestic Teton Range, adjacent to the historic gateway town of Jackson, the National Elk Refuge provides crucial big game wintering habitat in the Greater Yellowstone Ecosystem. Across the refuge's grassland, wetland, woodland, and sagebrush shrubland communities, visitors view wintering elk and other wildlife populations that are balanced with their habitats. The public enjoys quality hunting and fishing as well as year-round interpretative opportunities. Effective outreach and strong public and private partnerships ensure understanding and protection of refuge resources for future generations.



The final National Elk Refuge Comprehensive Conservation Plan is now available.

The U.S. Fish and Wildlife Service recently completed the National Elk Refuge's comprehensive conservation plan, a long-term planning effort that will guide management of the refuge over the next 15 years.

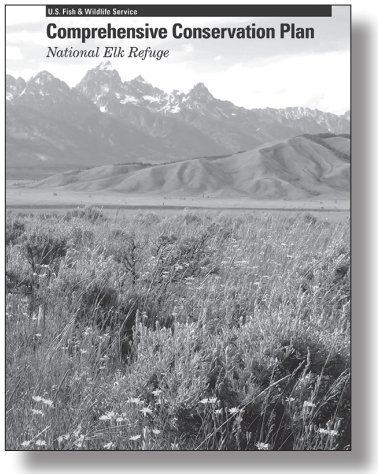
To learn more about the plan, please visit:

http://www.fws.gov/mountain-prairie/refuges/wy_ner.php

To receive a copy of the plan, please contact Toni Griffin, Acting Branch Chief, U.S. Fish and Wildlife Service, Region 6:

Email:
toni_griffin@fws.gov

Phone:
303 / 236 4378



News Release

U.S. FISH AND WILDLIFE SERVICE
Mountain-Prairie Region
134 Union Boulevard
Lakewood, Colorado 80228

For Immediate Release
October XX, 2016

Management Plan Completed for National Elk Refuge

Contact: Ryan Moehring, (303) 236-0345, Ryan_Moehring@fws.gov

LAKEWOOD, Colo. – The U.S. Fish and Wildlife Service (Service) has released a final Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) that will guide management of the National Elk Refuge (Refuge) in Jackson Hole, Wyoming for the next 15 years. The management decisions included in the CCP are a result of thorough environmental review and input from the local community and other stakeholders.

A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation, photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.

The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in the Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the Refuge, including supplemental feeding. Instead, the CCP addresses all other aspects of refuge management including migratory bird conservation, threatened and endangered species recovery, habitat management, visitor use, and management of cultural resources.

The final CCP/EA is available online here: https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. Hard copies are available at the refuge administrative offices located at 675 E. Broadway in Jackson. For questions about the CCP/EA, please call 307-733-9212.

Established in 1912, the National Elk Refuge spans approximately 25,000 acres and provides wildlife with a variety of habitat types, including grassy meadows, marshes, forest, sagebrush, and rock outcrops. Although the Refuge is best known for the largest herd of wintering elk in the world, nearly 175 species of birds and at least 47 mammal species have been observed on the Refuge. A free-roaming bison herd also winters at the Refuge. Each year, roughly 500,000 people visit the National Elk Refuge to enjoy the views and charismatic wildlife.

To learn more about the refuge,
visit: https://www.fws.gov/refuge/National_Elk_Refuge/about.html.

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. We are both a leader and trusted partner in fish and wildlife conservation, known for our scientific excellence, stewardship of lands and natural resources, dedicated professionals, and commitment to public service.

For more information on our work and the people who make it happen, visit http://www.fws.gov/mountain-prairie/. Connect with our Facebook page at http://www.facebook.com/USFWSMountainPrairie, follow our tweets at http://twitter.com/USFWSMtnPrairie, watch our YouTube Channel at http://www.youtube.com/usfws and download photos from our Flickr page at http://www.flickr.com/photos/usfwsmtnprairie/.

– FWS –

From:	Ryan Moehring
To:	Anna Munoz (anna_munoz@fws.gov); Will Meeks; "Maureen Gallagher"; "Mogadam, Roya"; "Mike Blenden"; Steve Kallin; Toni Griffin
Subject:	NER CCP Outreach
Date:	Thursday, October 13, 2016 11:57:00 AM
Attachments:	NER CCP Postcard_SURNAME.pdf NER CCP Comms Strategy_SURNAME.docx NER CCP Dear Reader Letter_SURNAME.doc NER CCP News Release_SURNAME.docx

---

All,

Matt Hogan has surnamed our NER CCP outreach package. Final products are attached. The purpose of this email is to coordinate with all of you on the timing of our outreach. Our original intent was to release this in October, which I am hopeful we can still do.

I am in for the rest of this week and all next, but then I'm off the following week, returning on the 31st. My preference, if you are amenable, would be to roll this out while I am in the office so I do not have to ask one of my colleagues to step in without having the benefit of the months of context that have informed this process.

To this end, I'm wondering if Toni or someone else can comment on the status of our FR pub window so we can start planning the timing of our rollout?

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

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BASIC COMMUNICATIONS STRATEGY

SECTION I: GENERAL INFORMATION

1. **Plan title:** Release of the National Elk Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA)

2. **DTS number: 44T**

3. **What is the action triggering this communications plan?** *(Please explain in no more than three sentences)*

The CCP and EA have been approved since September 2015. A separate engagement strategy for the Bison and Elk Management step-down plan is currently in development and will be soon available for leadership review.

4. **What is the proposed date to announce this action? Why has that date been selected?** *(Please note whether this date is flexible)*

We propose to release this CCP/EA no later than early October 2016.

SECTION II: GOALS AND MESSAGES

5. **What are our primary communications goals?**

Our primary communications goal is to inform our partners at the Wyoming Game and Fish Department, National Park Service, U.S. Forest Service, and the local public that the CCP/EA have been finalized and certain activities under the CCP are underway. Our secondary communications goal is to draw a clear line between the CCP/EA and the Bison and Elk Management Plan, separating those items in the minds of our constituents and indicating to interested stakeholders information about the latter plan is forthcoming this Fall.

6. **What are our key messages?** *(List no more than four!)*

- The purpose of Comprehensive Conservation Plans is to guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will

implement to protect species, manage habitats, and support compatible, public recreational and other uses.

- A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).
- Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.
- The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the refuge, including supplemental feeding. A separate announcement and a series of meetings on the Bison and Elk Management Plan are forthcoming.

SECTION III: IMPLEMENTATION

7. Who is leading this communications effort? *(Check one. Note if the response is neither of these, you should be using either a Partnership, Full or Targeted plan)*

◉ **Region** ○ **HQ**

8. Which programs and/or regions does this issue involve?

The National Elk Refuge (R6)

Refuges (R6)

External Affairs (R6)

9. Implementation timeline:

Date	Time	Tactic	Responsible
Day before release	10:00 a.m. MDT	Contact Brad Hovinga, Regional Wildlife Supervisor, WGFD	Steve Kallin
Day before release	10:00 a.m. MDT	Congressional notifications	Ryan Moehring and Steve Kallin
Day of release *(Day available in the Reading Room)*	10:00 a.m. MDT	Distribute press release	Ryan Moehring Lori Iverson will also forward the news release to the NER's news release list.
Day of release	10:00 a.m. MDT	Post Final CCP on Mountain-Prairie Refuge Planning website. Distribute Final CCP (electronic and hard copy) to individuals on the CCP mailing list.	Danielle Stevens will work with Rob Mansheim to post files on RO website. Toni Griffin will distribute the Final CCP to the mailing list.
Day of release	10:00 a.m. MDT	Post press release on R6 website and FWS homepage. Also, post link to press release on social media	Rob Mansheim Lori Iverson will send out a link on the NER's Twitter account.
Day of release	10:00 a.m. MDT	Email Dear Interested Party Letter to interested stakeholders.	Toni Griffin

10. Which communications tools are needed to support these strategies and tactics? *(Be as specific as possible about the products identified and who will produce them)*

Tool	Responsible	Due Date
News Release	Ryan Moehring	Complete
Communications Plan	Ryan Moehring	Complete
Dear Interested Party Letter	Toni Griffin	Complete

11. Which agencies, organizations and/or individuals should be notified?

Stakeholder Name	Contact Info	Pro/Anti/ Neutral	Contact By
Grand Teton National Park	David Vela, Superintendent; david_vela@nps.gov.	neutral	Day before announcement
National Park Service, Intermountain Region	James Doyle, Chief – Communication and Legislation; 303-969-2321; james_doyle@nps.gov	neutral	Day before announcement
Bridger-Teton National Forest	Patricia O'Connor, Supervisor; poconnor@fs.fed.us	neutral	Day before announcement
Wyoming Game and Fish Department	Brad Hovinga; brad.hovinga@wyo.gov	neutral	Day before announcement

12. Who are the primary points of contact for this action?

Media coordinators *(For national-level plans, list at least one person from HQ Public Affairs and others from region/program if appropriate. For regional-level plans, only regional coordinators are required. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Congressional coordinators *(Optional. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov
- Roya Mogadam, 303-236-4572; Roya_Mogadam@fws.gov

Subject matter experts available for interview *(Must be approved by HQ Public Affairs for an HQ-led announcement or Regional Public Affairs for region-led announcement. Enter name, email and phone)*

- Steve Kallin, 307-201-5409; Steve_Kallin@fws.gov

Additional technical experts for reference *(Enter name, email and phone)*

- Eric Cole, 307-201-5432; Eric_Cole@fws.gov

SECTION IV: DOCUMENT INFO

13. Date Created **Created By**

8/12/2016	Ryan Moehring

14. Date last edited **Edited By**

3/7/2017	Ryan Moehring

SECTION V: CONGRESSIONAL CONTACT LISTS

Delegation Contacts

Member Title	State	Member Name	STAFF_EMAIL
Senator	Wyoming	John Barrasso	brian_clifford@barrasso.senate.gov; kaitlynn_glover@ba kristi_wallin@barrasso.senate.gov
Senator	Wyoming	Michael Enzi	alison_mcguire@enzi.senate.gov karen_mccreery@enzi.senate.gov
Representative	Wyoming	Cynthia Lummis	landon.stropko@mail.house.gov tucker.fagan@mail.house.gov

Committee Contacts

N/A

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:
FWS/R6/NWRS/Planning
MAILSTOP 60130

MAILING ADDRESS:
P.O. Box 25486, DFC
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Boulevard
Lakewood, Colorado 80228-1807

Dear Reader:

We, the U.S. Fish and Wildlife Service (Service), are pleased to provide you with a copy of the comprehensive conservation plan (CCP) for the National Elk Refuge. The CCP will guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will implement to protect species, manage habitats, and support compatible, public recreational and other uses.

During the planning process, we worked closely with representatives from the National Park Service, the Wyoming Game and Fish Department, and the Teton County Planning Department. A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected Alternative D as the preferred management alternative.

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.

We will work closely with Wyoming Game and Fish Department and other Federal, State, and local partners to evaluate and manage habitats for the benefit of bison, elk, migratory birds, and other native species. An emphasis on adaptive management, including monitoring the effects of habitat management practices and use of research results to direct ongoing management, will be a priority.

We will use this plan, along with the Bison and Elk Management Plan (2007), as guidance for managing the refuge over the next 15 years. This comprehensive conservation plan will complement, not replace, the Bison and Elk Management Plan. A stepdown management plan is currently being drafted for the Bison and Elk Management Plan. This plan will outline, consistent with the Bison and Elk Management Plan, guidance to adaptively manage bison and elk herds to meet the goals and objectives outlined in the Bison and Elk Management Plan.

Prior to finalizing the stepdown management plan, the Service will conduct a thorough public engagement process with neighboring communities and other members of the public on how they can help shape the future refuge experience and to listen to and address concerns they bring to our attention. Public input is incredibly important to the Service.

Our public engagement process will include clearly explaining to the refuge's neighbors and other stakeholders what decisions have already been made as well as how their input will be used and can influence the decisions that are yet to be made regarding how we move forward with the

stepdown management plan. We intend to listen to and implement feedback received from refuge neighbors and other interested stakeholders.

The CCP document can be viewed online at https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. For more information about the CCP, please contact Steve Kallin, Project Leader at (307) 733-9212, or Steve_kallin@fws.gov.

Thank you for your continued interest in this planning process.

Sincerely,

Will Meeks
Assistant Regional Director
National Wildlife Refuge System

From:	Ryan Moehring
To:	Anna Munoz; Steve Kallin
Cc:	"Will Meeks"; "Maureen Gallagher"; "Mike Blenden"; "Cris Dippel"; "Lori Iverson"
Subject:	RE: FW: Step Down Plan, Jackson Hole Media
Date:	Thursday, October 13, 2016 5:04:00 PM

Sure, Anna. Steve, I'll call you tomorrow.

All,

My email from earlier today re: the CCP release is directly related to this and to Steve's concerns further down this chain, so if folks get a second, I suggest taking a look at that ASAP, please.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Munoz, Anna [mailto:anna_munoz@fws.gov]
Sent: Thursday, October 13, 2016 4:59 PM
To: Steve Kallin
Cc: Will Meeks; Maureen Gallagher; Mike Blenden; Cris Dippel; Lori Iverson; Ryan Moehring
Subject: Re: FW: Step Down Plan, Jackson Hole Media

Thanks, Steve. Ryan will be our point person on this. Ryan, will you touch base with Steve tomorrow to discuss this inquiry?

On Thursday, October 13, 2016, Steve Kallin <steve_kallin@fws.gov> wrote:
Hi Anna:

I received a message from Maureen Gallagher that I should contact you to take this media request. I received the second contact from Mike Koshmrl, Environmental Reporter for the Jackson Hole News and Guide. He wants to set up an interview next Monday for a story to be printed in the Weekly Paper on Wednesday. Please let me know how you would like to proceed.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Tuesday, October 11, 2016 10:11 AM
To: Will Meeks
Subject: RE: Step Down Plan, Jackson Hole Media

Hi Will:

I have a reporter contacting me for an interview for tomorrow's paper. If we don't make contact today, I suspect they will still run the story in the future.

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Will Meeks [mailto:Will_Meeks@fws.gov]
Sent: Thursday, October 06, 2016 2:22 PM
To: Steve Kallin; Mike Blenden
Cc: Maureen Gallagher; Cris Dippel; Lori Iverson; Eric Cole
Subject: RE: Step Down Plan, Jackson Hole Media

Thanks for the heads up Steve. I'll be in touch tomorrow.

Will Meeks
U.S. Fish and Wildlife Service
Mountain Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Thursday, October 06, 2016 12:00 PM
To: Mike Blenden
Cc: Will Meeks; Maureen Gallagher; Cris Dippel; Lori Iverson; Eric Cole
Subject: Step Down Plan, Jackson Hole Media

Mike:

This is a follow-up to our recent conversation about the BEMP Step Down Plan.

After being interviewed by the Jackson Hole News and Guide for the attached article, the news reporter asked me about the status of the Step Down Plan. I told him the decision was made to delay the process because of the election and for a longer discussion period with the public. He said the local rumor is that it was delayed due to the poor relationship between R-6 FWS Leadership and the WGFD due to the Grizzly Bear delisting process. He asked if the Regional Office would give him the same reasons for the delay if he called them. I told him I

believed the RO would tell him the same thing said and gave him your contact information. Yesterday, this same reporter called and said his paper wants him to do a story on the Step Down Plan for this next week's paper (Wednesday).

We are in an awkward position. A news release announcing that we are delaying the Step Down Plan process will surely anger many because this process has taken several years and they want to see us move forward. At the same time, a news release would likely motivate those opposed to any change, and trigger a blistering attack criticizing us for mismanagement and starving elk, similar to last year's "feedback". If we were following the Step Down Communications and Engagement Plans, we would be more proactive and better positioned to address the management criticism we all expect to occur again this year. However, for a number of reasons as I previously recommended, we should not follow these plans prior to the upcoming feed season if we are not going to start making changes to the upcoming feeding program.

I suggest that I do the interview with the reporter from the New & Guide and in addition to the reasons I initially gave him for the delay, that we add time separation between the CCP and the Step Down Plan to avoid confusion. What is the status of the CCP and when can we expect to release it?

Let me know your thoughts and be prepared for a call from this reporter.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

--
Anna Muñoz
Assistant Regional Director - External Affairs
U.S. Fish and Wildlife Service, Mountain-Prairie Region
Office: 303-236-4510
Cell: 720-648-2542

From:	Ryan Moehring
To:	"Griffin, Toni"; "Maureen Gallagher"; "Steve Kallin"
Subject:	RE: Step Down Plan, Jackson Hole Media
Date:	Monday, October 17, 2016 9:09:00 AM

Thanks, Toni. Very helpful. We will stay tuned as things progress. Thanks for continuing to keep us in the loop. I'll call the reporter today.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Griffin, Toni [mailto:toni_griffin@fws.gov]
Sent: Sunday, October 16, 2016 8:04 PM
To: Maureen Gallagher; Ryan Moehring; Steve Kallin
Subject: Re: Step Down Plan, Jackson Hole Media

The FR notice is in HQ waiting for clearance to publish. I was given an estimated timeframe of a couple weeks to clear HQ. Once cleared by HQ, we're about a week out from a FR publication date. If all goes well we could be set to distribute the plan to the public 1st or 2nd week of Nov.

Toni Griffin
Refuge Planning
Division of Biological Resources
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
Lakewood, CO 80228
Office Phone: 303-236-4378

On Fri, Oct 14, 2016 at 9:29 PM, Maureen Gallagher <maureen_gallagher@fws.gov> wrote:
Can you help?

Sent from my iPhone

Begin forwarded message:

> **From:** Ryan Moehring <ryan_moehring@fws.gov>
> **Date:** October 14, 2016 at 2:01:31 PM MDT
> **To:** Anna Munoz <anna_munoz@fws.gov>, Steve Kallin <steve_kallin@fws.gov>
> **Cc:** Will Meeks <will_meeks@fws.gov>, Maureen Gallagher

<maureen_gallagher@fws.gov>, Mike Blenden <mike_blenden@fws.gov>, Cris Dippel <cris_dippel@fws.gov>, Lori Iverson <lori_iverson@fws.gov>
Subject: RE: FW: Step Down Plan, Jackson Hole Media

All,

Steve and I spoke today and I now have the context I need to speak with this reporter. The one thing that I would like to know prior to making that call, however, is our CCP pub window. If anyone knows where we are on that, please let me know ASAP, as that question will undoubtedly come up.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Ryan Moehring [mailto:ryan_moehring@fws.gov]
Sent: Thursday, October 13, 2016 5:05 PM
To: Anna Munoz; Steve Kallin
Cc: 'Will Meeks'; 'Maureen Gallagher'; 'Mike Blenden'; 'Cris Dippel'; 'Lori Iverson'
Subject: RE: FW: Step Down Plan, Jackson Hole Media

Sure, Anna. Steve, I'll call you tomorrow.

All,

My email from earlier today re: the CCP release is directly related to this and to Steve's concerns further down this chain, so if folks get a second, I suggest taking a look at that ASAP, please.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Munoz, Anna [mailto:anna_munoz@fws.gov]
Sent: Thursday, October 13, 2016 4:59 PM
To: Steve Kallin
Cc: Will Meeks; Maureen Gallagher; Mike Blenden; Cris Dippel; Lori Iverson; Ryan Moehring

Subject: Re: FW: Step Down Plan, Jackson Hole Media

Thanks, Steve. Ryan will be our point person on this. Ryan, will you touch base with Steve tomorrow to discuss this inquiry?

On Thursday, October 13, 2016, Steve Kallin <steve_kallin@fws.gov> wrote:
Hi Anna:

I received a message from Maureen Gallagher that I should contact you to take this media request. I received the second contact from Mike Koshmrl, Environmental Reporter for the Jackson Hole News and Guide. He wants to set up an interview next Monday for a story to be printed in the Weekly Paper on Wednesday. Please let me know how you would like to proceed.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Tuesday, October 11, 2016 10:11 AM
To: Will Meeks
Subject: RE: Step Down Plan, Jackson Hole Media

Hi Will:

I have a reporter contacting me for an interview for tomorrow's paper. If we don't make contact today, I suspect they will still run the story in the future.

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Will Meeks [mailto:Will_Meeks@fws.gov]
Sent: Thursday, October 06, 2016 2:22 PM
To: Steve Kallin; Mike Blenden
Cc: Maureen Gallagher; Cris Dippel; Lori Iverson; Eric Cole
Subject: RE: Step Down Plan, Jackson Hole Media

Thanks for the heads up Steve. I'll be in touch tomorrow.

Will Meeks
U.S. Fish and Wildlife Service
Mountain Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Thursday, October 06, 2016 12:00 PM
To: Mike Blenden
Cc: Will Meeks; Maureen Gallagher; Cris Dippel; Lori Iverson; Eric Cole
Subject: Step Down Plan, Jackson Hole Media

Mike:

This is a follow-up to our recent conversation about the BEMP Step Down Plan.

After being interviewed by the Jackson Hole News and Guide for the attached article, the news reporter asked me about the status of the Step Down Plan. I told him the decision was made to delay the process because of the election and for a longer discussion period with the public. He said the local rumor is that it was delayed due to the poor relationship between R-6 FWS Leadership and the WGFD due to the Grizzly Bear delisting process. He asked if the Regional Office would give him the same reasons for the delay if he called them. I told him I believed the RO would tell him the same thing said and gave him your contact information. Yesterday, this same reporter called and said his paper wants him to do a story on the Step Down Plan for this next week's paper (Wednesday).

We are in an awkward position. A news release announcing that we are delaying the Step Down Plan process will surely anger many because this process has taken several years and they want to see us move forward. At the same time, a news release would likely motivate those opposed to any change, and trigger a blistering attack criticizing us for mismanagement and starving elk, similar to last year's "feedback". If we were following the Step Down Communications and Engagement Plans, we would be more proactive and better positioned to address the management criticism we all expect to occur again this year. However, for a number of reasons as I previously recommended, we should not follow these plans prior to the upcoming feed season if we are not going to start making changes to the upcoming feeding program.

I suggest that I do the interview with the reporter from the New & Guide and in addition to the reasons I initially gave him for the delay, that we add time separation between the CCP and the Step Down Plan to avoid confusion. What is the status of the CCP and when can we expect to release it?

Let me know your thoughts and be prepared for a call from this reporter.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

--
Anna Muñoz
Assistant Regional Director - External Affairs
U.S. Fish and Wildlife Service, Mountain-Prairie Region
Office: 303-236-4510
Cell: 720-648-2542

From: Ryan Moehring
To: Steve Kallin
Subject: RE: Interview by Mike Koshmrl
Date: Monday, October 17, 2016 11:33:12 AM

Sounds good, Steve. I'll call him around 1PM today.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

-----Original Message-----
From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Friday, October 14, 2016 4:09 PM
To: ryan_moehring@fws.gov
Subject: Interview by Mike Koshmrl

Ryan:
Mike Koshmrl recently contacted me about the step down plan article in the Jackson Hole news and Guide. I gave him your name as the person who will likely call him. He requested a call between 1:00 and 2:00 PM on Monday if possible.

All the best, Steve

From:	Ryan Moehring
To:	Anna Munoz; Steve Kallin
Cc:	"Will Meeks"; "Maureen Gallagher"; "Mike Blenden"; "Cris Dippel"; "Lori Iverson"
Subject:	RE: FW: Step Down Plan, Jackson Hole Media
Date:	Monday, October 17, 2016 1:03:00 PM

I just spoke with the reporter. He tried to stoke the flames of controversy but I made it clear that the grizzly delisting proposal is a wholly separate issue from NER management and that the CCP delay was related to our being a large administrative region with a significant workload. Per Toni, I told him that we should publish the CCP within the next month and also mentioned that we would be launching an engagement process for the BEMP in 2017. I stressed that we are committed to a robust public participation process prior to making changes to our supplemental feeding program. Steve, there were a couple of BEMP step down-specific questions that I did not know the answers to with 100% certainty (nothing controversial, just specific contents of plan/status kind of stuff), so I told him he was welcome to follow up on those w/ you. If he starts taking the conversation in another direction, please feel free to direct him to me.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Munoz, Anna [mailto:anna_munoz@fws.gov]
Sent: Thursday, October 13, 2016 4:59 PM
To: Steve Kallin
Cc: Will Meeks; Maureen Gallagher; Mike Blenden; Cris Dippel; Lori Iverson; Ryan Moehring
Subject: Re: FW: Step Down Plan, Jackson Hole Media

Thanks, Steve. Ryan will be our point person on this. Ryan, will you touch base with Steve tomorrow to discuss this inquiry?

On Thursday, October 13, 2016, Steve Kallin <steve_kallin@fws.gov> wrote:
Hi Anna:

I received a message from Maureen Gallagher that I should contact you to take this media request. I received the second contact from Mike Koshmrl, Environmental Reporter for the Jackson Hole News and Guide. He wants to set up an interview next Monday for a story to be printed in the Weekly Paper on Wednesday. Please let me know how you would like to proceed.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510

675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Tuesday, October 11, 2016 10:11 AM
To: Will Meeks
Subject: RE: Step Down Plan, Jackson Hole Media

Hi Will:

I have a reporter contacting me for an interview for tomorrow's paper. If we don't make contact today, I suspect they will still run the story in the future.

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Will Meeks [mailto:Will_Meeks@fws.gov]
Sent: Thursday, October 06, 2016 2:22 PM
To: Steve Kallin; Mike Blenden
Cc: Maureen Gallagher; Cris Dippel; Lori Iverson; Eric Cole
Subject: RE: Step Down Plan, Jackson Hole Media

Thanks for the heads up Steve. I'll be in touch tomorrow.

Will Meeks
U.S. Fish and Wildlife Service
Mountain Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Thursday, October 06, 2016 12:00 PM
To: Mike Blenden
Cc: Will Meeks; Maureen Gallagher; Cris Dippel; Lori Iverson; Eric Cole
Subject: Step Down Plan, Jackson Hole Media

Mike:

This is a follow-up to our recent conversation about the BEMP Step Down Plan.

After being interviewed by the Jackson Hole News and Guide for the attached article, the

news reporter asked me about the status of the Step Down Plan. I told him the decision was made to delay the process because of the election and for a longer discussion period with the public. He said the local rumor is that it was delayed due to the poor relationship between R-6 FWS Leadership and the WGFD due to the Grizzly Bear delisting process. He asked if the Regional Office would give him the same reasons for the delay if he called them. I told him I believed the RO would tell him the same thing said and gave him your contact information. Yesterday, this same reporter called and said his paper wants him to do a story on the Step Down Plan for this next week's paper (Wednesday).

We are in an awkward position. A news release announcing that we are delaying the Step Down Plan process will surely anger many because this process has taken several years and they want to see us move forward. At the same time, a news release would likely motivate those opposed to any change, and trigger a blistering attack criticizing us for mismanagement and starving elk, similar to last year's "feedback". If we were following the Step Down Communications and Engagement Plans, we would be more proactive and better positioned to address the management criticism we all expect to occur again this year. However, for a number of reasons as I previously recommended, we should not follow these plans prior to the upcoming feed season if we are not going to start making changes to the upcoming feeding program.

I suggest that I do the interview with the reporter from the New & Guide and in addition to the reasons I initially gave him for the delay, that we add time separation between the CCP and the Step Down Plan to avoid confusion. What is the status of the CCP and when can we expect to release it?

Let me know your thoughts and be prepared for a call from this reporter.

Take care,

Steve Kallin
Project Leader
National Elk Refuge
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Phone: (307) 201-5409
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steve_kallin@fws.gov

--
Anna Muñoz
Assistant Regional Director - External Affairs
U.S. Fish and Wildlife Service, Mountain-Prairie Region
Office: 303-236-4510
Cell: 720-648-2542

From: Ryan Moehring
To: Anna Munoz
Subject: RE: Jackson Hole News and Guide Article on NER
Date: Wednesday, October 19, 2016 2:20:00 PM

Thanks, Anna. I think this is the best-possible outcome given the circumstances we inherited. I'll be sure to set up a time with you to discuss the CCP rollout once we get closer to a pub date.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Munoz, Anna [mailto:anna_munoz@fws.gov]
Sent: Wednesday, October 19, 2016 1:28 PM
To: Ryan Moehring
Subject: Re: Jackson Hole News and Guide Article on NER

Good job in working this issue. All-in-all, it's not a bad article and although we still need to work through some things, but this could have turned out way worse.

Anna

Anna Muñoz
Assistant Regional Director - External Affairs
U.S. Fish and Wildlife Service, Mountain-Prairie Region
Office: 303-236-4510
Cell: 720-648-2542

On Wed, Oct 19, 2016 at 12:44 PM, Ryan Moehring <ryan_moehring@fws.gov> wrote:
http://www.jhnewsandguide.com/news/environmental/elk-refuge-step-down-plan-remains-held-up/article_2ac4ff2c-a9d4-51b8-bd8e-6373bc54a15f.html

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

Web |Facebook | Twitter | Flickr | YouTube

From:	Ryan Moehring
To:	Toni Griffin; Steve Kallin
Cc:	"Mike Blenden"; "Maureen Gallagher"; "Cris Dippel"; "Lori Iverson"; "Will Meeks"
Subject:	RE: FW: CCP
Date:	Tuesday, November 01, 2016 3:28:00 PM
Attachments:	NER TPsdocx.docx

Thanks, Toni. I'm adding Will.

As Toni noted, we are actively working on getting the CCP released. It is hung up w/ HQ. Will made a call earlier today to try to break the log jam and he may have more info.

I told the Jackson News and Guide that we would publish the CCP "in the next month". That printed on 10/19 (http://www.jhnewsandguide.com/news/environmental/elk-refuge-step-down-plan-remains-held-up/article_2ac4ff2c-a9d4-51b8-bd8e-6373bc54a15f.html). I'm hopeful we can keep to that timeframe.

I have attached the most recent talking points that generally address both the CCP and BEMP step-down. If Lori would like to call me prior to the meeting to discuss messaging, she is most welcome to do so.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Griffin, Toni [mailto:toni_griffin@fws.gov]
Sent: Tuesday, November 01, 2016 3:19 PM
To: Steve Kallin
Cc: Mike Blenden; Maureen Gallagher; Ryan Moehring; Cris Dippel; Lori Iverson
Subject: Re: FW: CCP

Hi All,

The notice of availability (NOA) is in HQ being routed for clearance to publish. Once clearance has been received we will submit the NOA to the Office of the Federal Register. It typically takes 3-4 days to publish the notice after it's received by the Office of the Federal Register. We are ready to distribute the CCP and outreach materials to occur with publication of the NOA.

I've been making inquiries to HQ as to when we may expect the NOA to be cleared but have not received a firm date.

Toni

Toni Griffin
Refuge Planning
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
Lakewood, CO 80228
Office Phone: 303/236-4378
Telework: Tuesday, Friday

On Tue, Nov 1, 2016 at 2:21 PM, Steve Kallin <steve_kallin@fws.gov> wrote:
Mike:

Please see Lori's email below. We are working in partnership with the Jackson Hole Public Art organization on a public art project for the Murie Family Park (Visitor Center Park). This project is becoming controversial (of course) with opposition from a small but determined group of local opponents. Lori will likely be asked in tomorrow's meeting about this project being consistent with our long-range planning (CCP).

Does anyone have an update on the release of the CCP. We would like to provide some information about the future of the CCP during this public meeting so we don't appear totally inept. At this point we have the "our Regional Office has been busy" excuse combined with "we don't know when the CCP will be released." This won't cut it for the local Jackson crowd. We are in the midst of engaging the public on this issue and because we can't provide credible answers to a few basic questions, it appears we are being evasive.

Thanks,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Iverson, Lori [mailto:lori_iverson@fws.gov]
Sent: Tuesday, November 01, 2016 12:34 PM
To: Steve Kallin
Subject: CCP

Steve,
Our NER CCP is very likely to come up at the Public Art Task Force meeting tomorrow as plans are discussed regarding the proposed wildlife viewing platform north of the visitor center. I would like to know the response the regional office would like me to use if I receive questions about the CCP. Specifically, I'd like to know these key talking points:

- When is the CCP expected to be released?
- Why did it take so long for it to be released from the time it was signed in September 2015?

Because this is a very vocal group attending tomorrow's meeting, and they have already been quoted in the newspaper regarding this particular platform project, it's likely they will continue to receive media coverage of their concerns.

My meeting is at 8:00-9:00 am tomorrow. I will likely go straight to the meeting and not stop in the office first. However, I will have my iPhone with me to check email for the appropriate response.

Thanks for offering guidance,
Lori

Lori Iverson
Outreach & Visitor Services
U.S. Fish & Wildlife Service
National Elk Refuge
PO Box 510 / 675 East Broadway
Jackson, WY 83001
Phone: 307.201.5433
Cell: 307.690.4375
Fax: 307.733.9729
lori_iverson@fws.gov
National Elk Refuge photo gallery
National Elk Refuge web site
Twitter: @NatlElkRefuge

"Of all the paths you take in life, make sure a few of them are dirt." - John Muir

NER Pre-CCP Release Talking Points (If Asked)

- In managing elk, bison, and other wildlife on the National Elk Refuge (NER), the U.S. Fish and Wildlife Service strives to create an environment where healthy and sustainable wildlife populations thrive.
- When unnaturally high concentrations of animals occur, the risk of disease transmission and the potential for a major disease outbreak increases. This is a scenario we are committed to working with the public and our partners to prevent.
- While we expect to release our Comprehensive Conservation Plan (CCP) sometime in November 2016, the Bison and Elk Management Plan (BEMP) will not be implemented this year. Before moving forward with that process, we feel it is critical to take time to engage with the local community, our partners, and other interested stakeholders to discuss the details of that plan and how it will affect the wildlife that rely on the NER and the public.
- That engagement process will begin sometime in 2017. When we have a firm timetable we will advertise these engagement opportunities widely throughout the Jackson community and beyond.
- In the meantime, our focus will be on publishing our CCP and working on its implementation. Until the BEMP engagement process is complete, our supplemental feeding activities will continue as they have in the past.

From:	Ryan Moehring
To:	Anna Munoz
Cc:	roya_mogadam@fws.gov
Subject:	Fwd: CCP
Date:	Tuesday, November 01, 2016 4:32:57 PM

Sent from my iPhone

Begin forwarded message:

From: Steve Kallin <steve_kallin@fws.gov>
Date: November 1, 2016 at 4:06:12 PM MDT
To: Ryan Moehring <ryan_moehring@fws.gov>, Toni Griffin <toni_griffin@fws.gov>
Cc: Mike Blenden <mike_blenden@fws.gov>, Maureen Gallagher <maureen_gallagher@fws.gov>, Cris Dippel <cris_dippel@fws.gov>, Lori Iverson <lori_iverson@fws.gov>, Will Meeks <will_meeks@fws.gov>
Subject: RE: FW: CCP

Thanks Ryan. I believe Lori fully understands the talking points and knows that you told the Jackson Hole News and Guide that the CCP would be published "in the next month." That's what we (NER) have basically been telling the media and public since last winter. That answer has worn thin and at this point, if we give it again, we will look ridiculous. I was hoping we would actually have something concrete to tell the public about the release of the CCP, during what will likely be a highly charged meeting.

Thank you,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Ryan Moehring [mailto:ryan_moehring@fws.gov]
Sent: Tuesday, November 01, 2016 3:29 PM
To: Toni Griffin; Steve Kallin
Cc: Mike Blenden; Maureen Gallagher; Cris Dippel; Lori Iverson; Will Meeks
Subject: RE: FW: CCP

Thanks, Toni. I'm adding Will.

As Toni noted, we are actively working on getting the CCP released. It is hung up w/

HQ. Will made a call earlier today to try to break the log jam and he may have more info.

I told the Jackson News and Guide that we would publish the CCP "in the next month". That printed on 10/19 (http://www.jhnewsandguide.com/news/environmental/elk-refuge-step-down-plan-remains-held-up/article_2ac4ff2c-a9d4-51b8-bd8e-6373bc54a15f.html). I'm hopeful we can keep to that timeframe.

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Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Griffin, Toni [mailto:toni_griffin@fws.gov]
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Toni

Toni Griffin
Refuge Planning
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
Lakewood, CO 80228
Office Phone: 303/236-4378
Telework: Tuesday, Friday

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Mike:

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Thanks,

Steve Kallin
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From: Iverson, Lori [mailto:lori_iverson@fws.gov]
Sent: Tuesday, November 01, 2016 12:34 PM
To: Steve Kallin
Subject: CCP

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and not stop in the office first. However, I will have my iPhone with me to check email for the appropriate response.

Thanks for offering guidance,
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U.S. Fish & Wildlife Service
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Fax: 307.733.9729
lori_iverson@fws.gov
National Elk Refuge photo gallery
National Elk Refuge web site
Twitter: @NatlElkRefuge

"Of all the paths you take in life, make sure a few of them are dirt." - John Muir

From: Ryan Moehring
To: Anna Munoz (anna_munoz@fws.gov)
Cc: Roya Mogadam
Subject: FW: CCP
Date: Wednesday, November 02, 2016 1:35:00 PM

FYI

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Will Meeks [mailto:Will_Meeks@fws.gov]
Sent: Wednesday, November 02, 2016 12:45 PM
To: Lori Iverson
Cc: Steve Kallin; Ryan Moehring; Toni Griffin; Mike Blenden; Maureen Gallagher; Cris Dippel
Subject: RE: CCP

All –

Due to some conflicts, I don't think we need to have a conference call and offer this as an update.

I contacted Mark Chase this morning and he informed me the package was with the Exec Sec. Once out of there we move to publish.

I think the message for current status, "The CCP is awaiting final approval by the Secretary's office. It will publish in the Federal Register after that. We don't anticipate any further delays."

Message for the delay to date should be, "The CCP was signed by acting DRD Hogan last year. We held final publication to begin a public engagement strategy to implement the step down aspects of the Bison and Elk Management Plan (EIS). Time lags and scheduling issues resulted in a delay/lapse which required us to resubmit the CCP (for final FR publication), news release, and outreach materials."

Will Meeks
U.S. Fish and Wildlife Service
Mountain Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

From: Will Meeks [mailto:will_meeks@fws.gov]
Sent: Tuesday, November 01, 2016 6:53 PM
To: Lori Iverson
Cc: Steve Kallin; Ryan Moehring; Toni Griffin; Mike Blenden; Maureen Gallagher; Cris Dippel
Subject: Re: CCP

I suggest we all have a conference call and cease with emails.

Mike - please set one up. I will make myself available anytime after 11 am.

Good night.

Will Meeks
U.S. Fish and Wildlife Service
Mountain-Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303(w)
720-541-0310 (c)

On Nov 1, 2016, at 6:06 PM, Lori Iverson <lori_iverson@fws.gov> wrote:

> Hi Ryan,
> Thanks for the response. I appreciate you getting back to us today.
>
> The talking points you provided don't address the interim between now and when the document was signed in September 2015. People know the document was signed then because we started implementing a couple high visibility of projects listed in the document, citing the CCP as our green light. I recently had someone point out that the CCP was done when it was signed in 2015, and all that was left to do was print it and send it out. The specific talking point I wanted guidance on isn't related to the current delay in HQ, but rather the delay since September 2015.
>
> I won't be in the office prior to the meeting at 8:00. I'll likely arrive there at 7:30 to help set up.
>
> Even if I don't have a concrete answer by tomorrow morning's meeting, it would be helpful to have a consistent talking point we all use that specifically addresses the delay since September 2015 to present.
>
> Thank you,
> Lori
>
> Sent from my iPhone

On Nov 1, 2016, at 4:06 PM, Steve Kallin <steve_kallin@fws.gov> wrote:

Thanks Ryan. I believe Lori fully understands the talking points and knows that you told the Jackson Hole News and Guide that the CCP would be published "in the next month." That's what we (NER) have basically been telling the media and public since last winter. That answer has worn thin and at this point, if we give it again, we will look ridiculous. I was hoping we would actually have something concrete to tell the public about the release of the CCP, during what will likely be a highly charged meeting.

Thank you,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
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steve_kallin@fws.gov

From: Ryan Moehring [mailto:ryan_moehring@fws.gov]
Sent: Tuesday, November 01, 2016 3:29 PM
To: Toni Griffin; Steve Kallin
Cc: Mike Blenden; Maureen Gallagher; Cris Dippel; Lori Iverson; Will Meeks
Subject: RE: FW: CCP

Thanks, Toni. I'm adding Will.

As Toni noted, we are actively working on getting the CCP released. It is hung up w/ HQ. Will made a call earlier today to try to break the log jam and he may have more info.

I told the Jackson News and Guide that we would publish the CCP "in the next month". That printed on 10/19 (http://www.jhnewsandguide.com/news/environmental/elk-refuge-step-down-plan-remains-held-up/article_2ac4ff2c-a9d4-51b8-bd8e-6373bc54a15f.html). I'm hopeful we can keep to that timeframe.

I have attached the most recent talking points that generally address both the CCP and BEMP step-down. If Lori would like to call me prior to the meeting to discuss messaging, she is most welcome to do so.

Thanks,
Ryan

Ryan Moehring

Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Griffin, Toni [mailto:toni_griffin@fws.gov]
Sent: Tuesday, November 01, 2016 3:19 PM
To: Steve Kallin
Cc: Mike Blenden; Maureen Gallagher; Ryan Moehring; Cris Dippel; Lori Iverson
Subject: Re: FW: CCP

Hi All,

The notice of availability (NOA) is in HQ being routed for clearance to publish. Once clearance has been received we will submit the NOA to the Office of the Federal Register. It typically takes 3-4 days to publish the notice after it's received by the Office of the Federal Register. We are ready to distribute the CCP and outreach materials to occur with publication of the NOA.

I've been making inquiries to HQ as to when we may expect the NOA to be cleared but have not received a firm date.

Toni

Toni Griffin
Refuge Planning
Mountain-Prairie Region
U.S. Fish & Wildlife Service
134 Union Blvd
Lakewood, CO 80228
Office Phone: 303/236-4378
Telework: Tuesday, Friday

On Tue, Nov 1, 2016 at 2:21 PM, Steve Kallin <steve_kallin@fws.gov> wrote:
Mike:

Please see Lori's email below. We are working in partnership with the Jackson Hole Public Art organization on a public art project for the Murie Family Park (Visitor Center Park). This project is becoming controversial (of course) with opposition from a small but determined group of local opponents. Lori will likely be asked in tomorrow's meeting about this project being consistent with our long-range planning (CCP).

Does anyone have an update on the release of the CCP. We would like to provide some information about the future of the CCP during this public meeting so we don't appear totally inept. At this point we have the "our

Regional Office has been busy" excuse combined with "we don't know when the CCP will be released." This won't cut it for the local Jackson crowd. We are in the midst of engaging the public on this issue and because we can't provide credible answers to a few basic questions, it appears we are being evasive.

Thanks,

Steve Kallin
Project Leader
National Elk Refuge
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steve_kallin@fws.gov

From: Iverson, Lori [mailto:lori_iverson@fws.gov]
Sent: Tuesday, November 01, 2016 12:34 PM
To: Steve Kallin
Subject: CCP

Steve,
Our NER CCP is very likely to come up at the Public Art Task Force meeting tomorrow as plans are discussed regarding the proposed wildlife viewing platform north of the visitor center. I would like to know the response the regional office would like me to use if I receive questions about the CCP. Specifically, I'd like to know these key talking points:

- When is the CCP expected to be released?
- Why did it take so long for it to be released from the time it was signed in September 2015?

Because this is a very vocal group attending tomorrow's meeting, and they have already been quoted in the newspaper regarding this particular platform project, it's likely they will continue to receive media coverage of their concerns.

My meeting is at 8:00-9:00 am tomorrow. I will likely go straight to the meeting and not stop in the office first. However, I will have my iPhone with me to check email for the appropriate response.

Thanks for offering guidance,
Lori

Lori Iverson
Outreach & Visitor Services
U.S. Fish & Wildlife Service
National Elk Refuge
PO Box 510 / 675 East Broadway
Jackson, WY 83001

Phone: 307.201.5433
Cell: 307.690.4375
Fax: 307.733.9729
lori_iverson@fws.gov
National Elk Refuge photo gallery
National Elk Refuge web site
Twitter: @NatlElkRefuge

"Of all the paths you take in life, make sure a few of them are dirt." - John Muir

From:	Google Calendar on behalf of Natalie Sexton
To:	steve_kallin@fws.gov
Subject:	NER public involvement discussion
Attachments:	invite.ics

This event has been canceled and removed from your calendar.

NER public involvement discussion

CALL IN #

877.953.1501
3457210#

When
Fri Nov 4, 2016 3pm – 3:45pm Mountain Time
Video call
HYPERLINK "https://plus.google.com/hangouts/_/doi.gov/natalie-sexton?
hceid=bmF0YWxpZV9zZXh0b25AZndzLmdvdg.i3vo0lm3caj2uunmknfb6r3ovc"https://plus.google.com/hangouts/_/doi.gov/natalie-sexton
Calendar
steve_kallin@fws.gov
Who
• natalie_sexton@fws.gov
- organizer
• will_meeks@fws.gov
• steve_kallin@fws.gov
• mike_blenden@fws.gov
Invitation from HYPERLINK "https://www.google.com/calendar/"Google Calendar

You are receiving this email at the account steve_kallin@fws.gov because you are subscribed for cancellations on calendar steve_kallin@fws.gov.

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National Elk Refuge

Jackson, Wyoming

Nestled below the majestic Teton Range, adjacent to the historic gateway town of Jackson, the National Elk Refuge provides crucial big game wintering habitat in the Greater Yellowstone Ecosystem. Across the refuge's grassland, wetland, woodland, and sagebrush shrubland communities, visitors view wintering elk and other wildlife populations that are balanced with their habitats. The public enjoys quality hunting and fishing as well as year-round interpretative opportunities. Effective outreach and strong public and private partnerships ensure understanding and protection of refuge resources for future generations.



The final National Elk Refuge Comprehensive Conservation Plan is now available.

The U.S. Fish and Wildlife Service recently completed the National Elk Refuge's comprehensive conservation plan, a long-term planning effort that will guide management of the refuge over the next 15 years.

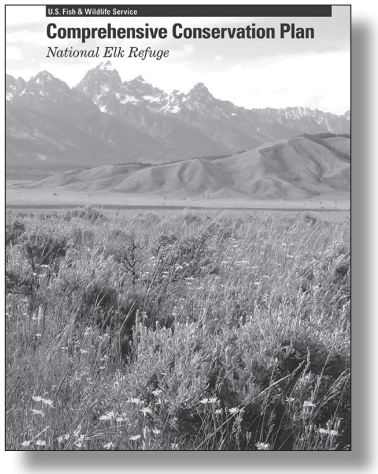
To learn more about the plan, please visit:

http://www.fws.gov/mountain-prairie/refuges/wy_ner.php

To receive a copy of the plan, please contact Toni Griffin, Acting Branch Chief, U.S. Fish and Wildlife Service, Region 6:

Email:
toni_griffin@fws.gov

Phone:
303 / 236 4378



News Release

U.S. FISH AND WILDLIFE SERVICE
Mountain-Prairie Region
134 Union Boulevard
Lakewood, Colorado 80228

For Immediate Release
November 14, 2016

Management Plan Completed for National Elk Refuge

Contact: Ryan Moehring, (303) 236-0345, Ryan_Moehring@fws.gov

LAKEWOOD, Colo. – The U.S. Fish and Wildlife Service (Service) has released a final Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) that will guide management of the National Elk Refuge (Refuge) in Jackson Hole, Wyoming for the next 15 years. The management decisions included in the CCP are a result of thorough environmental review and input from the local community and other stakeholders.

A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation, photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.

The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in the Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the Refuge, including supplemental feeding. Instead, the CCP addresses all other aspects of refuge management including migratory bird conservation, threatened and endangered species recovery, habitat management, visitor use, and management of cultural resources.

The final CCP/EA is available online here: https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. Hard copies are available at the refuge administrative offices located at 675 E. Broadway in Jackson. For questions about the CCP/EA, please call 307-733-9212.

Established in 1912, the National Elk Refuge spans approximately 25,000 acres and provides wildlife with a variety of habitat types, including grassy meadows, marshes, forest, sagebrush, and rock outcrops. Although the Refuge is best known for the largest herd of wintering elk in the world, nearly 175 species of birds and at least 47 mammal species have been observed on the Refuge. A free-roaming bison herd also winters at the Refuge. Each year, roughly 500,000 people visit the National Elk Refuge to enjoy the views and charismatic wildlife.

To learn more about the refuge,
visit: https://www.fws.gov/refuge/National_Elk_Refuge/about.html.

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. We are both a leader and trusted partner in fish and wildlife conservation, known for our scientific excellence, stewardship of lands and natural resources, dedicated professionals, and commitment to public service.

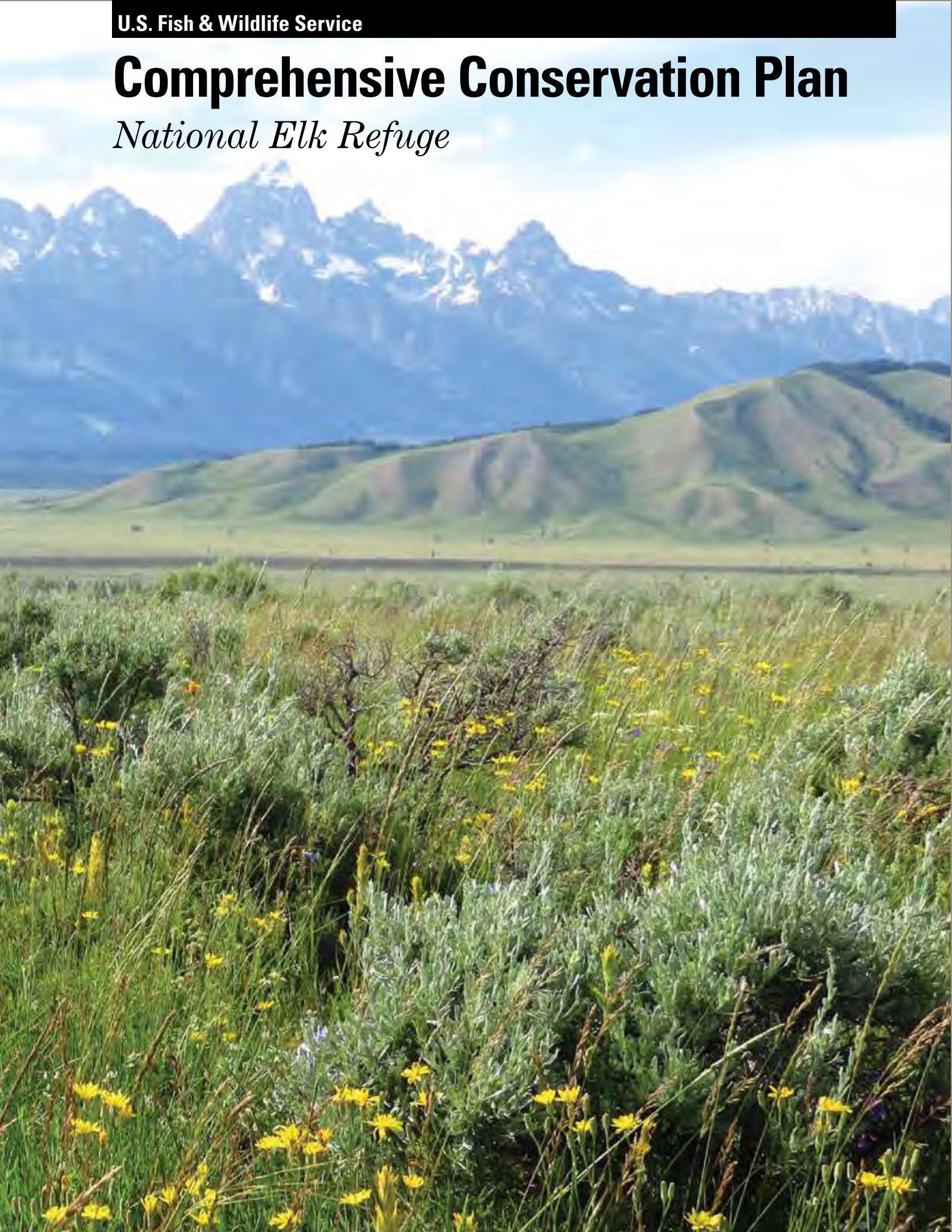
For more information on our work and the people who make it happen, visit http://www.fws.gov/mountain-prairie/. Connect with our Facebook page at http://www.facebook.com/USFWSMountainPrairie, follow our tweets at http://twitter.com/USFWSMtnPrairie, watch our YouTube Channel at http://www.youtube.com/usfws and download photos from our Flickr page at http://www.flickr.com/photos/usfwsmtnprairie/.

– FWS –

U.S. Fish & Wildlife Service

Comprehensive Conservation Plan

National Elk Refuge



The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people.





The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Cover photograph of the National Elk Refuge, Wyoming.
Ann Hough / FWS

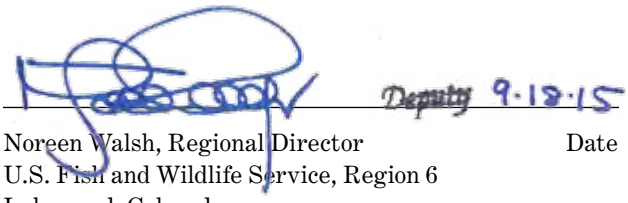
Comprehensive Conservation Plan

National Elk Refuge

Wyoming

September 2015

Approved by



Noreen Walsh, Regional Director — Date
U.S. Fish and Wildlife Service, Region 6
Lakewood, Colorado

Prepared by

National Elk Refuge
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U.S. Fish and Wildlife Service
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Comprehensive Conservation Plan

National Elk Refuge

Wyoming

Submitted by

Steve Kallin 7/20/2015

Steve Kallin — Date
Refuge Manager
National Elk Refuge
Jackson, Wyoming

Concurred with by

Michael Blenden 7/27/2015

Michael Blenden — Date
Refuge Supervisor, Region 6
U.S. Fish and Wildlife Service
Lakewood, Colorado

10/4/15

Will Meeks — Date
Assistant Regional Director
U.S. Fish and Wildlife Service, Region 6
National Wildlife Refuge System
Lakewood, Colorado

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Summary



Tony Hough / FWS

Elk

Nestled in the valley known as Jackson Hole in northwestern Wyoming, the National Elk Refuge is one of the oldest national wildlife refuges—established in 1912 as a "winter game (elk) reserve." Over the years, its purpose has been broadened to include "refuges and breeding grounds for birds, other big game animals, the conservation of fish and wildlife, and the protection of natural resources and conservation of threatened or endangered species." As the U.S. Fish and Wildlife Service, we manage this 24,777-acre national wildlife refuge as part of the National Wildlife Refuge System.

We have developed this comprehensive conservation plan for the National Elk Refuge to provide long-term guidance for management decisions, help achieve the goals needed to accomplish the purposes of the refuge including the enhancement of Flat Creek, and describe our best estimate of future needs. We will use this plan, along with the Bison and Elk Management Plan (2007), as guidance for managing the refuge over the next 15 years. The Bison and Elk Management Plan was finalized in April 2007 after a 9-year public process. This comprehensive conservation plan will complement, not replace, the Bison and Elk Management Plan.

A stepdown management plan is currently being drafted for the Bison and Elk Management Plan. This plan will outline, consistent with the Bison and Elk Management Plan, guidance to adaptively manage bison and elk herds to meet the goals and objectives outlined in the Bison and Elk Management Plan. Public comments will be solicited before the stepdown management plan is finalized.

The Refuge

The National Elk Refuge was established in response to severe elk starvation in Jackson Hole. The development of the town of Jackson and settlement of the valley by cattle ranchers substantially reduced historical elk winter range and led to mas-

sive elk starvation during the winters of 1909 and 1910. At the request of the State of Wyoming, the U.S. Congress first appropriated $20,000 on March 4, 1911, for "feeding, protecting and removing elk in Jackson Hole and vicinity."

Habitat and Wildlife

The refuge lies in the Greater Yellowstone Ecosystem, which is one of the last remaining nearly intact ecosystems in the northern temperate zone. The Gros Ventre River is the largest watercourse on the refuge and is among the river segments designated as wild and scenic by the Craig Thomas Snake Headwaters Legacy Act of 2008.

Flat Creek and its associated marshlands are integral for the natural recruitment of native trout for the Snake River watershed. Flat Creek provides a native fishery of Snake River cutthroat trout and provides a walk-in and trophy Snake River cutthroat trout fishery. No stocking occurs in Flat Creek, making natural recruitment the only source of native trout. Both Flat and Nowlin Creeks are important spawning and recruitment streams for native trout, and these creeks along with the Gros Ventre River are managed as wild Snake River cutthroat trout fisheries and are important habitat for other native fish species.

Flat Creek Marsh is also an important migratory stopover for waterfowl and shorebird species in the Pacific flyway and breeding habitat for trumpeter swans and other waterfowl. The Flat Creek wetlands provide habitat for the highest density of nesting trumpeter swans in the Greater Yellowstone area.

The Jackson core population area for greater sage-grouse as defined by the State of Wyoming Greater Sage-Grouse Core Area Protection Executive Order 2011-5 overlaps the refuge.

The grizzly bear is federally listed as threatened under the Endangered Species Act, and the greater sage-grouse is a candidate for listing; we have documented both species on the refuge. Refuge grassland and sagebrush shrubland communities support breeding populations of Wyoming species of greatest conservation need, including long-billed curlew and Brewer's sparrow.

The refuge is the terminus of seasonal migrations for four celebrated large mammal species. Part of the Jackson bighorn sheep herd spends the winter on the refuge on Miller Butte and around Curtis Canyon and migrates to summer range in the Gros Ventre Mountains. Portions of the Jackson elk herd migrate from their summer range in Yellowstone National Park to winter on the refuge. The refuge hosts the Jackson bison herd during the winter months, one of only three remaining free-roaming bison herds in North America. Pronghorn summer on the refuge and winter south of Pinedale, Wyoming, making one of the longest mammal migrations in the Western Hemisphere.



BJ Baker / FWS

Red-winged Blackbird

Visitation

The National Elk Refuge is considered one of the "crown jewels" of the Refuge System because of its spectacular scenery, closeness to two iconic national parks (Grand Teton and Yellowstone), and large charismatic populations of seasonal wildlife—especially elk and bison—that people want to stop and watch. The most prominent view of the refuge, which is seen by several million visitors annually as they drive to and from the town of Jackson on U.S. Highway 26/89, is the expansive Flat Creek wetland. Flat Creek's proximity to town, its easy access, and the large average fish size makes it a popular Wyoming creek and nationally recognized fishery.

The Miller House, built in 1898, was one of the early homesteads in the valley. Listed on the National Register of Historic Places in 1969, much of the original house has been restored to period standards and aesthetics, and it is open for tour by the public during the summer.

Our visitor services staff offers year-round programs to incorporate wildlife viewing, photography, interpretation, and environmental education into the visitor experience.



Uinta Ground Squirrel

Vision Statement

Nestled below the majestic Teton Range, adjacent to the historic gateway town of Jackson, the National Elk Refuge provides crucial big game wintering habitat in the Greater Yellowstone Ecosystem. Across the refuge's grassland, wetland, woodland, and sagebrush shrubland communities, visitors view wintering elk and other wildlife populations that are balanced with their habitats. The public enjoys quality hunting and fishing as well as year-round interpretative opportunities. Effective outreach and strong public and private partnerships ensure understanding and protection of refuge resources for future generations.

Goals

We developed this comprehensive conservation plan to address management of the refuge. The draft plan and environmental assessment, released in August 2014, gave the public a chance to review and comment on our evaluation of management alternatives to meet the following refuge goals. These goals will direct our work in achieving the vision and purposes of the refuge and outline approaches for managing the refuge's resources.

Habitat and Wildlife Management Goals

Adaptively manage bison, elk, and other wildlife populations and habitats as outlined in the Bison and Elk Management Plan and the CCP. Contribute to the conservation of healthy native wildlife populations and their habitats. Restore and sustain a native fishery that provides quality fishing opportunities.

Cultural Resources Goal

Preserve and interpret cultural resources in a way that allows visitors to connect to the area's rich history and conservation heritage.

Visitor Services Goal

Enable a diverse audience to understand and appreciate the refuge's wildlife conservation role in Jackson Hole, while safely enjoying year-round opportunities for wildlife-dependent recreation.

Visitor and Employee Safety and Resource Protection Goal

Provide for the safety, security, and protection of visitors, employees, natural and cultural resources, and facilities throughout the refuge.



BJ Baker / FWS

Historic Miller House

Administration Goal

Provide facilities and effectively use and develop staff resources, funding, partnerships, and volunteer opportunities to maintain the long-term integrity of habitats and wildlife resources of the refuge.

Management Direction

The comprehensive conservation plan directs the management of the National Elk Refuge to meet the purposes of the refuge and to address issues.

The plan is intended to be a broad umbrella of general concepts and specific objectives for the refuge over the next 15 years. As the plan is implemented, we will develop stepdown plans with details for carrying out actions needed to achieve objectives.

Abbreviations

Bison and Elk Management Plan	Bison and Elk Management Plan: National Elk Refuge, Grand Teton National Park, and John D. Rockefeller, Jr. Memorial Parkway
B.P.	Before present
CCP	Comprehensive conservation plan
CFR	United States Code of Federal Regulations
EA	Environmental assessment
EIS	Environmental impact statement
FTE	Full-time equivalent (position)
FWS	United States Fish and Wildlife Service
GIS	Geographic Information System
GPS	Global Positioning System
GL	General Schedule classification and pay system for law enforcement officers
GS	General Schedule classification and pay system
Improvement Act	National Wildlife Refuge System Improvement Act of 1997
LCD	Landscape Conservation Design
LCC	Landscape Conservation Cooperative
LIDAR	Light detection and ranging
NPS	National Park Service
Refuge System	National Wildlife Refuge System
Region 6	Mountain-Prairie Region of the U.S. Fish and Wildlife Service
RRS	Refuge Revenue Sharing Act
Service	United States Fish and Wildlife Service
SGCN	Wyoming's Species of Greatest Conservation Need
Trumpeter Swan Management Plan	Pacific Flyway Management Plan for the Rocky Mountain Population of Trumpeter Swans (Subcommittee on Rocky Mountain Trumpeter Swans 2012)

U.S.	United States
U.S.C.	United States Code
USDA Forest Service	United States Department of Agriculture, Forest Service
USGS	United States Geological Survey
visitor center	Jackson Hole and Greater Yellowstone Visitor Center
WG	Wage Grade classification and pay system
WGFD	Wyoming Game and Fish Department

A glossary of these and other terms follows chapter 4.

Chapter 1—Introduction



FWS

Bison

As the United States (U.S.) Fish and Wildlife Service, we manage the National Elk Refuge in northwestern Wyoming (see figure 1). This 24,777-acre national wildlife refuge is nestled in the valley known as Jackson Hole and is part of the National Wildlife Refuge System (Refuge System). The refuge lies centrally in the Greater Yellowstone Ecosystem, a mosaic of Federal, State, and private lands totaling 18 million acres that encompass the largest concentration of wild ungulates (hoofed mammals) and large carnivores in the lower 48 States.

We developed this comprehensive conservation plan (CCP) to provide a foundation for the management and use of the National Elk Refuge. To address the long-term management of the refuge, we developed a draft CCP and environmental assessment (EA), which was released in August 2014, for the public to review our evaluation of management alternatives.

This CCP specifies the necessary actions to achieve the purposes and vision of the refuge. Wildlife and habitat are the primary priorities in refuge management, and public use (including wildlife-dependent recreation) is allowed and encouraged as long as it is compatible with the purposes of the refuge.

The CCP will serve as a working guide for management programs and activities throughout the National Elk Refuge over the next 15 years. Although this document contains management direction for the refuge, detail will be provided in step-down management plans as part of implementing the final CCP.

This chapter introduces the process for development of the CCP, including descriptions of our involvement and that of the State of Wyoming, the public, and others. Chapter 1 also describes the conservation issues and the national, regional, State, and local plans that affect the refuge.

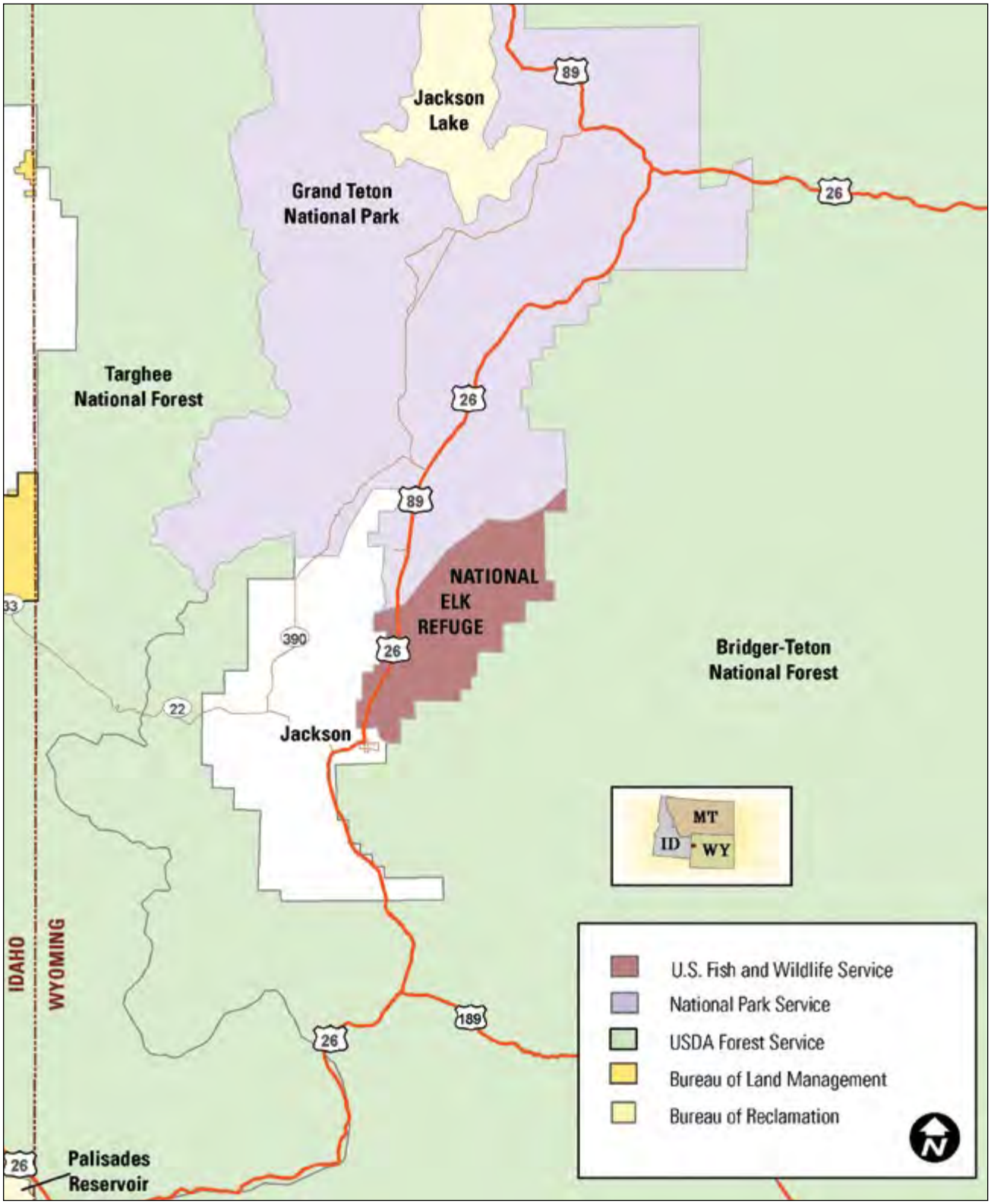


Figure 1. Vicinity map of the National Elk Refuge, Wyoming.

The remaining chapters contain the information we used and the results of our analysis that are the foundation of the CCP:

- Chapter 2 describes the refuge and planning issues.
- Chapter 3 describes the physical, biological, and social environment of the refuge.
- Chapter 4 describes objectives and strategies for all aspects of managing the refuge.

1.1 Purpose of and Need for the Plan

The purpose of the CCP is to describe the role that the National Elk Refuge will play in support of the mission of the Refuge System and to provide long-term guidance for managing programs and activities. The CCP is needed to help us achieve the following:

- communication with the public and other partners in efforts to carry out the mission of the Refuge System
- a clear statement of direction for managing the refuge
- an understanding by neighbors, visitors, and government officials of our management actions on and around the refuge
- management actions on the refuge that are consistent with the mandates of the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act)
- management of the refuge that is consistent with Federal, State, and county plans
- a basis for development of budget requests for the refuge's operation, maintenance, and capital improvement needs

In addition, the final CCP incorporates an analysis of the Flat Creek enhancement project, a large effort to improve the creek's habitat and the fishery it supports, as proposed under alternative D.

Sustaining the Nation's fish and wildlife resources is a task that can be accomplished only through the combined efforts of governments, businesses, and private citizens.

The Decision Made

The Regional Director for the Mountain-Prairie Region of the Service has chosen a preferred alternative for management of all refuge programs; this alternative has guided completion of the final CCP. The management direction in this final CCP will not conflict with management approved in the Bison and Elk Management Plan.

1.2 The U.S. Fish and Wildlife Service and the Refuge System

The U.S. Fish and Wildlife Service is the principal Federal agency responsible for fish, wildlife, and plant conservation, and the National Wildlife Refuge System is one of our major programs.

U.S. Fish and Wildlife Service

The mission of the U.S. Fish and Wildlife Service, working with others, is to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people.

In the late 19th and early 20th centuries, America's fish and wildlife resources were declining at an alarming rate, largely because of unrestricted market hunting. Concerned citizens, scientists, and hunting and fishing groups came together and generated the political will for the first significant conservation measures taken by the Federal Government. These actions included the establishment of the Bureau of Fisheries in the 1870s and, in 1904, passage of the first Federal wildlife law—the Lacey Act—which prohibited interstate transportation of wildlife taken in violation of State laws. Beginning in 1903, President Theodore Roosevelt created more than 50 national wildlife refuges across the Nation.

Over the next three decades, the United States ratified the Migratory Bird Treaty with Great Britain, and Congress passed laws to protect migratory birds, establish new refuges, and create a funding source for refuge land acquisition. In 1940, the U. S. Fish and Wildlife Service was created within the U.S. Department of the Interior, and existing Federal wildlife functions including law enforcement, fish management, animal damage control, and national wildlife refuge management were combined into a single organization for the first time.

Today, we enforce Federal wildlife laws, manage migratory bird populations, restore nationally significant fisheries, conserve and restore vital wildlife habitat, protect and recover endangered species, and help other governments with conservation efforts. In addition, we administer a Federal aid program that distributes hundreds of millions of dollars to States for fish and wildlife restoration, boating access, hunter education, and related programs across the United States.

National Wildlife Refuge System

In 1903, President Theodore Roosevelt designated the 5.5-acre Pelican Island in Florida as the Nation's first national wildlife refuge for the protection of native nesting birds. This was the first time the Federal Government had set aside land for wildlife. This small but significant designation was the beginning of the National Wildlife Refuge System.

One hundred years later, the Refuge System has become the largest collection of lands in the world specifically managed for wildlife, encompassing more than 150 million acres within 560 refuges and more than 3,000 small areas for waterfowl breeding and nesting. Today, there is at least one refuge in every State and in Puerto Rico and the U.S. Virgin Islands.

Mission

The Improvement Act established a clear mission for the Refuge System:

> *The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.*

The Improvement Act states that each national wildlife refuge (meaning every unit of the Refuge System including wetland management districts and conservation areas) must be managed to do the following:

- fulfill the mission of the Refuge System
- fulfill the individual purposes of each refuge
- consider the needs of fish and wildlife first
- support the biological integrity, diversity, and environmental health of the Refuge System
- recognize that wildlife-dependent recreation activities including hunting, fishing, wildlife observation, photography, environmental education, and interpretation are legitimate and priority public uses
- retain the authority of refuge managers to determine compatible public uses
- fulfill the requirement of developing a CCP for each unit of the Refuge System and fully involve the public in preparation of these plans

In addition to the mission for the Refuge System, the wildlife and habitat vision for each unit of the Refuge System supports the following principles:

- Wildlife comes first.
- Ecosystems, biodiversity, and wilderness are vital concepts in refuge management.
- Habitats must be healthy.
- Growth of refuges must be strategic.

The Refuge System serves as a model for habitat management with active participation from other interested parties. Following passage of the Improvement Act, the Service immediately began to carry out the direction of the new legislation including preparation of CCPs for all national wildlife refuges and wetland management districts. Consistent with the Improvement Act, the Service prepares CCPs in conjunction with public involvement.

People and the Refuge System

The Nation's fish and wildlife heritage contributes to the quality of American lives and is an integral

part of the country's greatness. Wildlife and wild places have always given people special opportunities to have fun, relax, and appreciate the natural world.

Whether through birdwatching, fishing, hunting, photography, or other wildlife pursuits, wildlife recreation contributes millions of dollars to local economies. In particular, money generated from a tax on the sale of sporting arms and ammunition and the sale of fishing equipment that is authorized by the Pittman-Robertson and Dingell-Johnson Acts, respectively, has generated tens of millions of dollars. Distributed by us, this money has been used by States to manage wildlife and fish populations, expand habitat, and provide education for hunters across the Nation. Approximately 35 million people visited the Refuge System in 2006, mostly to observe wildlife in their natural habitats (Caudill and Henderson 2005). Visitors are most often accommodated through nature trails, auto tours, interpretive programs, and hunting and fishing opportunities. Substantial economic benefits are being generated for the local communities that surround refuges and wetland management districts. Economists report that Refuge System visitors contribute more than $1.7 billion annually to local economies.

1.3 National and Regional Mandates

Refuge System units (national wildlife refuges, wetland management districts, and conservation areas) are managed to achieve the mission and goals of the Refuge System along with the designated purpose of the refuges as described in establishing legislation, Executive orders, or other establishing documents. The key concepts and guidance for the Refuge System are in the National Wildlife Refuge System Administration Act of 1966, Title 50 of the U.S. Code of Federal Regulations (CFR), the "Fish and Wildlife Service Manual," and the Improvement Act.

The Improvement Act amends the Refuge System Administration Act by providing (1) a unifying mission for the Refuge System, (2) a new process for determining compatible public uses on refuges and districts, and (3) a requirement that each refuge and district be managed under a CCP. The Improvement Act states that wildlife conservation is the priority on Refuge System lands and that the Secretary of the Interior will make sure that the biological integrity, diversity, and environmental health of refuge lands are maintained. Each refuge must be managed to fulfill the Refuge System's mission and the specific purposes for which the unit was established. The Improvement Act requires the Service to monitor the status and trends of fish, wildlife, and plants in each national wildlife refuge and wetland management district.

A detailed description of these and other laws and Executive orders that may affect the CCP or the Service's implementation of the CCP is in "Appendix A—Key Legislation and Policy." Service policies for planning and day-to-day management of refuges and districts are in the "Refuge System Manual" and the "Fish and Wildlife Service Manual."

1.4 Refuge Contributions to Regional and National Plans

The National Elk Refuge contributes to the conservation efforts outlined in the various State and national plans described here.

Conserving the Future

"Conserving the Future: Wildlife Refuges and the Next Generation" lays out 24 recommendations that 9 implementation teams are charged with fulfilling. The implementation of these recommendations is currently underway and can be followed online (FWS 2011).

Conserving the Future will deliver on three outcomes: articulate the important work and future of the Refuge System in a vision document, raise the awareness of conservation on refuges, and foster new leaders for us and the Refuge System as well as for the conservation community.

Partners in Flight

The Partners in Flight program began in 1990 with the recognition of declining population levels of many migratory bird species. The challenge is to manage human population growth while maintaining functional natural ecosystems in the face of human population growth. To meet this challenge, Partners in Flight worked to identify priorities for landbird species and habitat types. Partners in Flight activity has resulted in 52 bird conservation plans covering the continental United States.

In 2001, participants in Wyoming Partners In Flight, the State working group of Partners In Flight, developed the Wyoming Bird Conservation

Plan as part of the international Partners In Flight effort. Bird species found in Jackson Hole that are designated as level 1 (conservation action) and confirmed on the National Elk Refuge follow: Brewer's sparrow, greater sage-grouse, trumpeter swan, long-billed curlew, peregrine falcon, bald eagle, and Franklin's gull.

Pacific Flyway Management Plan for the Rocky Mountain Population of Trumpeter Swans

The "Pacific Flyway Management Plan for the Rocky Mountain Population of Trumpeter Swans" provides broad direction to the States, the Service, and other interests engaged in cooperative management of this population. The plan has been periodically updated to address evolving management challenges and to incorporate new information. The Pacific Flyway Council approved the most recent revision in 2012.

Trumpeter swans are native only to North America. Although no historical estimates of their abundance are available, by 1900 they had been eliminated from most of their historical range in the United States and Canada. Through habitat conservation, protection from illegal shooting, supplemental winter feeding, and re-introduction and translocation efforts, trumpeter swans have increased from a few hundred birds to nearly 35,000. To facilitate monitoring and management, the Service and the Canadian Wildlife Service designated three populations: the Pacific Coast, Rocky Mountain, and Interior. The Rocky Mountain Population increased from fewer than 200 in the early 1930s to 4,701 in February 2007.

The goal of the management plan is to restore the Rocky Mountain Population as a secure and primarily migratory population, sustained by naturally occurring and agricultural food resources in diverse breeding and wintering sites. Management objectives are: (1) continue to encourage swans to use wintering areas outside of the core Tri-state Area while reducing the number of wintering swans in the core Tri-state Area to a maximum of 1,500; (2) rebuild U.S. nesting flocks by year 2013 to at least 165 nesting pairs (birds that display evidence of nesting) and 718 adults and subadults (white birds) that use natural, diverse habitats; (3) expand the breeding range in order to enhance the connectivity of breeding flocks; (4) increase the abundance of desirable submerged macrophytes in the Henry's Fork of the Snake River in and near Harriman State Park; (5) promote the restoration and development of high quality wetland habitats for breeding and wintering swans; and (6) monitor the population.

Trumpeter swans are year-round residents on refuge wetlands. During the planning process we considered the Pacific Flyway Management Plan for the Rocky Mountain Population of trumpeter swans and developed an objective in the CCP to institute a monitoring program to evaluate the effects of habitat management activities on trumpeter swans.

North American Waterbird Conservation Plan

The "North American Waterbird Conservation Plan" (Kushlan et al. 2002) provides a contiguous framework for conserving and managing colonial-nesting waterbirds including 209 species of seabirds, coastal waterbirds (gulls, terns, and pelicans), wading birds (herons and ibises), and marshbirds (certain grebes and bitterns). The geographic scope of the plan covers 28 countries from Canada to Panama as well as islands and near-shore areas of the Atlantic and Pacific Oceans, the Gulf of Mexico, and the Caribbean Sea. As with Partners in Flight and other migratory bird plans, the North American Waterbird Conservation Plan has a goal to establish conservation action and exchange information and expertise with other bird conservation initiatives. The plan also calls for establishment of "practical units for planning" for terrestrial habitats; the National Elk Refuge is located within the Intermountain West.

North American Waterfowl Management Plan

Written in 1986, the North American Waterfowl Management Plan (FWS and Canadian Wildlife Service 1986) envisioned a 15-year effort to achieve landscape conditions that could sustain waterfowl populations. Specific plan objectives are to increase and restore duck populations to the average levels of the 1970s: 62 million breeding ducks and a fall flight of 100 million birds (FWS and Canadian Wildlife Service 1986). Recognizing the importance of waterfowl and wetlands to North Americans and the need for international cooperation to help in the recovery of a shared resource, the United States and Canadian Governments developed a strategy to restore waterfowl populations through habitat protection, restoration, and enhancement. The plan is innovative

because of its international scope and its implementation at the regional level.

The plan's success depends on the strength of partnerships called joint ventures, which involve Federal, State, provincial, tribal, and local governments; businesses; conservation organizations; and individual citizens. Joint ventures are regional, self-directed partnerships that carry out science-based conservation through a wide array of community participation. Joint ventures develop implementation plans that focus on areas of concern identified in the plan.

The National Elk Refuge lies within the Intermountain West Joint Venture. Throughout the planning process, we considered the North American Waterfowl Management Plan and the supporting efforts of the Intermountain West Joint Venture, which the CCP supports and promotes.

Recovery Plans for Federally Listed as Threatened or Endangered Species

One species that is federally listed as threatened, grizzly bear, and one candidate species, greater sage-grouse, have been documented at the National Elk Refuge. To make sure that the conservation of listed and candidate species is adequately considered in this document, we conducted a biological evaluation of their actions per section 7 of the Endangered Species Act.

If, during the life of this CCP, listed species are discovered on the refuge or new species are listed, we will make sure that the refuge takes part in any approved recovery plans. We will also conduct an Intra-Service Section 7 Consultation on refuge management activities that might affect the listed or candidate species.

Wyoming State Wildlife Action Plan

The Wyoming Game and Fish Commission adopted the State's Comprehensive Wildlife Conservation Strategy in 2005. The Wyoming Game and Fish Department (WGFD) revised the strategy in 2010 (WGFD 2010a), at which time it became known as the Wyoming State Wildlife Action Plan. The action plan is a broad strategy designed to coordinate efforts to maintain the health and diversity of wildlife in Wyoming and to prevent future listings under the Endangered Species Act. The Wyoming State Wildlife Action Plan is part of a national framework of plans that are required by each State to receive State Wildlife Grant money, which is a program enacted by Congress in 2001 and that we administer.



Ann Hough / FWS

Canada Goose Gosling

The 2010 State wildlife action plan identifies 180 "species of greatest conservation need" (SGCN) in Wyoming: 56 birds, 46 mammals, 30 fish, 8 amphibians, 21 reptiles, 5 crustaceans, and 14 mollusks. Many of these species are nongame species that have received little conservation attention in the past and for which species data may be unavailable. The action plan describes the modeled distribution and abundance of these species and uses a three-tier system to rank them according to conservation priority.

In addition to SGCN, the Wyoming State Wildlife Action Plan identifies five leading conservation challenges in the State: (1) rural subdivision and development; (2) energy development; (3) invasive species; (4) climate change; and (5) the disruption of natural disturbance regimes. Additionally, the action plan identifies and makes conservation recommendations for 11 terrestrial habitat types and 6 aquatic basins in

Wyoming in terms of the SGCN that may be found there. Important habitat types in Jackson Hole identified in the action plan include wetlands, riparian areas, aspen and deciduous forests, foothill shrublands, montane and subalpine forests, mountain grasslands, and sagebrush shrublands.

Important terrestrial SGCN found in Jackson Hole are peregrine falcon, long-billed curlew, Lewis's woodpecker, black tern, white-faced ibis, merlin, Caspian tern, harlequin duck, bald eagle, trumpeter swan, big brown bat, fringed myotis, little brown myotis, long-eared myotis, long-legged myotis, boreal toad, moose, wolverine, Canada lynx, dwarf shrew, and vagrant shrew. Important aquatic SGCN found in Jackson Hole are bluehead sucker, mountain sucker, mountain whitefish, and Snake River cutthroat trout.

Wyoming Greater Sage-Grouse Conservation Plan

On March 5, 2010, we concluded that the greater sage-grouse warrants protection under the Endangered Species Act, but listing is precluded by the need to take action on other species facing more immediate and severe extinction threats. In 2008, we adopted the "Upper Snake River Sage-Grouse Conservation Plan" (WGFD 2014) and provide the framework for local working groups to guide management efforts directed at halting long-term population declines. Our refuge staff takes part in local working group meetings, and we consider the recommended management practices in the plan when developing management practices and plans on the refuge.

The National Elk Refuge lies within the Jackson core population area of the Jackson greater sage-grouse as designated by the State of Wyoming Greater Sage-Grouse Core Area Protection Executive Order (2011–5), signed by Governor Matt Mead in June 2011. Executive Order 2011–5 was issued by Governor Mead to update the process and policy embodied in former Governor Dave Freudenthal's Executive Order 2008–2 and Executive Order 2010–4. The State established core population areas, in addition to stipulations for development on lands within those core areas, to build a statewide strategy to conserve the greater sage-grouse across Wyoming and to prevent the species from being listed for protection under the Endangered Species Act.

Bison and Elk Management Plan

Approved in 2007, the "Bison and Elk Management Plan: National Elk Refuge, Grand Teton National Park, and John D. Rockefeller, Jr. Memorial Parkway" (FWS and NPS 2007a) is referred to throughout this document as the Bison and Elk Management Plan. The purpose of the plan is to provide managers with goals, objectives, and strategies for managing elk and bison on the National Elk Refuge and in Grand Teton National Park. Goals and strategies were developed for the following:

- habitat conservation
- sustainable populations
- numbers of elk and bison
- disease management

In general, the plan moves elk and bison management toward reduced reliance on supplemental feeding and, at some future time, total reliance on natural forage. Management actions taken to date have focused on disease monitoring, reducing elk and bison herd sizes through public hunting, and increasing natural, standing winter forage through expanded irrigation. Management goals and actions approved in the Bison and Elk Management Plan apply to the National Elk Refuge, and we refer to them throughout the final CCP. Because the CCP will supplement the Bison and Elk Management Plan, we do not repeat the plan's objectives in the CCP.

Greater Yellowstone Coordinating Committee

The refuge has been a member of the Greater Yellowstone Coordinating Committee since 2002. Members include national wildlife refuge managers, national park superintendents, and national forest supervisors for units within the ecosystem. A memorandum of understanding provides a vehicle for cooperation and coordination in the management of Federal lands in the Greater Yellowstone Ecosystem. The committee's land managers periodically identify resource management issues where coordination across the Greater Yellowstone Ecosystem is desirable.

Responding to Accelerating Climate Change

We expect that accelerating climate change may have profound effects on the Nation's fish, wildlife, and plant resources. While many species will continue to thrive, some may decline and in some instances go extinct. Others will survive in the wild only through direct and continuous intervention by managers. In 2010, we finalized a strategic plan (FWS 2010) to address climate change for the next 50 years. This strategic plan employs three key strategies: adaptation, mitigation, and engagement. In addition, the plan acknowledges that no single organization or agency can address climate change without allying itself with others in partnership across the Nation and around the world. This plan is an integral part of the U.S. Department of the Interior's strategy for addressing climate change as expressed in Secretarial Order 3289 (September 14, 2009).

The Department of the Interior's Climate Change Adaptation Policy (523 DM 1) was issued in December 2012 in response to the need to prepare for the impacts of climate change. The policy articulates and formalizes the Department's approach to climate change adaptation and provides guidance to bureaus and offices for addressing climate change impacts on the Department's mission, programs, operations, and personnel. The new policy also establishes clear Departmental leadership responsibilities for climate change adaptation implementation.

We use the following guiding principles from this strategic plan in responding to climate change:

- Priority Setting—Continually evaluate priorities and approaches, make difficult choices, take calculated risks, and adapt to climate change.
- Partnership—Commit to a new spirit of coordination, collaboration, and interdependence with others.
- Best Science—Reflect scientific excellence, professionalism, and integrity in all our work.
- Landscape Conservation—Emphasize the conservation of habitats within sustainable landscapes, applying our strategic habitat conservation framework.
- Technical Capacity—Assemble and use state-of-the-art technical capacity to meet the climate change challenge.
- Global Approach—Be a leader in national and international efforts to meet the climate change challenge.

1.5 Landscape-Scale Conservation

In the face of escalating challenges such as land use conversion, invasive species, water scarcity, and refuge complex issues that have been amplified by accelerating climate change, our ecosystem approach of thinking about conservation has evolved to developing a broader vision—strategic habitat conservation. Landscape conservation cooperatives will facilitate how we carry out strategic habitat conservation.

Strategic Habitat Conservation

A cooperative effort between us and the U.S. Geological Survey culminated in a report by the National Ecological Assessment Team (USGS 2006). The report outlines a unifying adaptive resource management approach for conservation at a landscape scale for the entire range of a target species or suite of species. This is strategic habitat conservation—a way of thinking and doing business by incorporating biological goals for target species populations, by making strategic decisions about the work needed, and by constantly reassessing (figure 2).



Figure 2. The strategic habitat conservation process.



Figure 3. Map of the Great Northern Landscape Conservation Cooperative in North America.

We used this framework as the basis to locate the first generation of landscape conservation cooperatives. These cooperatives are conservation-science partnerships between us and other Federal agencies, States, tribes, nongovernmental organizations, universities, and others. Designed as fundamental units for planning and science, the cooperatives have the capacity to help us carry out the elements of strategic habitat conservation—biological planning, conservation design and delivery, and monitoring and research. Coordinated planning and scientific information strengthens our strategic response to accelerating climate change.

Landscape Conservation Cooperatives

Strategic habitat conservation is a means of applying adaptive resource management across large landscapes. The National Elk Refuge lies within the Service's Great Northern Landscape Conservation Cooperative (figure 3). This landscape conservation cooperative covers the mountain and transitional habitats in Montana, Idaho, Wyoming (including the upper Green River Basin in southern Wyoming and small parts of Colorado and Utah), and parts of the Interior Columbia Plateau reaching into Oregon and Washington westward to the Cascade Range. The Great Northern Landscape Conservation Cooperative also covers the international landscapes of interior British Columbia and Alberta, Canada, and covers the entirety of the northern Rocky Mountains and midcontinent lowlands of the Interior Northwest.

The landscape conservation cooperative has identified the following priority species: bull trout, grizzly bear, Lewis's woodpecker, trumpeter swan, westslope cutthroat trout, Arctic grayling, wolverine, willow flycatcher, greater sage-grouse, burrowing owl, and Columbia spotted frog. Two of these species, trumpeter swan and greater sage-grouse, use the refuge.

As the Great Northern Landscape Conservation Cooperative continues to develop, an overarching priority is to serve as a convening body to bring together partners to address existing and future issues related to climate change and landscape-scale conservation.

1.6 The Planning Process

The Improvement Act requires us to develop a CCP for each national wildlife refuge. This final plan for the National Elk Refuge will guide the management of the refuge for the next 15 years.

We prepared the draft CCP and EA in compliance with the Improvement Act and part 602 (National Wildlife Refuge System Planning) of the "Fish and Wildlife Service Manual." The actions described in the draft CCP and EA meet the requirements of the Council on Environmental Quality regulations that implement the National Environmental Policy Act of 1969.

Additional requirements and guidance are contained in the Refuge System's planning policy issued in 2000. The policy established requirements and guidance for refuge and district plans, including CCPs and stepdown management plans, to make sure that planning efforts follow the Improvement Act. The planning policy identified several steps of the CCP and environmental analysis process (figure 4).

We began the preplanning process in August 2010 with the establishment of a planning team comprised primarily of staff from the National Elk Refuge and the Region 6 Division of Refuge Planning. Contributors included other Service divisions, the WGFD, Teton County, and the National Park Service (refer to "Appendix B—List of Preparers and Contributors"). During preplanning, the team developed a mailing list and identified internal issues and the unique qualities of the refuge (refer to section "2.5 Special Values" in chapter 2). The planning team identified and reviewed current programs, compiled and analyzed relevant data, and identified the purposes of the refuge.

Public scoping started with a notice of intent to prepare the draft CCP and EA that we published in the Federal Register on October 22, 2010 (75 Federal Register 65370). We distributed information through news releases, issuance of the first planning update, and a public meeting held January 11, 2011, at Snow King Resort in Jackson, Wyoming, from 4 p.m. to 7 p.m.

The planning team encouraged public comment during the planning process through the development and release of the draft CCP and EA. This CCP project complies with public involvement requirements of the National Environmental Policy Act, and the planning team incorporated public input throughout the planning process. During the planning process, the team collected available information about the resources of the refuge and surrounding areas.



Figure 4. Process steps for comprehensive planning and associated environmental analysis.

Table 1. Summary of the comprehensive conservation planning process for the National Elk Refuge, Wyoming.

Date	*Event*	*Outcome or purpose*
August 4–5, 2010	Preplanning meeting	We discussed the initial planning team list, started the mailing list, and discussed the planning schedule and data needs.
October 22, 2010	Notice of intent	We published our notice of intent to prepare a CCP in the Federal Register.
December 10, 2010	Planning team invitations	The Regional Director invited tribal nations, National Park Service, USDA Forest Service, WGFD, and Teton County to join the planning team.
January 11–12, 2011	CCP kickoff and vision and goals meeting	The planning team reviewed the refuge purposes, identified refuge qualities and issues, and developed a draft vision statement and goals for the refuge.
March 14, 2011	Work plan	We completed the work plan of planning tasks.
January 2011	Planning update	We sent Planning Update 1 to people and organizations on the mailing list. The update described the planning process and announced the upcoming public scoping meeting.
January 11, 2011	Public scoping meeting	We held a public meeting in Jackson. The public had an opportunity to learn about the CCP process and provide comments.
February 1– June 7, 2011	Five planning team conference calls	The planning team summarized public comments, identified issues to be addressed in the planning process, and began developing a range of management alternatives for the refuge.
December 13–15, 2011	Alternatives development meeting	The planning team met in Jackson to discuss management alternatives.
March 19–21, 2012	Environmental consequences and selection of proposed action workshop	The planning team met in Jackson to review the environmental consequences for the alternatives and select a proposed action alternative.
June 19–21, 2012	Objectives and strategies work session	The planning team began writing objectives and strategies for the proposed action alternative.
September 2012–July 2013	Draft plan preparation	The planning team prepared the draft CCP and EA.
December 2013	Draft plan internal review	The planning team and other staff reviewed the draft CCP and EA and provided comments to help clarify the analyses and provide consistency.
August 2014	Draft plan preparation	The planning team completed the draft plan for distribution to the public for review.
September 9, 2014	Notice of availability	We published the notice of availability of the draft CCP and EA in the Federal Register.
September 2014	Planning update	We mailed the third planning update to those on our mailing list. The update announced the upcoming public meeting.
September 25, 2014	Public meeting	The public meeting was held in Jackson. The public had an opportunity to meet with refuge staff and provide comments on the draft plan.
November 2014–June 2015	Public comments review	The planning team reviewed the public comments and determined needed changes for the final CCP.
September 2015	CCP approved	The Regional Director selected the preferred alternative, signed the finding of no significant impact, and approved the CCP.
October–April 2016	Final plan preparation	The planning team prepared the final CCP for printing and distribution.



Lori Iverson / FWS

Flat Creek Marsh

This information is summarized in "Chapter 3—Refuge Resources." Table 1 lists the specific steps in the planning process to date for the preparation of the draft CCP and EA and the final CCP.

Coordination with the Public

We prepared a mailing list of more than 90 names during preplanning. The mailing list has private citizens; local, regional, and State government representatives and legislators; other Federal agencies; and interested organizations (refer to "Appendix C—Public Involvement"). The first planning update was distributed through refuge email mailing lists and at the public scoping meeting in January 2011. Information was provided on the history of the refuge and the CCP process and included an invitation to attend the public scoping meeting being held in January. The planning update contained information on how to be placed on the CCP mailing list, and the planning update provided opportunities for submitting comments.

The Service held a public scoping meeting January 11, 2011. Forty people attended the meeting, which was an open-house format with stations set up around and our staff attending each station to provide information and answer questions. We encouraged attendees to ask questions and offer comments. We recorded verbal comments and gave each attendee a comment form to submit other thoughts or questions in writing.

Written comments were due February 10, 2011. We received more than 230 comments orally and in writing during the scoping process. There were letters from eight organizations (Concerned Citizens for the Elk, Defenders of Wildlife, Friends of Pathways, Greater Yellowstone Coalition, Jackson Hole Chamber of Commerce, Jackson Hole Conservation Alliance, Jackson Hole Public Art Initiative, and The Wildlife Society) and four agencies (National Park Service, Teton Conservation District, Teton County, and WGFD). The planning team considered all of the comments throughout the planning process.

State Coordination

At the start of the planning process, our Regional Director (Region 6) sent a letter to WGFD, inviting them to join in the planning process. Two representatives from the WGFD are participating on the planning team.

We sent Planning Update 1 to the offices of the U.S. Representative Cynthia Lummis and U.S. Senators John Barrasso and Mike Enzi to tell them about the planning process and invite them to attend a public scoping meeting and provide comments on issues to be addressed during the planning process. In addition, we sent the planning updates to Wyoming Governor Matt Mead; Wyoming State Senators Leland Christensen and Dan Dockstader; and Wyoming State representatives Keith Gingery, Ruth Petroff, and Jim Roscoe. In addition, we made phone calls during the scoping period inviting the elected offi-

cials to attend the upcoming scoping meeting for the CCP; three local elected officials attended the meeting at the Snow King Resort in Jackson, Wyoming, on January 11, 2011.

Tribal Coordination

Early in the planning process, our Regional Director (Region 6) sent a letter to tribes identified as possibly having a cultural and historical connection to the area in which the National Elk Refuge is located. The letters went to the following tribal councils: Assiniboine and Sioux Tribes of Fort Peck, Cheyenne and Arapaho, Cheyenne River Sioux, Crow Creek Sioux, Lower Brule Sioux, North Arapaho, Northern Cheyenne, Oglala Sioux, Rosebud Sioux, Santee Sioux, Shoshone, Shoshone-Bannock, and Standing Rock Sioux. The tribal councils did not submit responses to the Region 6 letter; nevertheless, we gave the councils opportunities to comment throughout the planning process.

Teton County Coordination

At the start of the planning process, our Regional Director (Region 6) sent a letter to the Teton County Board of Commissioners inviting them to join in the planning process. A representative of Teton County and the City of Jackson is participating on the planning team.

Results of Scoping

We used the comments, collected from scoping meetings and correspondence, in the development of a final list of issues that are addressed in the final CCP. We decided which alternatives could best address these issues. The planning process ensures that we resolve or give priority to issues with the greatest effect on the refuge resources and programs over the life of the final CCP. Chapter 2 contains the issues we identified, along with a discussion of effects on resources. In addition, we considered suggested changes to current refuge management presented by the public and other groups.

The Draft Plan

Availability of the draft CCP and EA for the National Elk Refuge was announced in the Federal Register on September 9, 2014, and comments on this document were collected through October 24, 2014. A public meeting to discuss this plan was announced in a planning update released in September 2014. A meeting was held September 25, 2014, in the local community of Jackson, Wyoming. Meeting attendees were given the opportunity to submit comments. Comments were also collected online, by email, and by mail.

The public commented on the draft CCP and EA during a review period. We recorded all comments, oral and written. The planning team then reviewed them. Some modifications were made to this final CCP based on the public review. Appendix C has more detail about our involvement with the public, including responses to substantive public comments on the draft CCP and EA.

The Final Plan

The plan is intended to be a broad umbrella of general concepts and specific objectives for the refuge over the next 15 years. As the plan is implemented, we will develop stepdown management plans with details for carrying out actions needed to achieve objectives.

Chapter 2—The Refuge



Ann Hough / FWS

Trumpeter Swans

This chapter explains the establishment, management history, purposes, and special values of the National Elk Refuge in northwestern Wyoming along with the final vision and goals and a discussion of the planning issues.

2.1 Establishment, Acquisition, and Management History

The following section describes the refuge's establishment, acquisition, and management history.

Establishment

The National Elk Refuge is one of the oldest refuges in the Refuge System (see figure 5). It was established in 1912 as a "winter game (elk) reserve," but over the years, its purpose has been broadened to include "refuges and breeding grounds for birds, other big game animals, the conservation of fish and wildlife, and the protection of natural resources and conservation of threatened or endangered species."

Acquisition History

When the U.S. Congress appropriated $20,000 on March 4, 1911, for "feeding, protecting and removing elk from the Jackson Hole and vicinity," it also assigned E.A. Preble, scientist for the Bureau of Biological Survey, the task of making a preliminary investigation of the Jackson Hole elk situation. Preble was assisted by D.C. Nowlin (who became the first refuge manager) in assessing the Jackson elk herd and its needs.

Preble and Nowlin conducted an evaluation of that part of the Snake River Valley known as Jackson

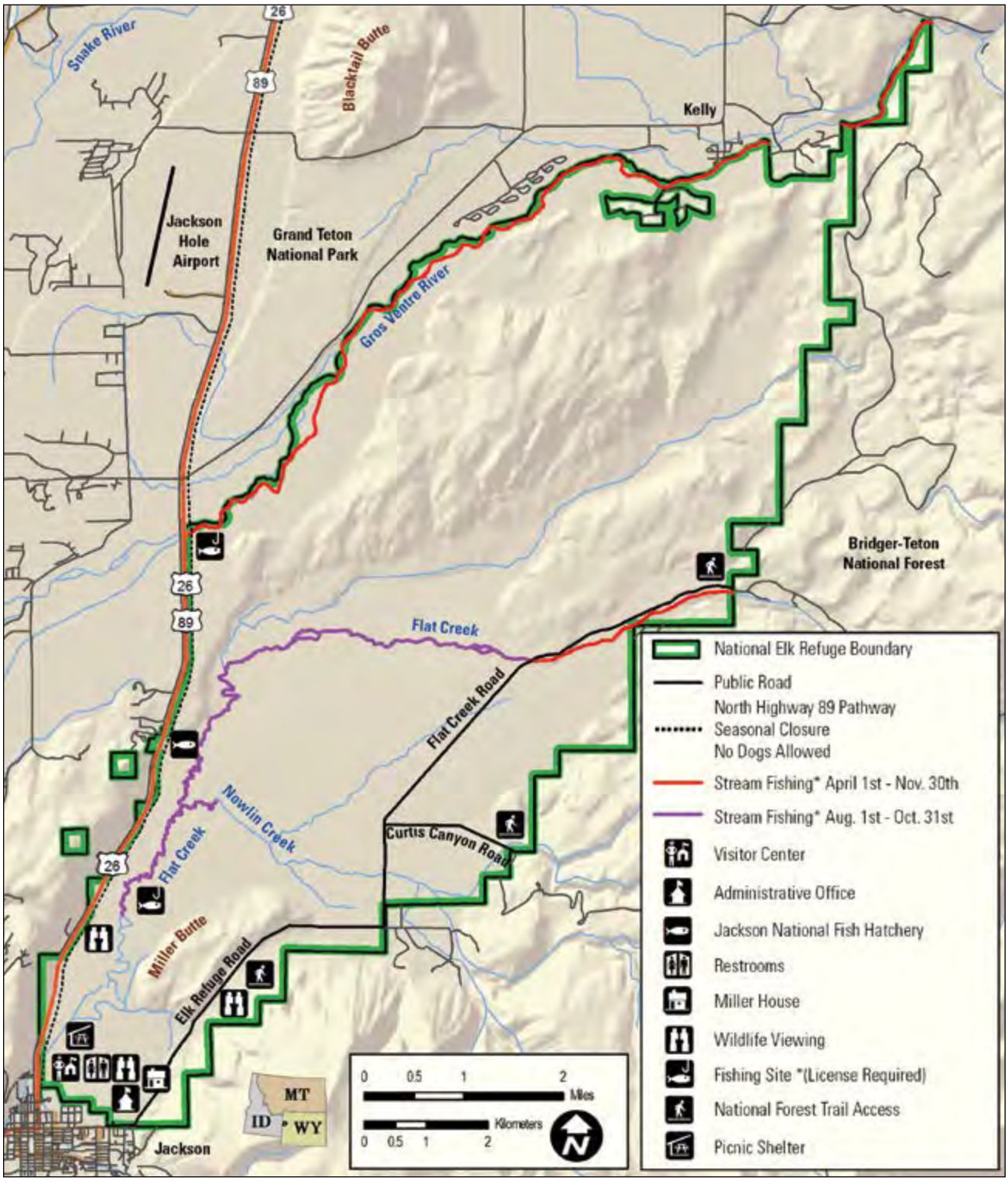


Figure 5. Base map of the National Elk Refuge, Wyoming.

Hole, which extends from Jackson Lake on the north to the mouth of the Hoback River on the south. They also evaluated the Buffalo River and Gros Ventre River valleys. Preble and Nowlin's population estimate was 20,000 elk with an estimated winter mortality of 2,000–2,500. Preble concluded his report with the statement, "The Biological Survey looks on the establishment of one or more winter refuges as the best solution of the problem of properly caring for the elk in winter." He recommended winter elk refuges either in the Gros Ventre River valley or in the Snake River Valley near the town of Jackson. Residents in Jackson strongly opposed the Gros Ventre River valley site but generally supported a location near their town.

On August 10, 1912, the U.S. Congress appropriated $45,000 to buy lands and pay for maintenance of a "winter game (elk) reserve" (37 Stat. 293). The first tract for the National Elk Refuge was bought in 1914. Since that time, we have acquired land primarily through purchase with a few tracts obtained through exchange, donation, or condemnation. Several noteworthy acquisitions have occurred. In 1927, the Isaac Walton League of America donated 1,757 acres, which increased the size of the refuge at that time by 30 percent. The top-priority acquisition listed in our 1965 refuge master plan was an 80-acre tract that occupied a 2.75-mile-long area along the eastern side of State Highway 89. We acquired this tract to prevent any commercial or residential development next to the refuge that would "block and disfigure" the "breathtaking view of the land."

By 1950, the refuge had expanded in size to 23,001 acres. More acquisitions occurred in 1978 and 1986 to prevent the completion of the adjacent Teton Highlands and Teton Ranch subdivisions. Land values in Teton County, especially next to the refuge, began to skyrocket in the 1990s and reached multiple millions of dollars per acre by 2007. These exorbitant land values have prevented all fee-title land acquisition since 1992. Today, the refuge has completely filled its approved acquisition boundary and is 24,778 acres in size. Table 2 summarizes the history of land acquisition for the refuge, and figure 6 shows locations of the land tracts. The refuge is bounded by the town of Jackson on the south, the Gros Ventre River on the north, Highway 89 on the west, and the Bridger-Teton National Forest on the east. Because much of the refuge was comprised from homesteads, areas of the refuge have retained some of these historical names, as shown on figure 7.

Management History

The National Elk Refuge was established in response to severe elk starvation in Jackson Hole. The development of the town of Jackson and settlement of the valley by cattle ranchers substantially reduced historical elk winter range and led to massive elk starvation during the winters of 1909 and 1910. At the request of the State of Wyoming, the U.S. Congress first appropriated $20,000 on March 4, 1911, for "feeding, protecting and removing elk in Jackson Hole and vicinity."

Feeding hay to elk wintering in Jackson Hole was one of the first management activities to occur on what is now the National Elk Refuge. No-feeding years have occurred irregularly and infrequently.

Table 2. Land acquisition history for the National Elk Refuge, Wyoming.

Date of acquisition	*Tract number*	*Final acres*	*Means of acquisition*
3/16/1914	9e, 9f, 9g	1,205.25	Purchase
4/21/1915	1	4,322.27	Primary withdrawal
10/18/1915	121	360	Purchase
10/22/1915	118	160	Purchase
9/26/1927	119, 119a	1,757.38	Donation
7/20/1936	59	240	Purchase
7/21/1936	39	802.74	Purchase
7/23/1936	52	140	Purchase
7/23/1936	68	796	Purchase
7/23/1936	30, 30–I	470.13	Purchase
7/30/1936	7	279.82	Purchase
7/30/1936	58	240	Purchase
7/30/1936	61	160	Purchase
10/31/1936	54	320	Purchase

Table 2. Land acquisition history for the National Elk Refuge, Wyoming.

Date of acquisition	*Tract number*	*Final acres*	*Means of acquisition*
10/31/1936	117	320	Purchase
11/7/1936	56	320	Purchase
1/14/1937	24	237.36	Purchase
4/2/1937	9, 9a, 9b, 9c, 9d	1,471.03	Purchase
4/13/1937	27, a, a–1, a–2, b, c, e	825.97	Purchase
4/28/1937	22	400	Purchase
5/11/1937	25	438.56	Purchase
5/12/1937	44	143.3	Purchase
5/17/1937	72	320	Purchase
5/17/1937	116	160	Purchase
5/17/1937	53, 53a, 53b	800	Purchase
5/24/1937	8	320	Purchase
5/24/1937	40	120.12	Purchase
6/7/1937	58a	160	Purchase
6/8/1937	28	640	Purchase
7/9/1937	34	160	Purchase
12/27/1937	8a	678.64	Condemnation
12/271937	113	160	Condemnation
1/5/1938	11	626.12	Purchase
6/9/1938	120	0.98	Purchase
7/25/1938	36	80	Purchase
11/3/1938	55	230	Purchase
11/21/1939	31, 31a, 31c	42.38	Donation
6/11/1940	2	320	Purchase
11/15/1941	51	220	Purchase
12/16/1949	206, 206a	2,712.97	Donation
2/6/1959	42	160	Land exchange
3/17/1965	122a	460	Land exchange
2/7/1972	123	80.12	Purchase
12/20/1974	124, 124a	111.51	Purchase
8/26/1975	124b	26.07	Purchase
4/18/1977	132	10.31	Purchase
11/16/1978	137	11.78	Purchase
12/14/1978	133, a, b, c, d	245.17	Purchase
9/6/1979	143	16.97	Purchase
7/21/1980	128	5.18	Purchase
2/8/1986	131	5.01	Purchase
3/28/1986	122b	354.26	Primary withdrawal
5/2/1986	154	41.03	Purchase
10/1/1986	130	5	Purchase
10/22/1986	125	50	Purchase
8/5/1991	155	20	Purchase
9/2/1992	124c	10	Purchase
10/1/1992	156	3.87	Purchase

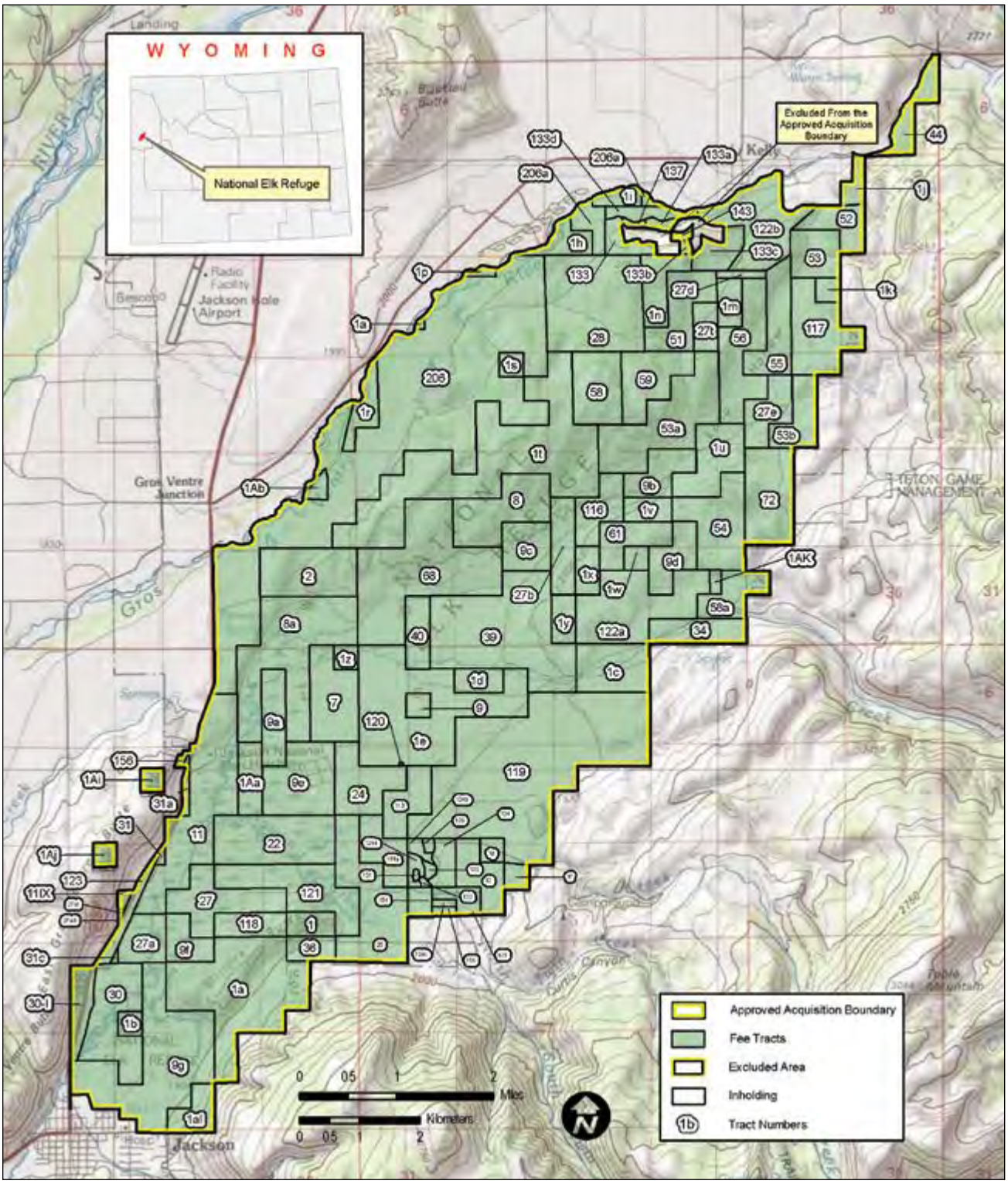


Figure 6. Map of land tracts composing the National Elk Refuge, Wyoming.

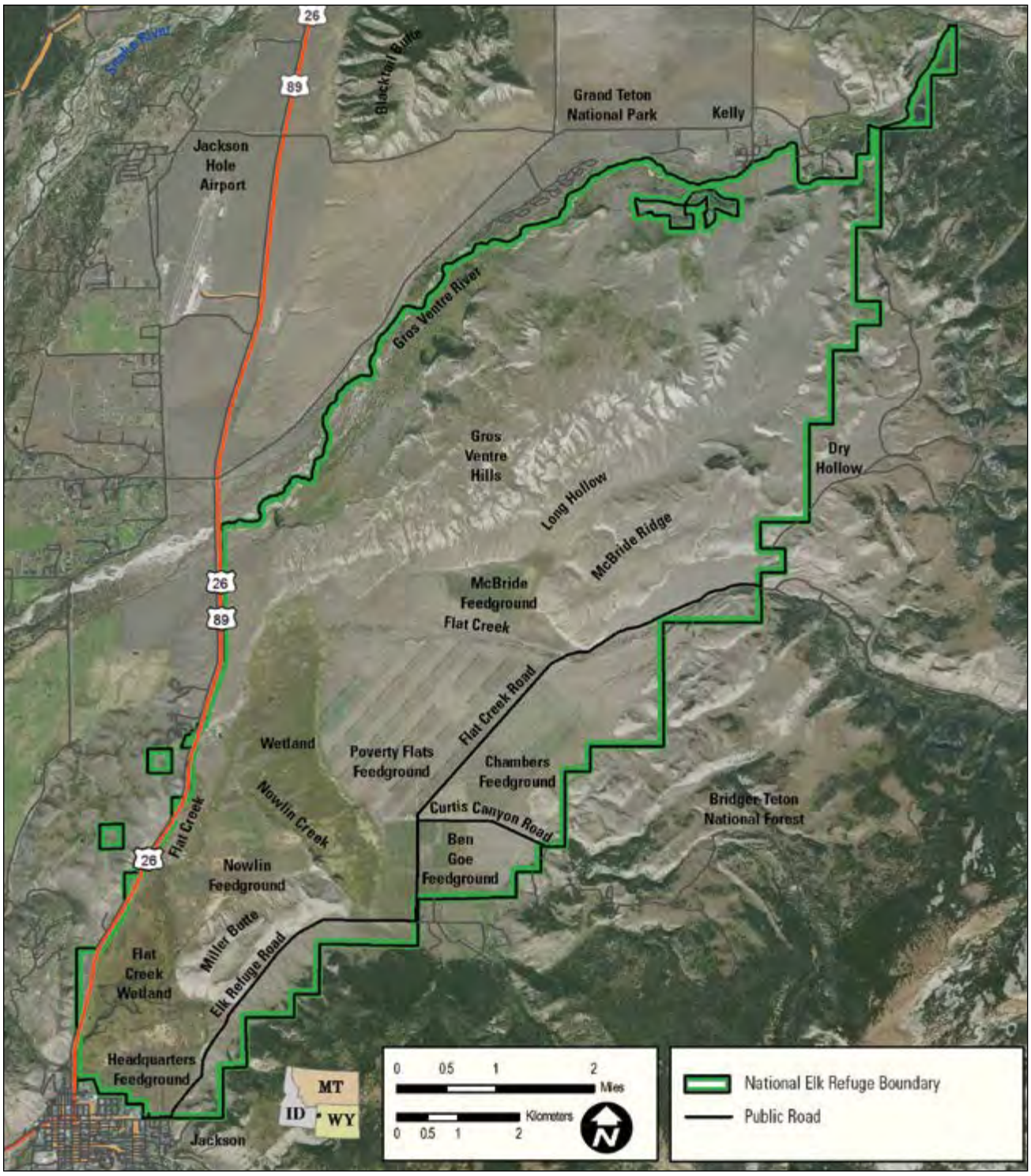


Figure 7. Map of areas and feedgrounds on the National Elk Refuge, Wyoming.

Since the refuge was established in 1912, there have been 9 years when no feeding was provided. The last such winter was in 1980–81. The length of the supplemental winter feeding program has ranged from no feeding to a maximum of 147 days; elk are fed an average of 70 days annually. We have fed hay to elk during at least a part of most winters from 1912 to 1975. In 1975, after several years of testing, we made a switch to alfalfa pellets (Smith and Robbins 1984).

Hunting is the primary management tool used to control the size of the Jackson elk herd. The first hunting season on the National Elk Refuge was in 1943, but hunting did not become an annual event until 1955.

Members and descendants of a small display herd of bison that escaped from Grand Teton National Park in the late 1960s discovered the refuge's winter supplemental feeding program in 1980. This source of winter nutrition enabled the bison herd size to increase almost exponentially to 1,250 animals by the fall of 2007. To reduce herd size to objective levels in the Bison and Elk Management Plan, bison hunting became an annual activity on the refuge in 2007 and has been the primary tool used to control the size of the Jackson bison herd.

2.2 Purposes

Every national wildlife refuge has a purpose for which it was established. The purpose is the foundation on which to build all refuge programs—from biology and public use to maintenance and facilities. No action that we or the public undertake may conflict with this purpose. The refuge purposes are found in the legislative acts or executive actions that provide the authorities to either transfer or acquire a piece of land for a refuge. Over time, an individual refuge may contain lands that have been acquired under various transfer and acquisition authorities, giving the refuge more than one purpose.

The goals, objectives, and strategies in the CCP (refer to chapter 4) are intended to support the individual purposes for which the National Elk Refuge was established:

- The National Elk Refuge was established in 1912 as a "winter game (elk) reserve" (37 Stat. 293, 16 United States Code [U.S.C.] 673).

- In 1913, the U.S. Congress designated the area "a winter elk refuge" (37 Stat. 847).

- In 1921, all lands included in the refuge or that might be added in the future were reserved and set apart as "refuges and breeding grounds for birds" (Executive Order 3596), which was affirmed in 1922 (Executive Order 3741).

- In 1927, the refuge was expanded to provide "for the grazing of, and as a refuge for, American elk and other big game animals" (44 Stat. 1246, 16 U.S.C. 673a).

These purposes apply to all or most of the lands now within the refuge. Several parcels have been added to the refuge specifically for the conservation of fish and wildlife (Fish and Wildlife Act of 1956), opportunities for recreational development oriented to fish and wildlife, the protection of natural resources, and the conservation of threatened or endangered species (Refuge Recreation Act of 1962, 16 U.S.C. 460k–l).

2.3 Vision

A vision is a concept, including desired conditions for the future, that describes the essence of what we are trying to accomplish at a refuge. The following vision for the National Elk Refuge is a future-oriented statement designed to be achieved through refuge management throughout the life of the CCP and beyond:

Nestled below the majestic Teton Range, adjacent to the historic gateway town of Jackson, the National Elk Refuge provides crucial big game wintering habitat in the Greater Yellowstone Ecosystem. Across the refuge's grassland, wetland, woodland, and sagebrush shrubland communities, visitors view wintering elk and other wildlife populations that are balanced with their habitats. The public enjoys quality hunting and fishing as well as year-round interpretative opportunities. Effective outreach and strong public and private partnerships ensure understanding and protection of refuge resources for future generations.

2.4 Goals

A goal is a descriptive, broad statement of desired future conditions that conveys a purpose but does not define measurable units. The goals direct efforts toward achieving the vision and purposes of the refuge and outline approaches for managing refuge resources. We developed five goals for the refuge based on the Improvement Act, the purposes of the refuge, and information developed during planning.

Habitat and Wildlife Management Goal

Adaptively manage bison, elk, and other wildlife populations and habitats as outlined in the Bison and Elk Management Plan and the CCP. Contribute to the conservation of healthy native wildlife populations and their habitats. Restore and sustain a native fishery that provides quality fishing opportunities.

Cultural Resources Goal

Preserve and interpret cultural resources in a way that allows visitors to connect to the area's rich history and conservation heritage.



Lori Iverson / FWS

Collaring elk is a regular and useful activity.

Visitor Services Goal

Enable a diverse audience to understand and appreciate the refuge's wildlife conservation role in Jackson Hole, while safely enjoying year-round opportunities for wildlife-dependent recreation.

Visitor and Employee Safety and Resource Protection Goal

Provide for the safety, security, and protection of visitors, employees, natural and cultural resources, and facilities throughout the refuge.

Administration Goal

Provide facilities and effectively use and develop staff resources, funding, partnerships, and volunteer opportunities to maintain the long-term integrity of habitats and wildlife resources of the refuge.

2.5 Special Values

Early in the planning process, our planning team and the public identified the outstanding qualities or special values of the National Elk Refuge. These special values are characteristics and features of the refuge that make it special to the public, valuable for wildlife, and worthy of refuge status. It was important to identify and describe the special values of the refuge to recognize its worth and to make sure they are conserved, protected, and enhanced through the planning process. These special values can be unique biological resources as well as something as simple as a quiet place to see a variety of birds and enjoy nature.

Intact Ecosystem

The refuge lies in a nearly intact ecosystem. The Greater Yellowstone Ecosystem is one of the last remaining nearly intact ecosystems in the northern temperate zone. As human population pressure and development degrade natural systems worldwide, large nearly intact areas such as the Greater Yellowstone Ecosystem sustain some of the last remaining populations of large carnivores, support some of the

longest ungulate migrations in North America, and contain some of the largest areas of undeveloped wilderness in the lower 48 States. A contiguous system of national park, national wildlife refuge, and national forest lands has conserved the relative integrity of the Greater Yellowstone Ecosystem.

High Scenic Quality

The National Elk Refuge is considered one of the "crown jewels" of the Refuge System because of its spectacular scenery, closeness to two iconic national parks (Grand Teton and Yellowstone), and large charismatic populations of seasonal wildlife—especially elk and bison—that people want to stop and watch.

The refuge, along with vast expanses of undeveloped national forest and national park land surrounding the refuge, offers spectacular scenic views of the Teton and Gros Ventre Ranges, the Sleeping Indian (Sheep Mountain), Jackson Peak, Cache Peak, Snow King Mountain, East Gros Ventre Butte, and the Gros Ventre Hills in the northern part of the refuge. The refuge's location along a heavily traveled highway leading to and from the Grand Teton and Yellowstone National Parks and its vast expanses of scenic open space are integral to the visual experiences of visitors. The visual appearance of a landscape is often the first thing to which a viewer responds. The most prominent view of the refuge, which is seen by several million visitors annually as they drive to and from Jackson on U.S. Highway 26/89/191, is the expansive Flat Creek wetland.

Undeveloped Habitat

"Habitat" is a species-specific concept that refers to the resources necessary to sustain populations of a given species or communities of species. Each wildlife organism has particular space, food, water, and thermoregulation needs that influence whether that species can exist in an area, and these requirements define the habitat of that species.

The National Elk Refuge represents one of the last undeveloped low-elevation areas in Jackson Hole. The refuge provides important habitat for species that depend on limited snow cover, open grasslands, sagebrush shrublands, or wetlands. Important refuge habitats include (1) winter range for elk, bison, moose, and bighorn sheep; (2) breeding habitat for grassland birds such as long-billed curlew; (3) wintering and breeding habitat for greater sage-grouse; and (4) wetland habitat for trumpeter swans, amphibians, and cutthroat trout.

Quality Water Resources

The Gros Ventre River drains approximately 600 square miles of eastern Jackson Hole and the adjacent Gros Ventre Range to the east. The river is the largest watercourse on the refuge and is among the river segments designated as wild and scenic by the Craig Thomas Snake Headwaters Legacy Act of 2008.

Overall, the refuge experiences a relatively natural, annual hydro-regime (waterflows occur without substantial human-constructed controls or alterations), which promotes healthy aquatic ecosystem processes, supports robust populations of aquatic invertebrates (animals without a backbone), and sustains native Snake River cutthroat trout populations. However, the diversion of irrigation water from the Gros Ventre River into Flat Creek is sustaining higher than normal summer flows and is not a "natural, annual hydro-regime." The Gros Ventre River irrigation diversion is conveyed through a ditch dug across the glacial moraine complex separating the river from Flat Creek. The lowermost portion of this ditch failed catastrophically in 1932, producing a massive erosion event in the moraine material. A deep gully developed, which delivered a large amount of sediment to the valley floor and directly to Flat Creek.

Water-level contours show that ground water from higher elevations flows to the southwest through the valley toward the Snake River. Data for the valley aquifer (permeable rock storing underground water) indicate excellent water quality, supporting use for drinking water supplies, recreation, and other commercial uses.

Variety and Abundance of Wildlife

The National Elk Refuge harbors a wide variety of wildlife. Unlike most national wildlife refuges, it is the abundance of big game animals, including the refuge's namesake, rather than birds that makes the refuge biologically unique. The refuge habitat is critical to sustain regional populations of these species, supporting unparalleled hunting and wildlife-viewing opportunities in Jackson Hole.

Federally Listed Species and Wyoming Species of Greatest Conservation Need

The National Elk Refuge is home to Federal and State species of concern. The grizzly bear is federally listed as threatened under the Endangered Species

Act and the greater sage-grouse is a candidate for listing; we have documented both species on the refuge. We have only incidental grizzly bear use documented on the northern parts of refuge. However, recent observations in the southern part of Grand Teton National Park bordering the refuge suggest that increased grizzly bear activity on the refuge may be likely in the near future. Greater sage-grouse use the refuge year-round, and successful breeding has been documented.

There is documented use of the refuge by 35 of Wyoming's SGCN (refer to "Appendix D—Species Lists"). We have documentation of breeding on the refuge for several of these species: trumpeter swan, bald eagle, redhead, lesser scaup, sandhill crane, long-billed curlew, Brewer's sparrow, bobolink, moose, bighorn sheep, and river otter. Refuge grassland and sagebrush shrubland communities support breeding populations of Wyoming SGCN, including long-billed curlew and Brewer's sparrow. Undoubtedly, other Wyoming-designated SGCN from certain taxonomic groups, such as bats and small mammals, are also present on the refuge, but we need more survey work to confirm their presence and use of the refuge.

Mammals

The refuge is the terminus of seasonal migrations for four celebrated large mammal species. Part of the Jackson bighorn sheep herd spends the winter on the refuge on Miller Butte and around Curtis Canyon and migrates to summer range in the Gros Ventre Mountains. Portions of the Jackson elk herd migrate up to 60 miles from their summer range in Yellowstone National Park to winter on the refuge. The refuge hosts the Jackson bison herd during the winter months, one of only three remaining free-roaming bison herds in North America. Pronghorn summer on the refuge and winter south of Pinedale, Wyoming (more than 70 miles away), making this one of the longest mammal migrations in the Western Hemisphere.

Given the abundance of prey and the lack of human disturbance, the refuge has become a haven for large carnivores. Gray wolves have been active on the refuge since 1999 and have denned on the refuge in all but 1 year since 2005. Mountain lion activity has occurred on Miller Butte and on the eastern part of the refuge. Black bears occasionally use the refuge, particularly during the fall season. Coyotes occur at high densities, particularly in the winter when they scavenge elk carcasses and occasionally kill weak and sick elk.

Migratory Birds

Parts of the refuge were established to protect and provide habitat for migratory birds that cross State lines and international borders; these bird species are by law a Federal trust responsibility. The refuge contains significant wetland and grassland communities that are important to migratory birds, and the value of these habitats is enhanced by the restricted human access, which prevents disturbance during nesting and other critical periods in their life cycle. The refuge contains one of the largest wetlands in northwestern Wyoming—Flat Creek Marsh—which is an important migratory stopover for waterfowl and shorebird species in the Pacific flyway (figure 8) and breeding habitat for trumpeter swans and other waterfowl.

Fish

Flat Creek, a spring-fed stream augmented by irrigation, originates north of the town of Jackson, runs through town, and ends at the Snake River south of town. This stream is integral to Jackson Hole and the natural recruitment of native trout for the Snake River. No stocking occurs in Flat Creek, making natural recruitment the only source of native Snake River cutthroat trout. The Gros Ventre River contains Snake River cutthroat, rainbow trout, and hybridized fish species.

Amphibians

The Gros Ventre River, Flat Creek, and Nowlin Creek riparian areas with their associated ponds and wetlands provide essential habitat for regional amphibian populations. Boreal chorus frogs are the most widespread species. Columbia spotted frogs are locally abundant in the Nowlin Creek drainage in two large breeding areas. In addition, boreal toads are locally abundant in two main breeding areas in the Nowlin Creek and Gros Ventre River drainages. Tiger salamanders, although common in the region, are thought to be rare on the refuge.

Abundant Visitor Opportunities

Visitor surveys conducted by the Jackson Hole Chamber of Commerce have consistently documented that 80–90 percent of valley tourists identify natural resource-based activities as their primary reason for visiting Jackson Hole. Hunting, fishing, wildlife observation, photography, environmental education, and interpretation are the six priority public uses (wildlife-dependent recreational uses) of the Refuge

System, and we provide opportunities for all of these activities on the National Elk Refuge.

We allow elk and bison hunting on the refuge to help meet herd management objectives and to provide recreational opportunities. Depending on which area hunters are in, we allow hunters to use a variety of weapons including rifles, archery equipment, and designated limited-range weapons such muzzle-loading rifles, shotguns with slugs, and handguns. The refuge accommodates hunters with disabilities and offers a special elk hunt for young people.

We manage Flat Creek as a trophy class fishery for Snake River cutthroat trout. This fish is a unique subspecies of cutthroat trout and is the only trout native to the area.

We provide a multiuse pathway to the public through a cooperative agreement with Teton County. The pathway is available to a wide variety of people seeking to experience the refuge on foot or via nonmotorized vehicles, allowing them to enjoy views of the refuge and providing wildlife viewing and photography opportunities during three seasons of the year. The pathway also allows users to connect to destinations such as the National Wildlife Art Museum, Jackson National Fish Hatchery, and Grand Teton National Park.

However, it is the spectacle of thousands of elk and hundreds of bison wintering on the refuge's grasslands that most intrigues the public and makes the refuge a national icon. Our visitor services staff offers year-round programs to incorporate wildlife viewing, photography, interpretation, and environmental education into the visitor experience. Thousands of people each year view elk at close range on the refuge while participating in the sleigh ride program. Bison are popular with visitors and residents as a symbol of the West, and they are central to the culture and traditions of many American Indian tribes. Bison can often be viewed along the fence north of the Jackson National Fish Hatchery and in the McBride area before Flat Creek Road is closed seasonally in December. Other ungulates such as bighorn sheep can often be easily viewed from Elk Refuge Road and are a popular species for winter wildlife viewers. From November to May, bighorn sheep can be found on the eastern slopes of Miller Butte and in the northern refuge near Curtis Canyon. Moose, pronghorn, and mule deer also frequent the refuge.

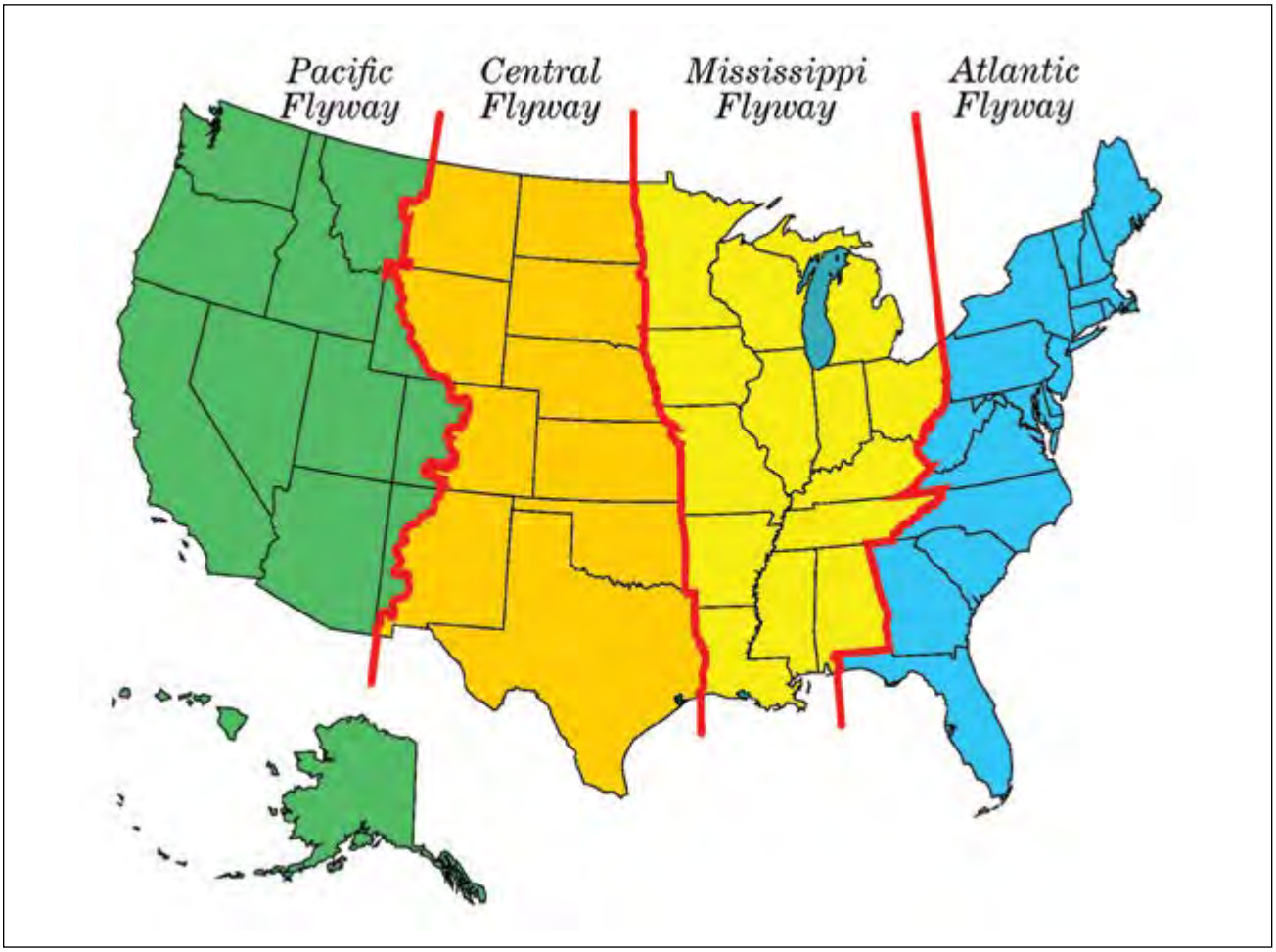


Figure 8. Map of waterfowl flyways in North America.

Rich Cultural History

In prehistoric times, American Indians living on surrounding lands used this high-elevation valley primarily during the warm months, and no one tribe occupied Jackson Hole year-round. Traditional uses of the lands included hunting and fishing, collection of plants and minerals, and ceremonial activities. We have recorded eight prehistoric archaeological sites on the refuge, which include roasting pits, stone circles, and a bison kill site. Among the artifacts that have been discovered are bones from elk and bison, numerous flakes, choppers, scrapers, and projectile point pieces. Present-day activity includes the ceremonial bison hunt that the Shoshone-Bannock Tribes conduct on the refuge.

The Miller House, built in 1898, was one of the early homesteads in the valley. Later, it became one of the first land tracts to be bought for the refuge, and it was the original office for the refuge. Listed on the National Register of Historic Places in 1969, much of the original house has been restored to period standards and aesthetics, and it is open for tour by the public during the summer.

2.6 Planning Issues

We identified several key issues following the analysis of comments collected from refuge staff and the public and a review of the requirements of the Improvement Act and the National Environmental Policy Act. As described in chapter 1, section 1.6, we used a public meeting, news releases, presentations to local agencies and organizations, an announcement in the Federal Register, and planning updates to solicit public input on which issues the CCP should address. We considered the substantive comments (those that could be addressed within the authority and management capabilities of the Service) when formulating the alternatives for future management of the refuge. These key issues are summarized below.

Unknown Effects of Climate Change

Although climate change is a naturally occurring phenomenon and temperature and precipitation changes are anticipated, there are many unknowns. Consequently, we do not fully understand the potential impacts that climate change may have on terrestrial and aquatic habitats and the associated wildlife species. Several scientific studies show that, in the past century, the climate has become warmer and drier in northern Yellowstone National Park (Balling et al. 1992a, 1992b). If this warming trend continues, it could have far-reaching effects on the plants and animals of the Greater Yellowstone Ecosystem (Romme and Turner 1991), which includes the National Elk Refuge.

Analysis of precipitation records from 1921 to 2002 gathered at a National Oceanic and Atmospheric Administration weather station in Jackson, Wyoming, showed no significant trends, either increasing or decreasing (Smith et al. 2004). Although temperature readings from 1931 to 2002 increased, calculations using the 1949–2001 Keetch-Byram Drought Index values, which evaluate upper level soil moisture content, revealed a "minor decline in drought conditions" (Smith et al. 2004).

Landscape-Scale Conservation Needs

There is increasing residential, commercial, and energy development near the refuge and surrounding areas. Threats to wildlife associated with development include loss of habitat, habitat fragmentation, vehicle collision mortality, loss of wildlife migration routes, poaching, and increased infestations of invasive plants, including noxious weeds. As towns, developments, farms, ranches, and roads spread across the region, wildland shrinks and is broken into smaller fragments. The land surrounding the refuge is mostly comprised of federally managed lands (Grand Teton National Park and Bridger-Teton National Forest) and the town of Jackson. The town of Jackson is already intensively developed, leaving little opportunity for further habitat protection in the immediate area. The National Elk Refuge, national parks, national forests, and State lands in the Greater Yellowstone Ecosystem preserve continuous tracts of important habitat and travel corridors for the area's wildlife and for the enjoyment of people.

Big Game Management Effects on Wildlife Habitat

Historical evidence suggests that the refuge once supported substantial willow, cottonwood, aspen, and mountain shrub communities. Because the refuge has

consistently maintained artificially high numbers of elk through supplemental feeding for almost 100 years, browsing by elk has reduced the spatial extent and structural complexity of woody plant communities, particularly on the southern end of the refuge (Smith et al. 2004). As a result, habitat for species that depend on these communities, such as beaver and breeding birds that nest in dense woody vegetation, has been drastically reduced. Furthermore, when the large concentrations of wintering elk and bison consume streamside woody vegetation, the streambanks become unstable and vulnerable to collapse into the stream, sending substantial amounts of sand and silt into the stream. Experiments suggest that these plant communities have the capacity to recover, but only if ungulate numbers are drastically reduced or they are excluded from browsing using fencing or other physical barriers.

Irrigation is a common habitat management tool that we use to increase both the quantity and quality of forage available to grazing wildlife. We have used irrigation to produce forage for many years on the National Elk Refuge as a technique to reduce wintering elk reliance on supplemental feeding. However, moving the irrigation system requires dragging the lines over the ground, and this activity can potentially have negative effects on the nests of birds such as the curlew, which is an important ground-nesting bird on the refuge and a bird of special concern to the State of Wyoming.

Invasive Plants Replacing Native Habitat

An invasive species is defined as a species that is nonnative to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health (National Invasive Species Council 2008). Invasive plant species spread easily, replace native habitat, reduce diversity, and cause great expenditure of financial and human resources. Adjacent private lands are often the sources for invasive plants, including State-designated noxious weeds.

Common noxious weeds present on the refuge are musk thistle and spotted knapweed. There are many other invasive plant species on the refuge including the following:

- Bindweed Dalmatian toadflax
- Oxeye daisy
- Scotch thistle
- Black henbane
- Diffuse knapweed
- Perennial pepperweed
- Whitetop
- Bull thistle
- Houndstongue
- Russian knapweed
- Wooly mullein
- Canada thistle
- Marsh sow thistle
- Scentless chamomile
- Yellow toadflax
- Common tansy

Many invasive plant infestations on the refuge are a direct result of abandoned livestock-feeding areas and corrals, old homesites, and roadbeds. These species reduce the diversity and number of native plants and change habitats, such as replacing a grass community with a forb community. Studies in Montana report that bison and deer reduced their use of a particular habitat by 70–82 percent when it was invaded by leafy spurge. Elk forage in bunchgrass sites on the refuge was decreased by 50–90 percent after a spotted knapweed invasion (Teton County Weed and Pest District 2002).

Invasive grasses, forbs, and woody species are of concern because they diminish the quality and suitability of habitat and reduce its potential to support many native wildlife species. Invasive plants also fail to protect and hold soil because they generally have a shallow root system, leading to increased erosion and sedimentation in streams. This in turn affects water quality, reduces aquatic habitat, and may lead to decreases in fish production.

Flat Creek Enhancement

There is a need to improve the condition of Flat Creek to increase aquatic habitat for all age classes of the Snake River cutthroat trout. This creek is an iconic fixture in Jackson Hole for tourists, anglers, and the native cutthroat trout. Flat Creek on the refuge provides a walk-in opportunity for anglers to experience a trophy fishery of Snake River cutthroat trout. However, the refuge reach of Flat Creek has experienced direct and indirect alteration to its stream form and function from changes in hydrologic and sediment inputs, installation of instream structures and treatments, and nearby land management activities. With some enhancement work on Flat Creek done in 2013, we need to continue this work farther down the refuge reach of Flat Creek to improve habitat for cutthroat trout (Biota 2013a, 2013b).

Conserving Wide-Ranging Wildlife

The refuge provides habitat for several wide-ranging wildlife species including elk, bison, bighorn sheep, pronghorn, moose, gray wolf, and grizzly bear. The refuge supports the preservation of the large landscapes that these species require. With long-distance mammal migrations imperiled around the globe, the refuge's importance in sustaining these phenomena is critical. The success of wolf restoration in the Greater Yellowstone Ecosystem continues to be a major issue for many of the citizens of Wyoming. The National Elk Refuge provides an excellent location and ideal habitat for seasonal occupation by wolves and, in recent years, has hosted a denning pack of wolves during the winter, spring, and summer months. These wolves have a large home range that contains substantial amounts of nonrefuge Federal, State, and private lands, where they can come into conflict with privately owned livestock.

Managing Habitat for Migratory Birds

Protecting habitat and managing for a wide variety of migratory birds is a priority for the refuge. Waterfowl and other waterbirds, grassland songbirds, and riparian-dependent birds are some of the highest priority groups.

Wildlife Disease

The supplemental feeding program has maintained artificially high densities of elk for almost 100 years and artificially high densities of bison for more than 30 years. Biologists from the refuge and WGFD evaluate several factors to decide whether feeding is needed and, if so, when it should begin and end. The feeding start date primarily depends on the amount of standing forage that is accessible to elk, which is influenced by forage production the previous growing season, elk and bison numbers, the timing of migration, winter temperatures, and snow conditions. Feeding typically ends within 1 week of the first day that snow has completely melted on the southern end of the refuge.

Feeding is a strategy designed to support elk population objectives and reduce damage to surrounding private lands, but it has unintended management and disease consequences. Feeding is used as a strategy to reduce brucellosis transmission from elk and bison to cattle, yet artificially concentrating elk and bison on feedgrounds also maintains higher brucellosis seroprevalence in elk and bison (Cross et al. 2007, 2010) and puts them at risk for other density-dependent diseases (Smith 2001). As a result, density-dependent ungulate disease is a major concern for the refuge. Brucellosis, septicemic pasteurellosis, psoroptic mange, necrotic stomatitis, necrotizing pododermatitis (foot rot), and helminth and lungworm parasitism have been well documented in the Jackson elk herd. Similarly, brucellosis and density-associated parasitism have been well documented in the Jackson bison herd. Brucellosis seroprevalence rates of unfed bison in Yellowstone National Park fluctuate between 40 and 60 percent (Cheville 1998). Jackson bison herd seroprevalence is approximately 60 percent.

Although the population level effects of these diseases have been minimal for elk and bison, their prevalence at the refuge suggests that substantial population reductions and other negative wildlife health effects are possible if more serious ungulate diseases were introduced to the refuge. For example, chronic wasting disease, bovine tuberculosis, malignant catarrhal fever, and foot-and-mouth disease have not been documented in the Jackson elk herd, but could have serious negative population effects at current elk densities. Likewise, bovine tuberculosis, bovine paratuberculosis, malignant catarrhal fever, and foot-and-mouth disease could pose significant threats to bison populations on the feedgrounds if these diseases were introduced.

During routine monitoring of cutthroat trout in 2003, tissue samples sent to the WGFD lab tested positive for *Myxololus cerebralis*, the parasite that causes whirling disease. Infection levels were low and no declines in the cutthroat trout population have been documented.

Amphibian monitoring on the refuge occurs at a finer temporal and spatial scale than other amphibian monitoring in the region (Patla 2009). As a result, amphibian monitoring functions as an early warning system for declines in amphibian populations and disease outbreaks. These monitoring efforts are particularly important given the detection of chytridiomycosis (chytrid disease) on the refuge. Chytrid disease is a fungal skin disease that has been implicated in amphibian population declines worldwide. A boreal toad collected on the refuge in 2000 was the first documented occurrence of the disease in northwestern Wyoming. Unlike infected amphibian populations in other areas, amphibians in northwestern Wyoming have not experienced catastrophic declines. However, the effects could be chronic and, therefore, continued monitoring is necessary to evaluate the effects of the disease on regional populations.

Insufficient Research, Inventory, and Monitoring

Artificial concentrations of high densities of elk and bison, because of supplemental feeding and habitat enhancement, provide unique opportunities to evaluate the effects of these management activities on vegetation, ungulate habitat use, breeding bird populations, and wildlife diseases.

The refuge facilitates regionally important cooperative research and monitoring including amphibian population monitoring, greater sage-grouse habitat use and demography, mountain lion research, bighorn sheep habitat selection and migration, and invasive plant monitoring. Given potential threats associated with climate change and invasive species, more inventory work is necessary to assess the baseline presence and abundance of certain taxonomic groups including invertebrates, rodents, bats and owls.

Members of the public, representatives from nonprofit conservation organizations, and staff from other agencies have expressed concern that inventory and monitoring efforts are insufficient to evaluate the effects of current and proposed management activities. Principal concerns are related to (1) the irrigation system expansion and its effects on hydrology, amphibians, and ground-nesting birds; (2) development of a multi-use pathway next to Highway 26/89/191 and its potential impacts on ungulate migration, invasive plant species introduction, and disturbance of breeding birds; and (3) the ongoing effects of the supplemental feeding program on breeding bird habitat and wildlife diseases. These are valid concerns that would require more staff and money to effectively monitor the effects of these management activities over time.

Human–Wildlife Conflicts

Wildlife that winter on the refuge can cause human–wildlife conflicts when they venture off the refuge and into the developed Jackson area. Of greatest concern are bison, which are large and sometimes bold animals that can exhibit aggressive behavior and be a serious threat to human safety and property. Elk have left the refuge in the past; in January 2006, a radio-collared elk left the refuge and went to a livestock feedline. Elk can create conflicts, mostly as a traffic hazard as they cross heavily used highways or pathways when moving onto the refuge, although they can also cause property damage and threaten human safety in certain situations.



BJ Baker / FWS

Historic Miller Ranch in the morning.

Hunting Management

Although hunting is the primary means of meeting herd objectives, a need was identified to consider the negative visual effect of hunters killing elk and seeing dead elk as they are transported off the refuge. Some individuals expressed a desire to prohibit hunting on the refuge; others desire a limited waterfowl hunt for population control of resident Canada geese. Some people would like the CCP to include monitoring the use of lead shot for waterfowl hunting (if it were allowed) and the subsequent impacts on bald eagles. However, mandatory State regulations already require the use of lead-free ammunition.

Increasing Demand for Environmental Education and Interpretation

The refuge cannot meet the high public demand for environmental education and interpretation programs with the current staff level. We need more interpretative staff and public facilities with adequate program areas.

Operational Efficiency of the Jackson Hole and Greater Yellowstone Visitor Center

During the peak summer season, visitation can reach 2,400 people per day, or roughly 3.6 visitors per minute, at the Jackson Hole and Greater Yellowstone Visitor Center (visitor center). With only one staff member assigned to the facility, staff levels are not adequate to maintain, run, and staff the busy visitor center. Rather than seasonally increasing Government staff or hiring employees funded through nongovernmental sources to enhance public use programs, the refuge solely relies on residential volunteers to provide interpretive and educational services. It is important to have adequate permanent refuge staff at the visitor center to guarantee consistent service, to recruit and manage volunteers, and to provide interpretive programming. Also, the current building is old and needs to be replaced to meet the customer service demand and to comply with the Architectural Barriers Act Accessibility Standard (United States Access Board 2013). Previous condition assessments identified many of the visitor center's features as poor or unsafe.

Management of Other Uses

There are several other public uses that demand extensive time by our refuge staff to coordinate and carefully manage to protect refuge resources and keep the public safe.

North Highway 89 Pathway

The North Highway 89 Pathway provides an opportunity for the public to enjoy the beauty of the National Elk Refuge and observe much of the wildlife that makes Jackson Hole so special. Some of the public would like us to extend the use of the bike path by eliminating or modifying the seasonal closure. However, the seasonal closure is part of the agreement with Jackson Hole Community Pathways to mitigate for wildlife disturbance and is believed to be an essential requirement for this activity to be compatible with the refuge purposes.

Public Use of North Park

The refuge's North Park provides a shelter and picnic tables to support wildlife-dependent recreation at the refuge, for use on a first-come, first-served basis. North Park is a small area on the refuge that is so close to town that it appears to be part of Jackson. In fact, we have a memorandum of understanding with Jackson to maintain the lawn, picnic tables, and shelter. The memorandum of understanding also allows Jackson to conduct a reservation system for private use of the shelter for weddings and other events; Jackson charges a fee for the reserved use and keeps the fee. However, these uses do not support wildlife-dependent recreation, and reserving the area may hinder the experience of people visiting the refuge for activities such as wildlife observation.

Special Use Permits

Because of the refuge's location in the scenic, highly visited Jackson Hole, the staff receives a high volume of requests for special uses of the refuge. The refuge issues approximately 40 special use permits annually. Most of these permits are issued to wildlife auto-tour companies, fishing outfitters and guides, and commercial filmmakers and photographers.

The refuge receives an extensive amount of local, regional, national, and international media attention, especially during the winter season. Media coverage includes print, electronic, and video and film venues. Because the area is a focus of media attention and millions of people visit this area each year, the National Elk Refuge has the opportunity to embody our mission as an ambassador for the Refuge System.

The refuge staff has an extensive workload to properly evaluate, process, and monitor special use permits and filming requests. Because of the volume of requests the refuge receives for activities such as special access and photography in closed areas, discretion must be used to accommodate a request even if the activity is compatible. When considering a special use request, the refuge staff must decide not only if the single activity can be accommodated, but whether or not it is feasible if multiple parties make the same request. Furthermore, there is a need to set standards for consistent evaluation of the special use requests that we allow and to give groups equal opportunities to gain permits.

Swimming

At the northeastern corner of the refuge, there is a feature known as the Gros Ventre River "jump cliff." Here, swimmers jump off of cliff rocks in Grand Teton National Park into the Gros Ventre River and into the jurisdiction of the refuge. Technically, when the diver hits the water, they are trespassing onto the refuge and participating in an activity that we have not determined as a compatible use of the refuge. A further complication is that the public does not clearly understand the boundary between the park and the refuge. Swimming is not a wildlife-dependent recreational use.

Access

The refuge has high demand for various types of access as described below.

General Access

There is a concern that only hunters and anglers are allowed access to the refuge, with birdwatcher and other user groups not having equal opportunity to use the refuge for other wildlife-dependent purposes such as birding and wildlife observation. The need to provide free access to the refuge for other user groups was identified.

Elk Refuge Road

Elk Refuge Road is the primary access to the refuge and the only legal entrance to the refuge for the public. The refuge struggles with management of traffic on Elk Refuge Road because of its mixed use by pedestrians, vehicles, service trucks, and large equipment. Because of the ease of access to the refuge and its proximity to town, local residents use Elk Refuge Road extensively for walking, jogging, and bicycling. Many pedestrians walk several abreast or do not move to the side of the road when vehicles are present, causing drivers to move into the oncoming lane to pass.

A regulation panel at the refuge entrance and literature available to the public states that stopping or parking a vehicle on Elk Refuge Road is prohibited; however, many cars, vans, and trucks park in the road when wildlife is present near the roadway rather than using the turnouts. In some cases, traffic traveling in both directions stop on the road, obstructing the free movement of other vehicles and creating safety hazards. Furthermore, roadway congestion is a safety concern in bad weather when there may be icy road conditions or limited visibility because of fog, rain, or snow.

Access for Boating

Public comment received during the CCP scoping process requested that boat use be allowed on Gros Ventre River segment upstream from the town of Kelly. The northern boundary of the refuge is the Gros Ventre River, and the northeastern corner of the refuge is used as a takeout point by boaters floating downstream from Slide Lake. Less frequently, boat traffic continues downstream to the town of Kelly. However, the refuge and the Grand Teton National Park consider this part of the Gros Ventre River to be closed to boating. The segment of the river from the Jump Rock takeout site to the town of Kelly was recently designated as scenic under the Craig Thomas Snake Headwaters Legacy Act of 2008. The act requires the refuge and the park to create a comprehensive river management plan to guide the management of each segment designated as wild, scenic, or recreational to protect the "outstandingly remarkable values" of the river.

The proposed use of boating was reviewed during development of the Snake River Headwaters Comprehensive River Management Plan. The prohibition against boating on the portion of the Gros Ventre River that serves as the common boundary between the refuge and the park will be retained.

Access to the National Forest

Because the Bridger-Teton National Forest lies adjacent to the refuge, some users want to access the forest through the refuge. Open portions of Elk Refuge Road allow the public seasonal access to national forest lands, including designated routes to reach the forest on foot or by vehicle. Allowing limited access to the national forest, either by road or trail, shows good cooperation between two Federal agencies and extends a convenience to forest users.

Presently, the refuge allows antler hunters to park and camp overnight on Elk Refuge Road on April 30 to await the lifting of the national forest closure (for wintering wildlife) where the public enters the forest to collect antlers. At 8 a.m. on May 1, refuge staff caravans 100 or more vehicles through the refuge to the boundary of the national forest. The overnight parking creates some resource damage, requires us to increase our law enforcement presence, costs us a significant amount of money to manage, and may be an incompatible use of the refuge.

Public Outreach Opportunities

The National Elk Refuge is featured in many newspapers, Web sites, and other publications each year. These articles are reviewed for accuracy whenever possible; when the media does not directly speak to a refuge staff member, or when staff resources are insufficient to meet or speak with the media contact, erroneous information is common.

People living in or visiting Jackson Hole are easily confused about the differences among Federal land management agencies and how their missions and public use opportunities can greatly vary. Neighboring Grand Teton National Park and Bridger-Teton National Forest are areas with many more non-wildlife-dependent recreational opportunities for the public such as boating, mountain biking, swimming, and hiking. Conflicts can arise when a public use is denied or restricted on the refuge, especially when the same recreational opportunity is allowed under another nearby Federal jurisdiction. Consequently, the National Elk Refuge can seem excessively restrictive without a better understanding of its mission and the prominence of its "wildlife first" guiding principle.

The National Elk Refuge has made it a public outreach goal to continue to write articles, conduct interviews, and use other sources to share information about refuge projects or management issues. Staff limitations and workloads limit this specific type of outreach and have precluded incorporating new technologies into information dissemination. The visitor services staff bought software to produce short video segments, but allocating work time for training and production has not yet been a priority.

Miller House Restoration

The historic Miller Ranch has three main structures: the house, the barn, and the USDA Forest Service cabin. Other than a 2-week rehabilitation project in the summer of 2007, no substantial work has been completed on any of the structures. The upper floor of the barn has outstanding potential for use as an interpretive site and location for programs and events, but the foundation has experienced substantial settling and cracking. Stabilization and restoration will be necessary before the building could be used as a site for interpretive programs. We will need to find funding opportunities other than the refuge's base funding to restore the historic structure and prevent further deterioration of the structure.

Lack of Resources to Administer the Refuge

Money and staff are not sufficient to fulfill the purposes and meet the goals of the refuge. In addition, visitor numbers and associated demands are expected to increase in coming years. Consequently, less will get done with a corresponding decline in programs, infrastructure, and facilities. The refuge has 10.5 permanent full-time equivalent (FTE) positions, a measure indicating the amount of available workforce on the refuge, and approximately 0.5 seasonal FTE. Refuge staff needs to identify and set



Lori Iverson / FWS

Bald Eagle

priorities for unfunded needs to be able to compete effectively for more money within our agency and from partners and other sources. Creative partnerships and volunteer assistance, although helpful, are not a complete or reliable solution and require substantial staff time. With more resources, we could accomplish more of the CCP's goals and objectives.

Stronger Programs Through Partnerships

The National Elk Refuge has many opportunities for partnerships because of the popularity of Jackson Hole and the many nongovernmental organizations, tourism operators, and interested public in the area. Furthermore, there are several governmental agencies—Teton County, National Park Service, and USDA Forest Service—that have land management responsibilities around the refuge. Maintaining a strong partnership network including private landowners, public agencies, and nonprofit organizations is integral to accomplishing our mission of conservation. Partners provide financial assistance, technical assistance, and help with planning and implementation. Partnerships and management coordination with public and private partners is important because refuge operations can have substantial impacts on surrounding lands.

The refuge shares the responsibility of managing wildlife with the State of Wyoming. Close coordination with WGFD enables refuge programs to complement the State's wildlife goals and objectives. This is especially critical in the management of the migratory elk and bison herds. Collaboration with WGFD on harvest goals, permits and licenses, law enforcement, and disease monitoring are important for the effective management of these herds.

To enhance Flat Creek for native cutthroat trout (Biota 2013a, 2013b), the refuge is collaborating with several organizations: WGFD, Jackson Hole Trout Unlimited, Rocky Mountain Elk Foundation, and Snake River Fund.

The town of Jackson shares its boundary with the refuge and both are located within Teton County. Regular communication with elected officials from the town and county helps diffuse ongoing residential development and public service expansion pressures. Refuge management actions must consider the residential water facilities for the town and a multi-use, nonmotorized pathway for Teton County that are located on the refuge.

Winter sleigh ride interpretive tours are conducted through the Grand Teton Association by a private concessionaire. The visitor center and sleigh rides are integral to wildlife observation, photography, interpretation, and environmental education programs and generate revenue used to enhance these programs.

The refuge has enjoyed a 55-year partnership with the Jackson District Boy Scouts. In addition to clearing much of the refuge of antlers that are a hazard to refuge vehicles, 75 percent of the proceeds of the annual Boy Scouts of America Elk Antler Auction are returned to the refuge for habitat management-related expenses.

Refuge Management Effects on the Jackson Economy

Employment and nonsalary refuge expenditures (maintenance and operations) benefit the local community, county, and State in the form of income, jobs, taxes, and personal spending. The refuge plays an active, albeit small, role in economic development in the local economy. The National Elk Refuge attracts many visitors and tourist dollars to the local community of Jackson. The national prominence of the refuge and its proximity to Jackson ensures that many Jackson Hole visitors either directly or indirectly use the refuge, but actual dollars generated from the refuge are minor. However, any changes to refuge management are perceived by some people to affect the economy of Jackson.

Issues Outside the Scope of the CCP

Although the public identified elk and bison management as an issue during scoping for the CCP, the issue is outside the scope of this CCP process. Managing elk and bison in this area was recently addressed in an interagency process following the National Environmental Policy Act that had extensive public involvement; the resulting Bison and Elk Management Plan was completed in 2007. The plan has goals, objectives, and strategies for managing elk and bison on the National Elk Refuge and Grand Teton National Park. Supplemental winter feeding of the elk herd is addressed in the Bison and Elk Management Plan.

Some people felt the State of Wyoming should manage the National Elk Refuge instead of our agency. Divestiture of a national wildlife refuge requires an act of Congress; therefore, this is outside the scope of the CCP.

Chapter 3—Refuge Resources and Description



Ann Hough / FWS

Bighorn Sheep

This chapter describes the characteristics and resources of the National Elk Refuge, Wyoming, under these topic headings:

3.1 Physical Environment
3.2 Biological Resources
3.3 Management Tools
3.4 Human History and Cultural Resources
3.5 Special Management Areas
3.6 Visitor Services
3.7 Socioeconomic Environment
3.8 Operations

3.1 Physical Environment

Within Teton County, Wyoming, the town of Jackson borders the refuge on the south, and the town of Kelly lies near its northern boundary. Lands to the south and west are mostly privately owned. East of the refuge are lands administered by Bridger-Teton National Forest, including the nearby Gros Ventre Wilderness.

The National Elk Refuge is 6 miles at its widest point and 10 miles from southwest to northeast, with elevation ranging from 6,200 to 7,200 feet. The northern half of the refuge consists of steep rolling hills. The southern half is glacial washout material, with one resistant formation (Miller Butte) rising approximately 500 feet above the valley floor. The refuge, along with Grand Teton National Park, John D. Rockefeller, Jr. Memorial Parkway, and Yellowstone National Park, is part of a larger area referred to as the Greater Yellowstone Ecosystem.

The following sections describe aspects of the physical environment that may be affected by implementation of the CCP:

- climate
- land features
- soils
- water resources
- air quality
- visual resources

Climate

The valley known as Jackson Hole is characterized by long, cold winters with deep snow accumulations and short, cool summers. Prevailing winds in the valley come from the southwest but strong winds are relatively rare.

Temperature

January is the coldest month with an average daily maximum temperature of 24 °F and an average daily minimum temperature of 1 °F at low elevations. Temperature extremes vary from summer highs of 92–98 °F to winter lows of –40 to –52 °F.

Precipitation

Precipitation levels are relatively steady throughout the year, with a total average annual accumulation of 15.2 inches in Jackson Hole. Average monthly precipitation levels range between 1 and 2 inches, with May and December being wettest and July and February driest. Jackson Hole averages 90 inches of snowfall per year, accounting for 60 percent of annual precipitation. Snow pack depth of 6–18 inches in southern parts of the refuge and 48 inches in the northern half are common. Maximum snow depth is reached between March 15 and April 1 (Martner 1977).

Climate Change

The U.S. Department of the Interior issued an order in January 2001 requiring Federal agencies under its direction that have land management responsibilities to consider potential climate change effects as part of long-range planning endeavors. The U.S. Department of Energy's report, Carbon Sequestration Research and Development (1999), concluded that ecosystem protection is important to carbon sequestration and might reduce or prevent loss of carbon stored in the terrestrial biosphere. The report defines carbon sequestration as "the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere" (1999).

The increase of carbon dioxide within the earth's atmosphere has been linked to the gradual rise in surface temperature, commonly referred to as global warming. Vegetated land is a tremendous factor in carbon sequestration. Large, naturally occurring communities of plants and animals that occupy major habitats—grassland, forest, wetland, tundra, and desert—are effective both in preventing carbon emission and in acting as biological scrubbers of atmospheric carbon dioxide.

Carbon sequestration constitutes the primary, climate-related effect to be considered in planning. One of our activities in particular—prescribed fire—releases carbon dioxide directly to the atmosphere from the biomass consumed during combustion. However, there is no net loss of carbon because new vegetation quickly germinates to replace the burned-up biomass. This vegetation sequesters an approximately equal amount of carbon as was lost to the air (Dai et al. 2006).

Several scientific studies report that, in the past century, the climate is becoming warmer and drier in northern Yellowstone National Park (Balling et al. 1992a, 1992b). If this warming trend continues, it could have far-reaching effects on the plants and animals of the Greater Yellowstone Ecosystem (Romme and Turner 1991).

Analysis of precipitation records from 1921 to 2002 gathered by a National Oceanic and Atmospheric Administration weather station in Jackson, Wyoming, showed no significant trends, either increasing or decreasing (Smith et al. 2004). Although temperature readings from 1931 to 2002 increased, there was a "minor decline in drought conditions," per calculations using the 1949–2001 Keetch-Byram Drought Index values that evaluate upper-level, soil moisture content (Smith et al., p. 98).

Land Features

The National Elk Refuge is centrally located in Jackson Hole in northwestern Wyoming. The refuge ranges from 6,200 to 7,400 feet above sea level and is bordered by the town of Jackson to the south, private ranchlands and subdivisions to the west, Grand Teton National Park to the north, and national forest lands of the Gros Ventre Mountains to the east. Topographic, hydrologic, and soil features interact to influence the species composition of plant communities on the refuge. The refuge comprises seven main topographic zones:

- Gros Ventre Hills
- foothills of the Gros Ventre Mountains
- Miller Butte
- Poverty Flats alluvial plain
- Flat Creek Marsh
- Flat Creek riparian zone
- Gros Ventre River riparian zone

The northern third of the refuge is dominated by the Gros Ventre Hills. These relatively steep, rolling, sedimentary formations range in elevation from 6,300 to 7,200 feet. The Gros Ventre Hills support native wheatgrass and needlegrass communities on

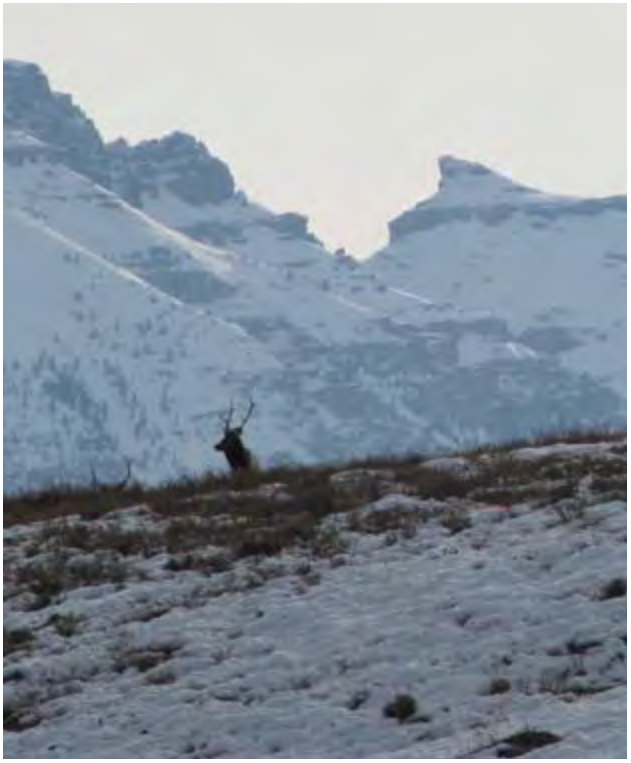
south aspects, with mixed communities of mountain snowberry, rose, and sagebrush in sheltered draws with deeper soils. North aspects support aspen and some mixed-conifer stands of Douglas-fir lodgepole pine and limber pine. Scattered stands of Rocky Mountain juniper grow on some rocky slopes. Lower elevation draws are dominated by mountain big sagebrush, threetip sagebrush, and grassland communities. Similar vegetative features are found on foothills of the Gros Ventre mountains on the eastern border of the refuge and on Miller Butte, a 1,300-acre formation on the southern end of the refuge that rises 500 feet above the valley floor.

A gently sloping alluvial plain, called Poverty Flats by early homesteaders because if its poor agricultural potential, is the principal topographic feature in the east-central portion of the refuge. This area consists of shallow soils that overlay glacially deposited cobble. Before Euro-American settlement, the alluvial plain was likely covered by mountain big sagebrush and dry native grassland. Currently, the area is a mixture of native dry grassland, crested wheatgrass, and nonnative cultivated grassland, with only small pockets of mountain big sagebrush limited to areas of deeper soil and snow accumulation.

Approximately 2,700 wetland acres form the southwestern corner of the refuge. Flat Creek, Nowlin Creek, Twin Creek, and ground water originating from porous carbonate rocks to the east of the refuge feed the wetlands (Galbraith et al. 1998). In addition to these natural sources, the Flat Creek Marsh typically receives irrigation diversion water from the Gros Ventre River from May through July via the Boyle Ditch, which serves private water users downstream of the refuge. There is an elevation gradient to the wetlands of the Flat Creek Marsh that affects soil moisture and plant communities. The highest elevations next to the alluvial plain host wet meadow plant communities of Kentucky bluegrass, tufted hairgrass, meadow foxtail, and timothy grasses. Mid-elevation wetlands are dominated by shrubby cinquefoil, rushes, sedge species, and several species of willow. However, willows growing in these areas are mostly less than 1.5 feet in height and do not form a significant portion of the canopy cover due to browsing by elk and bison (Anderson 2002, Smith et al. 2004). The lowest elevation areas in the wetland consist of open water and cattail–bulrush marsh.

The riparian zones of the Gros Ventre River and the portion of Flat Creek that flows over the alluvial plain are characterized by braided stream channels and cottonwood woodland plant communities. The Gros Ventre River bordering Grand Teton National Park and the easternmost portion of Flat Creek on the refuge support multi-aged communities of narroweaf cottonwood with shrub understories of chokecherry, serviceberry, rose, gooseberry, and Bebb, greenleaf and sandbar willows. Where Flat Creek flows over the western portion of the alluvial plain, only sparse, mature narrowleaf cottonwoods exist. The lack of regenerating aspen and other understory shrubs in this area has been attributed to browsing and rubbing damage from elk and bison (Smith et al. 2004).

(Note: The above description is paraphrased from Smith et al. 2004.)



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Elk

Soils

More than 20 different soil types are found on the National Elk Refuge (Young 1982). Soils at lower elevations are alluvial (transported by stream or river), generally sandy loam or loam, and are shallow and permeable. Soils at higher elevations are also loamy, with considerable areas of gravelly soils and cobblestone on south-facing slopes and ridges.

Greyback gravelly loam—a deep, somewhat excessively drained soil—occurs in irrigated areas of the refuge. About 20 percent of the irrigated area has a cobbly loam surface layer but is otherwise similar to Greyback gravelly loam. Permeability is moderately rapid, and available water capacity is low. Roots penetrate to a depth of 60 inches or more. On 0- to 3-percent slopes, the surface runoff is slow, and the erosion hazard is slight. On 3- to 6-percent slopes, the surface runoff is medium, and the erosion hazard is moderate.



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Irrigation

Water Resources

This section describes the hydrology, water quality, and water rights on the refuge.

Hydrology

Surface hydrologic features on the refuge include the Gros Ventre River, Cache Creek, Flat Creek, Nowlin Creek, and several other small creeks and springs (figure 9). The Gros Ventre River flows westerly and forms the northern boundary of the refuge. Flat Creek flows east to west and nearly bisects the refuge. Water from Cache Creek reaches the refuge by way of an underground diversion that surfaces into a cistern located near the refuge headquarters. In addition to natural watercourses, there are many miles of irrigation ditches. Three wells and an enclosed water storage reservoir are used by the town of Jackson.

Water-level contours show that ground water flows from high areas southwest through the valley toward the Snake River. Data for the alluvial valley aquifer indicate excellent water quality, supporting use for drinking water, recreation, and other commercial uses. Much of the aquifer has high permeability and substantial interconnection to the rivers and lakes, making it vulnerable to contamination from facilities, visitor use, and transportation corridors in the recharge areas (parts of the aquifer where water moves downward toward the water table).

Gros Ventre River

The Gros Ventre River, which drains approximately 600 square miles of eastern Jackson Hole and the mountains farther east, is the largest watercourse on the refuge. The relatively wide river channel is heavily braided in areas where geologic materials are of low erosional resistance, as is the case on the refuge. The many gravel bars in the river channel have little or no vegetative cover because of annual flooding and erosion.

Flat Creek

Flat Creek originates in the Gros Ventre Range east of the refuge and drains approximately 120 square miles. The Flat Creek drainage is a broad valley setting with expansive wetlands. The wide valley floor has gentle elevation relief and is made of materials deposited from river and lake processes. The natural stable stream channels are slightly entrenched, meandering, riffle-pool beds. Flows vary seasonally because of runoff, input of irrigation water diverted from the Gros Ventre River, diversions by irrigators, and losses from infiltration. The porous nature of refuge soils through which a section of Flat Creek flows causes high infiltration losses and results in a seasonally dry channel bed in this area. Nowlin Creek is a small spring-fed tributary of Flat Creek. From the southeastern part of the refuge, the creek flows westerly through four constructed impoundments to its confluence with Flat Creek.

Flat Creek has experienced direct and indirect alteration to its stream form and function from changes in hydrological and sediment inputs, installation of instream structures and treatments, and nearby land management activities. These structures from the 1980s are failing and, in some cases, are negatively affecting the stream and associated habitats. In cooperation with WGFD (project lead), the refuge is planning restoration and enhancement of the creek. After completing a categorical exclusion (FWS 2013a) under the National Environmental Policy Act, in October 2013 the refuge restored 1 mile of Flat Creek, as follows:

- removed 39 deteriorating instream structures
- removed 347 feet of riprap
- enhanced 23 riffle and 25 pool habitat units
- removed 300 square feet of reed canarygrass
- installed 4,184 square feet of woody and sod vegetation
- created 19,000 feet of floodplain

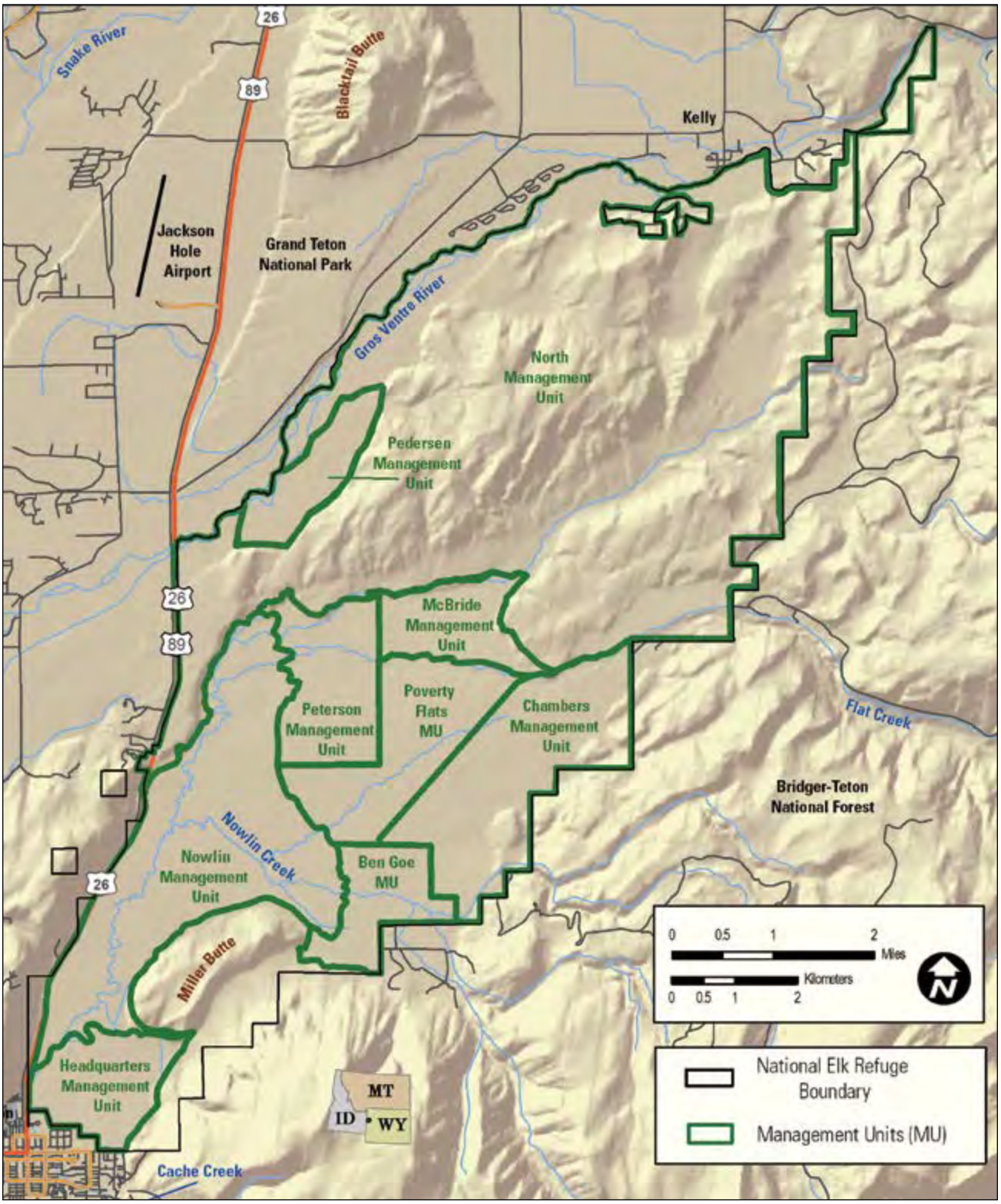


Figure 9. Map of management units and surface hydrology of the National Elk Refuge, Wyoming.

Springs, Ponds, and Other Water Features

Smaller water features include Twin Creek and Holland Spring near the southeastern boundary, Romney and Peterson Springs in the western part, and other miscellaneous springs, like Pierre's Ponds, Sleeping Indian Pond, and Bill's Bayou, throughout the refuge.

Water Quality

Surface water quality in Teton County is believed to be high but can be adversely affected by both point source pollution (such as a gasoline station along Flat Creek) and nonpoint source pollution (such as overland runoff of fecal matter from winter concentrations of livestock). Urban development has little or no potential for influencing surface water quality on the refuge. Lower Cache Creek, however, flows through Jackson, and a diversion from this watercourse (the Cache Creek pipeline) enters the refuge where we use it for irrigation. This section could be affected by urban runoff, potentially affecting downstream water quality (Jackson and Teton County, Wyoming 1994).

There is no information about water quality in Cache Creek near the refuge. However, two ongoing studies on sections of the creek flowing through Jackson, closer to its confluence with Flat Creek, found that petroleum hydrocarbons from vehicles and sodium (probably from compounds used by local road departments for ice melting) are entering Flat Creek, along with city storm water. A similar situation may be occurring on Cache Creek. Zinc, the only heavy metal found in storm water samples, is also flowing into Flat Creek from the town, but we do not know its source (R. Norton, personal communication, as cited in FWS 1998). Hydrocarbon input might be reduced by using storm water retention cisterns.

Another possible nonpoint source of pollution affecting refuge water quality, although not documented as a problem, is the large amount of fecal material produced by wintering elk and bison. We suspect that the high concentration of waterfowl in the Nowlin Marsh area is contributing to decreased water quality in the lower section of Flat Creek on the refuge.

The Teton County Conservation District has conducted water quality sampling on several sites within the refuge (refer to table 3). Nitrates are of particular concern. Although data from 1996 to 2002 showed nitrate levels consistently below the U.S. Environmental Protection Agency's drinking water standards (10 parts per million), detected levels in 1997 and in 2002 were higher than expected for typical western Wyoming waters (R. Stottlemeyer, personal communication, 2003; Stottlemeyer et al. 2003). Irrigation, fertilization, and elk and bison fecal material could be contributing to the elevated nitrate concentrations, but we need further study.

In 2002, the Teton County Conservation District implemented source tracking of fecal coliforms. Results from DNA analysis showed that 34 percent of the coliforms come from rodents, 13 percent from bison, 13 percent from elk, 13 percent from unknown sources, 7 percent from canines, and 7 percent from birds. Farming practices such as disking, seeding, sprinkler and drip irrigation, herbicide and fertilizer application, and crop harvesting may affect water quality and quantity.

We consider ground water resources to be high quality on the refuge as a whole and not subject to septic-related pollution concerns except perhaps around the Twin Creek subdivision and other inholdings. Residential and commercial development in Jackson and elsewhere in Teton County may cause local reductions in ground water quality (Jackson and Teton County, Wyoming 1994). Although Jackson and surrounding areas use centralized wastewater treatment facilities, the perceived major threat to ground water supplies elsewhere in Teton County is pollution from individual septic systems (Jackson and Teton County, Wyoming 1994).

Water Rights

Table 4 displays the refuge's water rights.

Air Quality

In general, the air quality of Jackson Hole is high. Airborne pollutants generated by industrial activities pose no significant threats to air quality in the valley. However, Jackson Hole is a high-elevation valley surrounded by mountains and is particularly susceptible to air quality problems associated with temperature inversions. During periods of high atmospheric pressure, dense cold air is trapped near the valley floor by upper layers of warmer air. Air quality in the southern part of the valley next to Jackson might decline as a result of pollutants trapped in the lower atmosphere during inversions. These pollutants include carbon monoxide generated mostly by automobile emissions, dust particles, and wood smoke. This pattern may persist for several days at a time, but pollutant concentrations are dispersed when weather patterns change, especially when accompanied with winds.

Air quality on the refuge, although not measured or monitored, is considered good to excellent, with low concentrations of pollutants throughout the year. However, the lower elevations and southern part of the refuge may have periods of reduced air quality

Table 3. Average values of selected water quality factors in or near the National Elk Refuge, Wyoming, 1996–2002.

Values	*Flat Creek control [1] (number of samples tested)*	*Flat Creek 1 [2] (number of samples tested)*	*Nowlin Creek [3] (number of samples tested)*	*Flat Creek 2 [4] (number of samples tested)*	*Standard*
Temperature (degrees Fahrenheit, °F)	42.2 °F (8)	45.3 °F (10)	46.5 °F (4)	46.2 °F (11)	68 °F
Dissolved oxygen (milligrams per liter, mg per L)	11.2 mg per L (7)	10.5 mg per L (9)	9.51 mg per L (4)	9.8 mg per L (10)	—
Turbidity (nephelometric turbidity unit, NTU)	0 NTU (3)	1.1 NTU (4)	1.4 NTU (4)	26.8 NTU (4)	—
Acidity or alkalinity, pH (units)	8.29 units (8)	8 units (10)	8.05 units (4)	8.14 units (11)	6.5–9 units
Nitrate as N (mg per L)	less than 0.1 mg per L (6)	0.14 mg per L (7)	less than 0.1 mg per L (5)	less than 0.1 mg per L (7)	10 mg per L
April 2000 sample					
Fecal coliform (coliform per 100 milliliters, col per 100 ml)	3 col per 100 ml	53 col per 100 ml	55 col per 100 ml	60 col per 100 ml	200 col/100 ml
Escherichia (E.) coli (col per 100 ml)	1 col per 100 ml	45 col per 100 ml	49 col per 100 ml	29 col per 100 ml	126 col/100 ml

[1] *Near the boundary of the refuge with the Bridger-Teton National Forest.*
[2] *North of the Jackson National Fish Hatchery.*
[3] *Below the third pond, next to the barn and corral.*
[4] *Outside the refuge's southwestern boundary, below the Dairy Queen, and subject to many outside influences (such as a major highway and gas station).*

from winter temperature inversions and concentrations of airborne pollutants generated by Jackson. Current refuge management practices do not decrease air quality to any measurable degree. Vehicular use of unpaved refuge roads during dry summer and autumn periods generates dust but will likely have only a negligible lowering of overall refuge air quality.

Fire management activities which result in the discharge of pollutants (carbon monoxide (CO), Particulate Matter (PM), and other pollutants from fires are subject to and must comply with all applicable Federal, State, and local air pollution control requirements as specified in Section 118 of the Clean Air Act, as amended, 1990. Air quality is regulated by the State of Wyoming Department of Environmental Quality (DEQ). The State requires that a permit be issued by the DEQ prior to initiating a prescribed fire.

The area is currently designated as "Attainment" for the Criteria Pollutants—Ozone (O_3), Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Sulfur Dioxide (SO_2), Particulate Matter 10 (PM10), Particulate Matter 2.5 (PM2.5), and Lead (Pb)—by the Environmental Protection Agency (EPA) (EPA 2013). The management of smoke is incorporated into the planning of prescribed fires, and to the extent possible, in suppression of wildfires. Sensitive areas will be identified and precautions taken to safeguard visitors and local residents.

Visual Resources

The quality of visual resources is an important part of the recreational experience (USDA Forest Service 1982). The visual appearance of a landscape is often the first thing to which a viewer responds.

The National Elk Refuge, the Grand Teton National Park, and the vast expanses of undeveloped national forest land surrounding the refuge offer spectacular scenic views of the Gros Ventre and Teton Ranges, Cache Peak, East Gros Ventre Butte, Jackson Peak, Sleeping Indian (Sheep Mountain), Snow King Mountain, and the Gros Ventre Hills in the northern part of the refuge. The Gros Ventre River along the northern refuge boundary supports a cottonwood-dominated riparian zone.

Table 4. Water rights owned by the National Elk Refuge, Wyoming.

Priority date	*Water right number*[1]	*Structure name or type*	*Source*	*Flow rate*[3]		*Use*	*Acres irrigated*
				cfs	*gpm*		
06/10/1883	TP 10329	Holland No. 1 Ditch	South Twin Creek	2.28	—	Irrigation, stock	160
06/01/1887	TP 10173	Carnes Ditch	Flat Creek	2	—	Irrigation	140
05/15/1888	TP 10306	Robert E. Miller	Cache Creek Pipeline	2.28	—	Irrigation	160
05/15/1888	TP 10307	Grace G. Miller	Cache Creek Pipeline	2.6	—	Irrigation	182
12/31/1888	TP 10317	Territorial ditch	South Twin Creek	1.07	—	Irrigation	75
12/31/1888	TP 10318	Territorial ditch	South Twin Creek	0.02	—	Irrigation	2
05/08/1899	2106	Dewey Ditch	Flat Creek	1	—	Irrigation	70
02/01/1894	642	Robert E. Miller	Flat Creek (Cache Creek Pipeline)	1.94	—	Irrigation	160
05/28/1894	732	Swamp Ditch	Swamp Creek	2.07	—	Irrigation	145
05/28/1894	732	Swamp Ditch	Swamp Creek	1	—	Irrigation	70
02/07/1896	1175	Petersen Ditch	Flat Creek	2.91	—	Irrigation	204
02/07/1896	1175	Petersen Ditch	Flat Creek	2	—	Irrigation	140
02/07/1896	1176	Longfellow Ditch	Flat Creek	3.18	—	Irrigation	223
02/07/1896	1176	Longfellow Ditch	Flat Creek	1.14	—	Irrigation	80
06/05/1896	1230	Crawford Ditch	South Twin Creek (Holland Creek)	2.28	—	Irrigation	160
08/11/1896	1301	Sheep Creek Ditch	Sheep Creek	0.24	—	Irrigation	17
05/08/1897	1478	M.C. Ditch	Flat Creek	1.9	—	Irrigation	133
06/26/1897	1517	Lanigan Ditch	Flat Creek	1.28	—	Irrigation	90
01/23/1900	2446	Adle Ditch	Flat Creek	1.42	—	Irrigation	100
04/24/1900	2587	Pettigrew Ditch	Spring Creek (Gros Ventre River)	2.84	—	Irrigation	199
06/18/1900	2667	Hanrow Ditch	Warm (Seebolm) Springs	0.86	—	Irrigation	60
06/18/1900	2668	Romeo Ditch	Gros Ventre River	0.32	—	Irrigation	22.48
02/25/1901	3036	Paulina Ditch	Valdez and Uncle Mike Springs (Swamp Creek)	0.35	—	Irrigation	25
04/22/1901	3129	Wood Ditch	Flat Creek	0.42	—	Irrigation	30
04/22/1901	3129	Wood Ditch	Flat Creek	1.38	—	Irrigation	97
10/11/1901	717E	M.C. Ditch Enlargement	Flat Creek	0.92	—	Irrigation	65
11/06/1901	3534	Elk Ditch	Swamp Creek	1	—	Irrigation	70
01/17/1902	3680	Sunnyside Ditch	White Springs (Flat Creek)	1.71	—	Irrigation	120
01/17/1902	3681	Botcher Spring Ditch	Botcher Springs (Flat Creek)	0.5	—	Irrigation	35
05/26/1902	839E	Romeo Ditch Enlargement	Gros Ventre River	1.633	—	Irrigation	114.46
07/28/1902	886E	Pettigrew Ditch Enlargement and Cherry Flats Ditch	Gros Ventre River	1.57	—	Irrigation, domestic	110
11/10/1903	5636	Maggie M. Ditch	Flat Creek	1.42	—	Irrigation	100
07/18/1904	6133	Spencer Ditch	Flat Creek	1.08	—	Irrigation	76

Table 4. Water rights owned by the National Elk Refuge, Wyoming.

Priority date	*Water right number*[1]	*Structure name or type*	*Source*	*Flow rate*[3]		*Use*	*Acres irrigated*
				cfs	*gpm*		
09/07/1905	6847	Ben Goe Ditch	Flat Creek	1.71	—	Irrigation, stock, domestic	120
04/14/1906	1519E	Crawford Ditch Enlargement	South Twin Creek	0.34	—	Irrigation	24
04/28/1906	1534E	Crawford Ditch Enlargement No. 2	South Twin Creek	0.12	—	Irrigation	9
09/07/1906	1612E	Adle Ditch Enlargement	Flat Creek	4.2	—	Irrigation	294.25
04/23/1907	1712E	Longfellow Ditch Enlargement	Flat Creek	0.86	—	Irrigation	60
07/19/1907	1743E	Glidden Ditch Enlargement No. 2	Gros Ventre River	0.62	—	Irrigation	44
07/24/1908	8619	Lost Springs Ditch	Flat Creek	4.35	—	Irrigation	305
07/24/1908	8619	Lost Springs Ditch	Flat Creek	2.21	—	Irrigation, domestic	155
10/30/1908	2146E	M.C. Ditch Enlargement	Flat Creek	0.71	—	Irrigation	50
10/30/1908	2146E	M.C. Ditch Enlargement	Flat Creek	0.47	—	Irrigation	33
05/02/1909	9892	Harry R. Robinson Ditch	Flat Creek	4.2	—	Irrigation	294
12/07/1909	2137E	Ben Goe Ditch Enlargement	Flat Creek	0.57	—	Irrigation	40
05/20/1910	9900	McInelly Ditch	Flat Creek	2.28	—	Irrigation, domestic	160
06/10/1910	2374E	Lost Springs Ditch Enlargement	Flat Creek	1.71	—	Irrigation	120
06/10/1910	2374E	Lost Springs Ditch Enlargement	Flat Creek	2.28	—	Irrigation, domestic	160
06/20/1910	9990	Sam's Ditch	Sam's Springs (Flat Creek)	0.07	—	Irrigation, domestic	5
06/02/1911	10924	Ratcliff Ditch	Flat Creek	3.43	—	Irrigation, domestic	240
06/02/1911	10924	Ratcliff Ditch	Flat Creek	3.85	—	Irrigation	270
06/02/1911	10924	Ratcliff Ditch	Flat Creek	4.43	—	Irrigation	310
01/06/1912	11137	Garton Springs Ditch	Garton Springs (Flat Creek)	0.14	—	Irrigation, domestic	10
04/11/1912	11291	Edith A. Ferrin South Twin Creek Ditch	South Twin Creek	0.57	—	Irrigation, domestic	40



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Romney Ponds

Table 4. Water rights owned by the National Elk Refuge, Wyoming.

Priority date	*Water right number*[1]	*Structure name or type*	*Source*	*Flow rate*[3]		*Use*	*Acres irrigated*
				cfs	*gpm*		
12/23/1912	11635	Scott and McBride Ditch	Flat Creek	3.71	—	Irrigation, domestic	260
12/23/1912	11635	Scott and McBride Ditch	Flat Creek	3.15	—	Irrigation, domestic	221
06/11/1913	11884	Pecos Ditch	Flat Creek	1.46	—	Irrigation, domestic	102.6
07/13/1914	12549	Pasture Ditch	Flat Creek	0.21	—	Irrigation, domestic	15
01/13/1915	3106E	Pecos Ditch Enlargement	Flat Creek	0.57	—	Irrigation, domestic	40
01/26/1915	13001	Pederson Spring Ditch	Springs (Gros Ventre River)	0.5	—	Irrigation	35
02/04/1915	3124E	McInelly Ditch Enlargement	Flat Creek	1.5	—	Irrigation	105
04/24/1917	3772E	McInelly Ditch Enlargement	Flat Creek	2.16	—	Irrigation	150
12/24/1917	3867E	Adle Ditch Enlargement	Flat Creek	0.57	—	Irrigation	40
12/24/1917	3867E	Adle Ditch Enlargement	Flat Creek	0.49	—	Irrigation	34
03/10/1927	17277	Haight Ditch	Flat Creek	1.29	—	Irrigation, domestic	90
12/06/1927	17319	Three Springs Ditch[2]	Sheep Creek	—	—	Irrigation, domestic	7
09/17/1934	18537	Shortcut Ditch[2]	Sheep Creek	—	—	Irrigation, stock	360
11/10/1937	5084E	Sheep Creek Ditch Enlargement[2]	Sheep Creek		—	Irrigation	277.7
05/13/1977	6643E	Hanrow Ditch Enlargement No. 2	Warm (Seebolm) Springs	1.23	—	Irrigation	86
02/20/1990	9637R	Pierre Reservoir No. 1	Spring Creek	—	—	Wildlife	—
03/13/1990	9588R	Pierre Reservoir No. 2	Spring Creek	—	—	Wildlife	—
03/13/1990	10030R	Romney No. 1 Reservoir	Gros Ventre River	—	—	Fish, wildlife	—
03/13/1990	10031R	Romney No. 2 Reservoir	Gros Ventre River	—	—	Fish, wildlife	—
03/13/1990	10032R	Romney No. 3 Reservoir	Gros Ventre River	—	—	Fish, wildlife	—
03/30/1993	7090E	Romeo Ditch Enlargement No. 2	Gros Ventre River	24.4	—	Fish, wildlife, reservoir	—
03/30/1993	7091E	Romey Springs Ditch Enlargement	Gros Ventre River	8.56	—	Fish, wildlife, reservoir	—
01/13/1994	10054R	Elk Park Pond Reservoir	Elk Park Drain	—	—	Fish	0
11/14/2000	UW 130740	Sled No. 1 Well	Ground water	—	25	Domestic	—
02/07/2005	UW 165547	Miller/Shop Well No. 1	Ground water	—	23	Miscellaneous	—
12/11/2009	UW 191934	Shop Well	Ground water	—	30	Miscellaneous	—

[1]UW=underground well; TP=territorial proof number for rights established before statehood.

[2]Supplemental supply.

[3]cfs=cubic feet per second; gpm=gallons per minute.

The most prominent view of the refuge, which is seen by several million visitors annually as they drive to and from Jackson on U.S. Highway 26/89, is the expansive Flat Creek Marsh. During winter, thousands of elk make the refuge an important visual and ecological resource for the region. Although bison are fed in areas that are not visible to the public, the public can see bison along the fence north of the Jackson National Fish Hatchery and in the McBride area before Flat Creek Road is closed in December. As the bison herd grows, bison are more frequently seen in the southern sections of the refuge.

Some refuge features that may detract from the visual quality of the refuge, include the following:

- an 8-foot fence that runs for approximately 8 miles along the southern and western boundaries of the refuge keeps elk and bison from entering the town or migrating to the cattle ranches in Spring Gulch and reduces vehicle–wildlife accidents from animals on the highway.
- a power line that parallels Highway 89 north of Jackson for about 2 miles
- feed trucks and feed sheds
- Jackson National Fish Hatchery, Elk Refuge Road, and refuge housing

3.2 Biological Resources

This section describes the biological resources that may be affected by the implementation of the CCP. Unless otherwise noted, most of the information is from our unpublished data located in files at the refuge headquarters. Descriptions of these topics follow:

- plant communities
- wildlife
- federally listed species and Wyoming SGCN

Plant Communities

We classified 33 plant community types on the National Elk Refuge, 23 of which are dominated by native plants and 10 by nonnative grass species (see figure 10). Homesteaders or refuge staff planted nonnative grass plant communities to support hay production or pasture for livestock or elk. Smooth brome, intermediate wheatgrass, meadow brome, and Russian wildrye are common examples of these plant communities on the refuge. While some of these communities have adapted to natural conditions where adequate soil moisture exists, most are perpetuated by irrigation activities.

For this analysis, we classified vegetative communities on the refuge into one of six general categories: native grasslands, sagebrush shrublands, wetlands (marshlands, wet meadows, and open water), riparian woodlands and aspen woodlands, conifer forests, and cultivated fields (refer to table 5). Appendix D lists the plant species that occur on the refuge.

Table 5. Plant community types on the National Elk Refuge, Wyoming.

Habitat	*Acres*
Native grasslands	8,092
Sagebrush shrublands	8,010
Wetlands	
Marshlands (630 acres)	
Wet meadows (1,720 acres)	
Open water (326 acres)	2,676
Riparian woodlands and aspen woodlands	3,227
Conifer forests	160
Cultivated fields	2,400
Total	24,565

Native Grasslands

Native grasslands are important plant communities on the refuge because they provide winter forage for elk and bison, which are primarily grazers. Native grasslands occur where there is sufficient precipitation to grow grasses but not trees or where drought, frequent fires, grazing by large mammals, or human disturbance have prevented trees or shrubs from becoming established. Native grasslands, including some bluegrass, wheatgrass, and needlegrass species, cover approximately 8,092 acres. Except for localized areas, native grasslands are in good condition, especially in the northern part of the refuge (Eric Cole, biologist, U.S. Fish and Wildlife Service, Jackson, Wyoming, personal communication, 2002).

Most native grassland habitats are dominated by native perennial bunchgrass species with native woody species such as broom snakeweed and green rabbitbrush. There is little invasion by tap-rooted forbs between grass plants. Soil between grasses is



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A wetland at Miller Ranch.

not eroding on most native grasslands on the refuge. Other plant species commonly found in native grasslands include rushes, smooth brome, brome snakeweed, yellow salsify, Junegrass, green rabbitbrush, fringed sage, and alfalfa. We consider these communities, while heavily used by elk and bison, to be largely representative of historical dry, native grassland plant communities and self-sustaining if new infestations of invasive plant species are controlled. In the southern half of the refuge, the Poverty Flats grasslands receive heavy use by elk and Miller Butte receives moderate to heavy use. On the southern end of the refuge, there is little residual growth on bunchgrasses from the previous year of ungulate grazing during the grass dormant season. This removal can increase the production of some perennial bunchgrass plants, although standing dead plant material has been shown to be beneficial to plant health by some authors (Briske 1991, Sauer 1978). The grasslands on the northern end of the refuge receive much less use by elk and bison because of deeper snow and hunting disturbance.

The largest continuous segment of native grasslands is in the center of the refuge: (1) northeast of the Nowlin Creek marshlands; and (2) northwest, west, and east of Flat Creek Road. This area is being invaded by crested wheatgrass, a nonnative grass that we once planted on the refuge.

Sagebrush Shrublands

Sagebrush shrublands encompass approximately 8,010 acres and are scattered throughout the refuge, with the largest concentrations in the east-central and northeastern parts. Sagebrush shrublands are generally tall, dense, and comprised of native species in the northern half of the refuge, with some small areas in the McBride and Peterson management units having shorter, lower density sagebrush (Eric Cole, biologist, U.S. Fish and Wildlife Service, Jackson, Wyoming, personal communication, 2002). In general, sagebrush stands closer to feedgrounds are shorter and less dense. In the southern half of the refuge, sagebrush stands are in poor condition because of overbrowsing by elk and bison and mechanical damage by bison, elk, and feed equipment. Good-condition sagebrush shrubland communities in a late stage of succession have a relatively high diversity and cover of herbaceous plants. It is possible that late-seral sagebrush shrublands on the refuge are overrepresented because of a history of full fire suppression (the benefits of fire were not considered as part of the suppression strategy).

Sagebrush shrublands usually receive more precipitation (or grow on sites with more soil moisture) than grasslands, but less than forested areas. Limited areas of basin big sagebrush have extremely tall

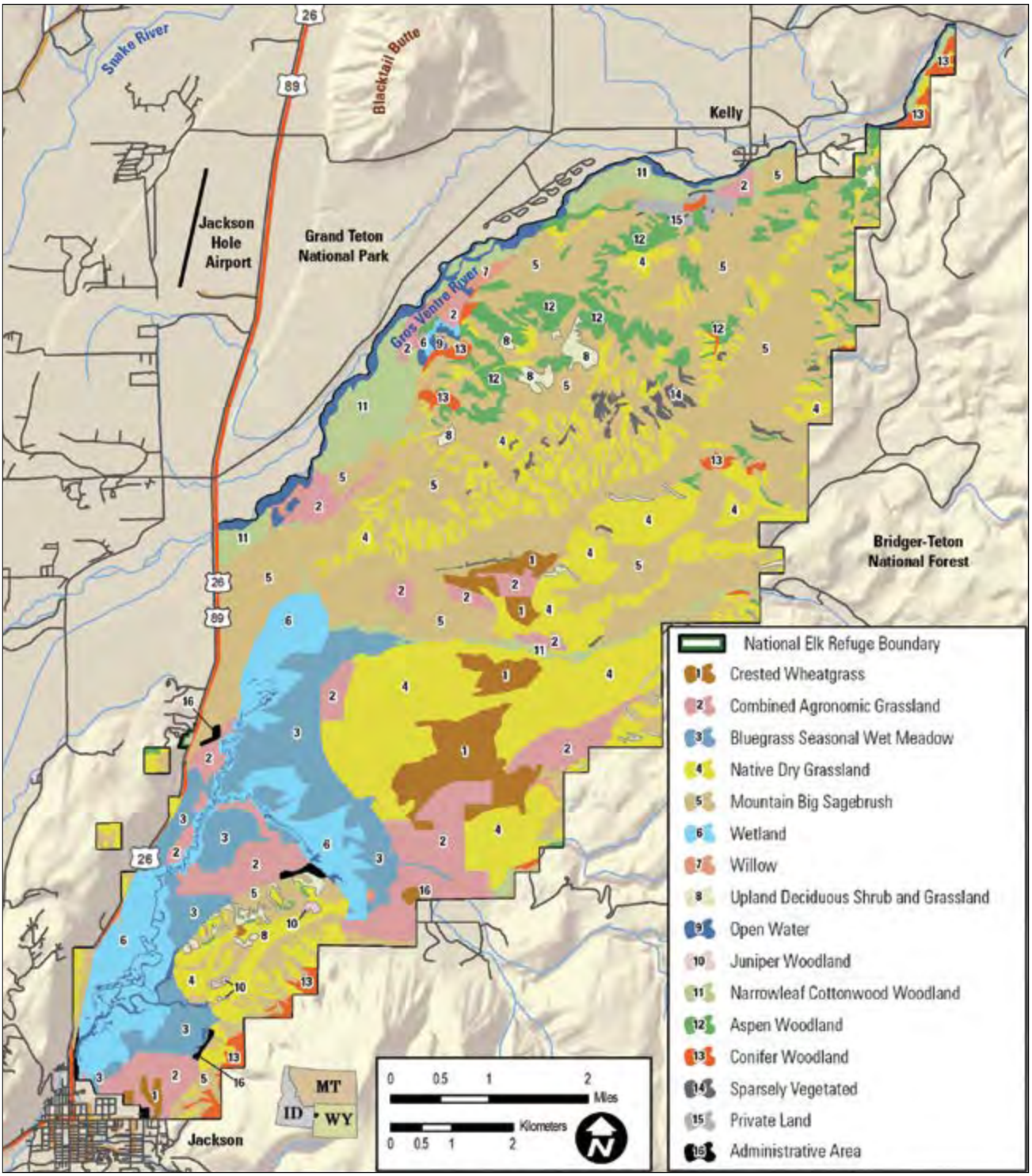


Figure 10. Map of plant communities on the National Elk Refuge, Wyoming.

sagebrush plants (in excess of 9 feet tall), but most sagebrush communities on the refuge are dense, mature stands of mountain big sagebrush less than 3 feet tall. Communities are made up of shrubs and short trees and are fairly open, and there is a diversity of native perennial grasses and native forbs growing between sagebrush plants. Common species in this vegetative grouping are big and three-tipped sagebrush, bluegrass species, snowberry, wild rose, and smooth brome. Douglas rabbitbrush is found throughout the refuge, but occurs as a subdominant. Other plant species commonly found in sagebrush shrubland communities on the refuge are needlegrass, wheatgrass, snakeweed, and rubber rabbitbrush.

There is conflicting information on the fire-return interval and likely historical density of sagebrush stands in the western United States. Knight (1994) suggested that, on a regional scale, the overall grassland and sagebrush shrubland landscape may be remarkably similar today compared to pre-European settlement. Periodic fires produced patches of grassland and young sagebrush intermixed with dense older stands, and presettlement fire intervals were likely every 20–25 years (Tisdale and Hironaka 1981). Therefore, full fire suppression on the refuge has resulted in larger stands of dense, older sagebrush than pre-European conditions. However, more recent work by Bukowski and Baker (2013) suggests that the historical fire-return interval in mountain big sagebrush stands was 137–217 years. Therefore, fire suppression in existing old, dense, tall sagebrush stands on the refuge might be an appropriate management strategy to protect a rare plant community that is important to greater sage-grouse and other sagebrush-dependent species.

Most sagebrush plant communities on the refuge fall within the greater sage-grouse core area as defined by State of Wyoming Greater Sage-Grouse Core Area Protection Executive Order 2011–5. The core area encompasses all areas on refuge north of Flat Creek, slopes east of the Chambers management unit, and the bench above the Jackson National Fish Hatchery (WGFD 2011).

Wetlands

The National Elk Refuge contains approximately 2,676 acres of wetlands, including marshlands, wet meadows, and open water (see figure 10). Wetlands function as a natural sponge that stores and recharges ground water supplies. Wetlands moderate streamflow by releasing water to streams (especially important during drought), and they reduce flood damage by slowing and storing floodwater. Wetland plants protect streambanks against erosion because the roots hold soil in place and the plants break up the flow of stream or river currents. Wetlands improve water quality by filtering sediment, pollutants, and excess nutrients from surface runoff. As one of the most biologically productive ecosystems in the world, the nutrient-rich environment of wetlands provides food and habitat for a variety of wildlife.

Wetlands on the refuge are some of the most diverse and important in Jackson Hole because of their water-regulating functions, visual qualities, and importance to wildlife, especially resident and migratory birds. Most wetlands receive moderate to heavy winter use by elk but vegetation generally recovers its dense and tall condition and largely native species composition during the growing season. Bison rarely used wetlands in the past but recently have begun to graze wet areas next to the Poverty Flats feedground and wet meadows near the Jackson National Fish Hatchery.

Marshlands

Marshlands are low-lying and concave or occur on gentle slopes with seepage. They are inundated frequently or continually with water but are most often persistently saturated. Marshes are characterized by emergent, soft-stemmed vegetation (such as bulrush, cattail, rush, and sedge) that is adapted to living in shallow water or in moisture-saturated soils. Spring-inundated sites, which dry by fall, are also included in this category.

Marshland communities occur on approximately 630 acres of the refuge and are dominated by bulrush, cattail, and sedge species (Eric Cole, biologist, U.S. Fish and Wildlife Service, Jackson, Wyoming, personal communication, 2002). These stands develop to full stature each year dependent on water availability. In marshland habitats, considerable residual material remains under the bases of growing plants from the previous years' herbaceous growth, except in areas that have been burned. There are few invasive plant infestations in refuge marshlands.

Wet Meadows

Wet meadow habitats occur on approximately 1,720 acres on the refuge and are comprised of shrubby cinquefoil, sedges, and grasses such as foxtail barley, timothy, Kentucky bluegrass, tufted hairgrass, and common horsetail. Approximately 1,450 of the 1,720 acres contain willow plants less than 1.5 feet tall, indicating that mature willow stands have been converted to other plant communities because of decades of heavy elk browsing (Smith et al. 2004). Large numbers of elk on the refuge prevent these suppressed willow plants from growing out of the browse zone. However, the root systems of these willow plants remain intact and continue to produce suckers. This suggests that these areas could still support tall, dense willow communities if they were protected from ungulate browsing.

Wet meadow communities are dominated by nearly 100-percent cover of native sedge species and water-tolerant grasses. In some wet meadow habitats, shrubby cinquefoil is a major component of the cover. There is often little residual cover because of heavy grazing by elk. The amount of residual cover in wet meadow communities varies from year to year depending on the depth of snow cover and grazing pressure. There is little invasion from noxious weed species; however, invasive species, such as Kentucky bluegrass, fowl bluegrass, and clover are present in wet meadow habitats.

Open Water

Open water accounts for 326 acres on the refuge and consists of stream and river channels and sites where standing water persists through most years, including pools and ponds.

Riparian Woodlands and Aspen Woodlands

Riparian areas and aspen woodland communities occur on approximately 3,227 acres of the refuge. These habitat types have been declining in condition and acreage throughout refuge history. Riparian woodlands and aspen woodlands are particularly important as wildlife habitat and have been affected by elk and bison browsing.

Riparian woodland habitat consists of approximately 300 acres of willow habitat and about 1,090 acres of cottonwood communities. Riparian woodlands occur along the Gros Ventre River and Flat Creek. Decades of winter browsing by elk have reduced these willows to remnant plants less than 18 inches high. There are 1,450 acres of suppressed willow plants in what are now wet meadow communities, but were once willow habitat. Elk browsing in cottonwood communities has removed understory, and cottonwood trees are not regenerating. Cottonwood stands close to the McBride feedground experience higher snag density and higher down woody debris cover. Cole (2002a, 2002b) did not find a difference in the number of woody plant species in stands closer to feedgrounds as compared to stands farther away, but total woody cover increased with increasing distance from feedgrounds (Smith et al. 2004).

Aspen woodland habitat consists of approximately 1,850 acres of aspen-dominated communities on hillsides, usually some distance from water. Aspen-dominated woodlands are scattered on the Gros Ventre Hills throughout the northern part of the refuge and on the eastern edge of the refuge in the south, next to the Gros Ventre Wilderness. Many aspen stands are characterized by mature trees, with little if any aspen understory. Aspen stands in the northern hills of the refuge appear to be declining slowly, but some aspen communities escape browsing, and stand replacement is occurring periodically. Aspen recruitment is prevented by heavy elk browsing on aspen suckers that prevents most suckers from growing out of the browse zone.

Many aspen stems are approximately 120 years old, which is approaching the maximum lifespan of 150 years. Most of these stands will eventually convert to sagebrush shrubland habitat, primarily in the form of snowberry and rose stands. A few stands may convert to native grassland habitat, depending on their location and the understory condition. Findings by Keigley et al. (2009) suggest that limited-scale regeneration of aspen has occurred on the northernmost parts of the refuge since 2005. Possible but untested explanations of this regeneration include changes in ungulate distributions or migration patterns, changes in ungulate numbers, or some combination of these factors. Cottonwood and aspen saplings grow inside exclosures (fenced areas) on the upper section of Flat Creek, indicating that these trees can replace themselves if ungulates are totally excluded.

Riparian woodlands and aspen woodlands include stands of quaking aspen, narrowleaf cottonwood, and willows. Mountain big sagebrush, bluegrasses, brome



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Cottonwood

species, Douglas-fir, pinegrass, rose species, sedges, and snowberry in some areas may be codominants (those species that influence the kinds of other species that may exist in an ecological community). Engelmann spruce trees are scattered throughout the woodland stands but are subdominant. Other plant species common in riparian woodlands and aspen woodlands are bearberry honeysuckle, bitterbrush, buffaloberry, chokecherry, horsetail, mountain timothy, muhly, needlegrass, rush species, serviceberry, wheatgrass species, and yellow salsify.

Dobkin et al. (2002) state that willow, cottonwood, and aspen stands on the refuge have been modified by overbrowsing by ungulates; this is based on historical photographs, written records, and an understanding of the ecology of these communities. Dieni et al. (2000) and Smith et al. (2004) also note the growing experimental evidence that ungulate browsing is the cause of declines in aspen and cottonwood communities. Dobkin et al. (2002) also found that willow sites on the refuge were "mostly poorly functioning or nonfunctioning ecologically." They concluded that although willow habitat is influenced by flooding, hydrologic conditions, ungulate use levels, fire frequencies, and precipitation patterns, the decline of willows on the refuge appears to be mostly related to heavy browsing (28- to 55-percent removal of annual growth). The decline of willows along Flat Creek in the southern part of the refuge has exceeded 95 percent (Smith et al. 2004). Shrubby cinquefoil, a less palatable woody species, is abundant in this prior range of willows and has probably increased as willows declined. In contrast, willows in the northern end of the National Elk Refuge are moderately browsed, and only some willow plants reach their full height potential. Growth of new willow stems out of the browse zone is sporadic, and there is some space between most willow clumps.

Riparian area restoration will be designed to modify bank and streambed structure and will not address ungulate browsing of willows or facilitate their recovery (Biota 2013a, 2013b; FWS 2013a).

Conifer Forests

Conifer forests on the refuge cover 160 acres and consist of Douglas-fir, juniper, lodgepole pine, wheatgrasses, and other plant species. Conifer forests occur mostly on the extreme eastern edge of the refuge in the north and in the south on hillsides next to Bridger-Teton National Forest and on the northern slopes of the Gros Ventre Hills. Elk use the refuge forests and the adjacent national forest land for cover and shelter from winter storms, and they graze on palatable understory shrubs and grasses. Bison rarely use conifer stands.

Regeneration of young conifer trees appears sufficient to replace existing stands, but subdominant species in these communities that are much more palatable to elk, such as serviceberry and chokecherry, are heavily browsed and are not regenerating. Other plant species common in conifer forests on the refuge are bluegrass species, buffaloberry, pinegrass, mountain boxwood, and snowberry.

Cultivated Fields

Cultivated fields, which we plant specifically to augment native forage that is available for elk in the winter, are used extensively by elk and bison. The refuge chooses cultivated plant species based on their palatability, persistence, ability to compete with weeds, low probability that they will invade native grasslands, and their ability to stand up after a heavy snowfall. Only part of the approximately 2,400 acres available for cultivation would likely be cultivated in any particular year. Most cultivated fields on the refuge are irrigated using the K-Line irrigation system that was installed in 2010, with limited flood irrigation in the Ben Goe and Pedersen management units.

Ten plant community types are in the cultivated fields in the southern and central parts of the refuge. Dominant plant species include alfalfa, intermediate wheatgrass, Kentucky bluegrass, Russian wild rye, smooth brome, and meadow brome. Smooth brome, the most common species, provides moderate-quality standing forage but is undesirable because of its inability to remain erect in heavy snow. Smooth brome also requires irrigation in drought years and may spread to suitable sites in other cultivated fields and native grassland habitats. Experiments with other plant species are continuing in an effort to find palatable grass species that will meet refuge forage production objectives and to assess the practicality of restoring native species to some areas.

Forage Production

Forage production is an estimate of the amount of food available to elk and bison produced in a given growing season. This includes (1) annual growth of trees and shrubs that is less than 8 feet from the ground, and (2) herbaceous vegetation such as grasses, forbs (nonwoody broad-leaved plants), and weeds, which are a subcategory of forbs. Annual forage production mostly depends on the species composition of the plant community, precipitation, the amount of water available for irrigation, the number of staff members available for irrigation activities, and infestation by insect herbivores such as grasshoppers. The time of year that precipitation occurs is also important; rain in the spring and early summer increases forage production more than later in the year.

Table 6. Estimates of forage production on the National Elk Refuge, Wyoming.

	Type of forage and amount in tons					
Year	*Grass*	*Forb*	*Woody*	*Weed*	*Total*	*Herbaceous*
1998	17,655	1,849	1,344	170	21,018	19,647
1999	13,904	1,924	3,120	0	18,948	15,850
2000	9,879	1,304	2,189	116	13,488	11,299
2001	7,641	1,353	2,230	65	11,289	9,059
2002	7,980	1,323	4,571	228	14,102	9,531
2003	5,185	1,307	3,923	218	10,633	6,710
2004	16,324	2,927	5,153	345	24,749	19,597
2005	15,881	2,011	3,998	98	21,988	17,990
2006	12,757	2,523	3,505	187	18,972	15,468
2007	10,019	2,310	2,861	45	15,235	12,374
2008	13,087	3,272	4,009	57	20,425	16,414
2009	15,100	2,524	3,809	11	21,444	17,635
2010	11,374	2,241	2,335	37	15,987	13,653
2011	15,677	3,226	2,445	4	21,352	18,907
2012	9,873	1,800	1,844	7	13,524	11,677
Annual average	12,156	2,126	3,156	106	17,544	14,387

Source: National Elk Refuge, Wyoming, 1998–2012.

Table 6 shows estimates of forage production between 1998 and 2012. Not all annual forage production on the refuge is available to, or used by, wintering elk. Factors such as topography, location, snow accumulation and condition, species preference and palatability, growth form of vegetation, hunting pressure, and other factors work in concert to influence forage availability and elk use. Higher annual forage production often results in shorter supplemental feed seasons, but snow conditions and the number of elk and bison occupying the refuge also influence the length of the feeding season.

Invasive Plants

Invasive plant infestations cover about 1,100 acres of the refuge. Invasive plant species (some of which are classified as noxious weeds by the State of Wyoming) are major contributors to the loss of quality wildlife habitat and rangeland, second in scope only to land development. Invasive species are nonnative plants that thrive in early succession plant community conditions where their lack of native controls (such as wildlife and insect grazers, fungal infections, and disease agents) allow them to outcompete native species in colonizing disturbed soil sites. After successful site colonization, invasive plants aggressively spread into surrounding plant communities, outcompeting native and crop plants by crowding them out, changing environmental conditions such as water availability and fire regime, and depositing chemicals into the surrounding soil that prevent other plants from successfully growing in those areas. The result is large and expanding single-species stands of vegetation that provide little or no benefit to native wildlife and insects.

Many invasive plant infestations on the refuge are a direct result of abandoned livestock feeding areas and corrals, old homesites, and roadbeds. At least 19 species of invasive plants are present (table 7).

Invasive species reduce the diversity and number of native plants and change habitats, such as replacing a grass community with a forb community. Invasive plants do not provide quality winter forage for elk and other big game and often modify habitat of native wildlife and insects. Studies in Montana show that bison and deer reduced their use of a particular habitat by 70–82 percent when it was invaded by leafy spurge. Elk forage in bunchgrass sites decreased by 50–90 percent after a spotted knapweed invasion (Teton County Weed and Pest District 2002). Invasive plants also fail to protect and hold soil because they generally have a shallow root system, leading to increased erosion and sedimentation in streams. This, in turn, affects water quality and decreases fish production.

Crested wheatgrass covers approximately 650 acres. While this nonnative plant is palatable to elk and bison in the spring, it has little nutritional value to wildlife as winter forage. Its spread is a concern

Table 7. Noxious weed species on the National Elk Refuge, Wyoming.

Scientific name	*Common name*	*Range of infestation acreage*
Cardaria draba	Whitetop	5–30
Carduus nutans	Musk thistle	35–125
Centaurea maculosa	Spotted knapweed	25–120
Centaurea repens	Russian knapweed	<1
Centaurent diffusa	Diffuse knapweed	<1
Cirsium arvense	Canada thistle	0.1–15
Cirsium vulgare	Bull thistle	<0.5–10
Convolvulus arvensis	Bindweed	<0.1
Cynoglossum officinale	Houndstongue	0.2–2
Hyoscyanus niger	Black henbane	<0.2
Lepidium latifolium	Perennial pepperweed	0.1
Leucanthemum vulgare	Oxeye daisy	<0.1
Linaria dalmatica	Dalmatian toadflax	0.2–2
Linaria vulgaris	Yellow toadflax	<1
Matricaria perforata	Scentless chamomile	<0.2
Onopordum acanthium	Scotch thistle	0.1–1
Sonchus arvense	Marsh sowthistle	5–20
Tanacetum vulgare	Common tansy	<0.5
Verbascum thapsus	Wooly mullein	1–15

because the refuge is a winter range for ungulates. Although grassland condition in crested wheatgrass areas is good in terms of relative forage production, minimal erosion, and vigorous grass growth, the cover in these areas of native grass species has been reduced by 50–90 percent and replaced by crested wheatgrass (Eric Cole, biologist, U.S. Fish and Wildlife Service, Jackson, Wyoming, personal communication, 2002). Therefore, the invasion of crested wheatgrass has the potential to modify the condition of native grassland habitats on the refuge.

Cheatgrass has invaded an estimated 250 acres of native grasslands on the refuge. This annual grass is a prolific seed producer and cures out early in the summer, producing sharp, pointed seeds that can injure the eyes and mouths of grazing animals. Cheatgrass may provide forage for elk and bison in the spring during greenup, but has little nutritional value as winter forage. It is considered a serious problem because the dry grass is highly flammable, and after a fire cheatgrass spreads quickly. In the past, cheatgrass was not considered a problem in Jackson Hole because the climate was too wet; the recent drought, however, has allowed cheatgrass to expand rapidly.

The refuge and Grand Teton National Park both use biological, cultural, chemical, and mechanical means to control invasive plants. Invasive plants on the refuge have not substantially affected forage conditions, but spotted knapweed and musk thistle invasions in the park are considered serious (S. Haynes, biologist, Grand Teton National Park, Moose, Wyoming, personal communication, 2002).

Control work can be effective at containing an infestation to existing areas, but it generally is not at the level required to eradicate large infestations. Control operations are expensive, requiring designated staff, equipment, and chemicals. By its very nature, control is never complete because an infestation is never eradicated, and any lapse in vigilance allows the infestation to spread into surrounding areas. Yearly control operations are less expensive than large-scale eradication programs but, over the long term, can be much more expensive. Herbicides are the most effective means of control on invasive plants, but some people are suspicious of their use and concerned about their effects on the environment.

Wildlife

Descriptions of habitat and occurrence follow for wildlife at the refuge—mammals, birds, reptiles and amphibians, and fishes.

Mammals

Forty-eight native species of mammals inhabit the refuge:

- Elk, bison, bighorn sheep, pronghorn, and mule deer are the varied large ungulates (hoofed mammals) common on the refuge.
- Carnivores include coyote, gray wolf, mountain lion, and black bear.
- Small mammals are abundant in Jackson Hole.
- Large rodents that occur in Jackson Hole are yellow-bellied marmots, porcupines, and beavers.
- Midsize predators inhabiting the refuge include badger, bobcat, long-tailed weasel, ermine, mink, and bobcat. Raccoon, skunk, and red fox are uncommon, perhaps because of competition with the coyote.

Elk

Elk are the most abundant large mammal species occupying the National Elk Refuge, and their conservation is the reason the refuge was established. The creation of Yellowstone National Park in 1872 and the National Elk Refuge in 1912 was crucial in terms of protecting elk and their winter ranges in Jackson Hole. The creation of Grand Teton National Park in 1929, as well as its expansion in 1950, consolidated and protected elk summer ranges in Jackson Hole.

Supplemental feeding of elk wintering on the refuge was started in 1912 to mitigate the loss of natural winter range and prevent elk from eating livestock forage on private land next to the refuge. By the 1930s, the feeding program had successfully stabilized the elk population. Elk were fed baled hay during at least part of most winters from 1912 to 1975. In 1975, after several years of testing, a switch was made to alfalfa pellets (Smith and Robbins 1984). "No-feeding years" have occurred irregularly and infrequently. Since the refuge was established in 1912, there have been 9 years when no supplemental feed was provided for elk; the last such winter was in 1980–81.

Biologists from the refuge and WGFD evaluate several factors to figure out whether feeding is needed, and if so, when it should begin and end. The feeding start date primarily depends on the amount of standing forage that is accessible to elk, which is influenced by (1) the amount of forage produced the previous growing seasons, (2) elk and bison numbers, (3) the timing of migration, (4) winter temperatures, and (5) snow conditions. Feeding typically ends within 1 week of the first day that snow has completely melted on the southern end of the refuge. These conditions correspond with new grass growth or sufficient residual forage from the previous growing seasons being exposed by melting snow. Since 1912, the period of supplemental feeding has ranged from "no feeding" to a maximum of 147 days, with an average of 70 days annually.

The 2014 winter population classification count for the Jackson elk herd was 11,423 animals (A. Courtemanch, biologist, WGFD, Jackson, Wyoming, personal communication, 2014). This is within 5 percent of the State's population objective of 11,000 for the herd size. Although the Jackson elk herd as a whole is near objective, the winter distribution of these elk is weighted heavily toward feedgrounds, and subobjectives for the population have not been met. The winter distribution of elk, including how many are on feed on the refuge is heavily influenced by annual snow conditions. Table 8 shows population objectives and actual population estimates from 2011 to 2014 for the Jackson elk herd and for segments of the population based on where elk spend the winter. The challenge to managers in meeting these objectives is to reduce the number of elk wintering on the refuge while increasing the use of native winter range.

Depending on spring conditions, elk begin leaving the refuge in late March and early April, and almost all elk have left the refuge for calving and summer ranges by mid-May. Historically, it was common for 100–200 elk to summer on the northern portion of the refuge, but currently almost no elk exhibit this behavior. The decline in summer resident elk on the refuge could be linked to hazing activities by refuge staff, the relatively recent presence of denning wolves on the refuge, changes in refuge hunting seasons, or some combination of these factors. The refuge focus for elk management is to reduce the duration of time that elk spend on the refuge to conserve winter forage, minimize the need for winter feeding, and reduce disease risk. Therefore, the decline in summering elk is viewed as a positive development by refuge managers.

Elk summer in five distinct areas: (1) southern Yellowstone National Park; (2) Teton Wilderness; (3) Bridger-Teton National Forest south of Teton Wilderness; (4) Grand Teton National Park north of Beaver Creek; and (5) Wilson to Beaver Creek, which comprises both private and Grand Teton National Park lands. Refuge staff have collared cow elk on the feedgrounds since 1978. The proportion of elk that migrate long distances from Yellowstone National Park appears to have declined over time, while the proportion of elk that migrate relatively short distances (Wilson to Beaver Creek) has increased dramatically (Cole and Foley et al. 2015). The shift

Table 8. Winter elk population objectives and actual population estimates for the Jackson elk herd and wintering areas from 2011 to 2013.

Winter range area	*Number of elk*					
	Herd objective	*2011*	*2012*	*2013*	*2014*	*Average*
National Elk Refuge on feed	5,000	7,746	7,360	6,285	8,296	7,422
Gros Ventre drainage	3,500	2,775	3,265	2,982	2,377	2,850
Other winter range	2,500	982	894	1,784	750	1,103
Total	11,000	11,503	11,519	11,051	11,423	11,374

appears to be a long-term population response, rather than individual elk switching summer ranges, but the causes of this shift remain unclear. We are examining data associated with this phenomenon and hope to publish these results. Changes in elk use of summer range are important to managers because long-distance migration by mammals is imperiled globally, plus it will be difficult to reach the refuge population objective of 5,000 elk with a growing segment of short-distance migrants. Another factor is that the Yellowstone National Park and Teton Wilderness segments are economically important to hunting guides and outfitters.

Monitoring focuses on evaluating the management strategies designed to meet the objectives of the Bison and Elk Management Plan. The primary tasks of the refuge's biological staff are to monitor the following: (1) elk and bison populations; (2) forage production relative to irrigation and other habitat enhancement projects; and (3) variables that determine start and end dates of the supplemental feeding program.

The refuge accomplishments below correspond with the elk management topics in the Bison and Elk Management Plan:

Habitat Goals

- In 2007, the refuge reseeded 100 acres of agricultural fields to increase production of nutritious, palatable natural standing winter forage.
- From 2007 through 2012, refuge staff annually treated approximately 1,000 acres of grasslands with a harrow (a farm implement used to break up and even plowed ground) to break up accumulations of elk and bison manure and to promote grass production.
- In 2010, we installed a new $5.2 million irrigation system to substantially expand and improve irrigation capacity to increase winter forage. Water use was reduced and irrigated acres increased from approximately 900 acres to 3,300 acres annually.

Population Goals

- The refuge set up a new South Unit elk hunt on the refuge.
- The staff developed the online Refuge Hunting Permit Application System to encourage broader participation in the refuge elk hunting program.
- In 2007–12, we provided recommendations and participated in the annual process for setting the elk season and harvest objectives with WGFD and Grand Teton National Park.

Information and Outreach Goals

- In 2007, refuge staff developed the Sleigh Ride Tour Interpretive Manual for the sleigh ride concessionaire to cover key messages of the Bison and Elk Management Plan and the Refuge System. Annually, 20,000–25,000 people take this tour.
- In 2007, we started an interpretive training program for the sleigh ride concessionaire's staff to ensure accurate delivery of key messages from the Bison and Elk Management Plan. We conduct this training annually.
- Since 2007, the refuge has presented programs to key community and conservation organizations that included explanations of management activities and strategies to achieve the goals outlined in the Bison and Elk Management Plan. Organizations and individuals include Grand Teton Association Board of Directors; Jackson Hole Historical Society; Jackson Hole Rotary; The Nature Conservancy; Teton County Commissioners; Wyoming Outfitters and Guides Association; Yellowstone Business Partnership; and local, State, and Federal elected officials.



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Sleigh ride tours enhance the information and outreach goals of the refuge.

- Since 2007, we have implemented new visitor programs to highlight refuge management activities and the above topics. Programs include roving naturalist, daily visitor center program, wildlife caravans, and teacher seminars on refuge management.

- Staff conduct school programs designed to build a foundational understanding about refuge management and basic elk and bison ecology for hundreds of school-age children.

- Refuge staff discuss refuge management goals and practices in news releases and articles that we send to an email contact list of several hundred people, including elected officials, media, and local nonprofit organizations.

Supplemental Feeding Program

- With WGFD, the refuge developed criteria to coordinate the seasonal start of the supplemental feeding program. We have successfully used this criteria since the 2008 feeding season (refuge files). The refuge and our cooperators are collecting remote sensing and elk nutritional data to develop criteria to determine the seasonal end of the supplemental feeding program.

Disease Prevention

- Beginning in 2007, we annually coordinate with WGFD each winter to vaccinate elk for brucellosis.

- The refuge provided money from 2007 through 2013 to WGFD for hiring technicians to collect samples for chronic wasting disease on the refuge and vicinity from hunter-harvested elk during the hunting season. Most years, testing has been at the level of 95-percent confidence of detecting chronic wasting disease at 1-percent prevalence.

- Since 2008, as a standard operating procedure, permanent refuge employees carry a firearm in the tractor during supplemental feeding. They are instructed to immediately shoot any elk that exhibit suspected symptoms of chronic wasting disease. We make sure that all elk collected are tested for the disease. Employees receive training in identifying the symptoms of chronic wasting disease and must pass a firearms proficiency test.

- In 2009, with the Wildlife Health Office in Bozeman, Montana (Tom Roffe), the refuge started a long-term project to monitor the

health of elk and bison herds. The purpose of the project is to identify the presence and prevalence of all diseases in these herds. Also, part of the monitoring project is looking at whether management actions cause environmental conditions that increase the presence or prevalence of diseases. All elk collected for this project are tested for chronic wasting disease. From 2009 to 2013, 145 elk were collected and tested for a variety of diseases.

- In 2008, the refuge established the Chronic Wasting Disease Working Group, comprised of land and wildlife management agencies that have influence on the Jackson elk herd: Bridger-Teton National Forest, Grand Teton National Park, National Elk Refuge, WGFD, and Yellowstone National Park. The purpose of this group is to share information. When possible, we leverage efforts to detect the presence of the disease and reduce the risk of environmental contamination by chronic wasting disease.

- One of the outcomes from the Chronic Wasting Disease Working Group is a consensus about the importance of increased surveillance for the disease. The Grand Teton National Park, WGFD, and the refuge will all pursue money for more technicians to increase samples from hunter-harvested elk. The coordination of this effort and potential sharing of these technicians between agencies was the topic for the working group meeting in March 2009.

- The WGFD has provided free testing for chronic wasting disease to the refuge and Grand Teton National Park hunters. We anticipate that increased public awareness, combined with the ability for hunters to test their harvested elk, will increase the sample size for testing for chronic wasting disease on the refuge and the Grand Teton National Park.

Planning

- Since November 2012, the refuge has been developing the Bison and Elk Stepdown Management Plan for the Bison and Elk Management Plan.

Bison

The Jackson bison herd is of special importance as one of the last remnants of the extensive wild herds that once roamed much of North America. As bison continue to inhabit the landscape of what remains of the western frontier, a part of the unique American experience is preserved for future generations. This section describes (1) bison on the refuge, (2) bison in the Greater Yellowstone Ecosystem, and (3) Jackson Hole Wildlife Park.

Bison on the Refuge

The free-ranging bison established fairly well-defined movement patterns in Grand Teton National Park, spending summers in area of The Potholes, Signal Mountain, and the Snake River bottoms and wintering in the Snake River bottoms and farther south (see the "Jackson Hole Bison Herd Seasonal Ranges" map on page 150 of the environmental impact statement [EIS] for the Bison and Elk Management Plan [FWS and NPS 2007b]). During the early 1970s, the bison wintered in the river bottoms north of the community of Moose and in the Kelly Hayfields vicinity, east of Blacktail Butte. Since the winter of 1975–76, however, most of the herd has wintered on the National Elk Refuge (except during the mild winter of 1976–77).

Our agency has jurisdiction over wildlife including bison on the refuge (16 U.S.C. 668dd) and the National Park Service has jurisdiction over wildlife in Grand Teton National Park (16 U.S.C. 1). In 2002, WGFD and the Wyoming Livestock Board defined two "wild bison" management areas, one for the Absaroka herd and the other for the Jackson herd. The State has jurisdiction over bison from the Jackson wild bison herd in "all lands in Lincoln, Sublette and Teton Counties west of the Continental Divide, excluding Grand Teton National Park, Yellowstone National Park and the National Elk Refuge."

Bison are counted annually on the refuge in the winter and in the park in the summer. WGFD also conducts annual aerial surveys of bison on native winter range. As of February 2006, the herd numbered 948. Between 1969 and 1985, the refuge did little to manage bison. We documented the size of the herd and its sex and age composition on an opportunistic basis. A study was initiated in 1997 to find out more about bison demography, reproduction, and effects of brucellosis on the population.

Soon after the bison began wintering on the National Elk Refuge, they discovered the supplemental feed put out for the elk. Although the staff tried to haze bison away from the elk feeding areas, our efforts were largely unsuccessful. Consequently, the refuge staff resorted to liberally feeding bison to keep them away from elk feed lines and to reduce conflicts. We are concerned about bison wintering on the refuge because of (1) increased consumption of supplemental feed and the associated cost; (2) conflicts with the elk-feeding program and management

guidelines for the refuge; (3) human safety concerns near the refuge visitor center, along Elk Refuge Road, and in the town of Jackson when bison approached the refuge's southern entrance; and (4) property damage such as broken fences and signs. Since discovering the elk feed lines on the refuge in 1980, the bison herd has greatly increased in size. We culled 16 bison and conducted a special permit hunt (taking 19 bison) in an effort to reduce the herd. However, litigation brought hunting to an end on the National Elk Refuge. We had not done any herd reductions on the refuge since 1990, and the bison population continued to grow at a rapid rate, increasing annually by approximately 10–14 percent.

In the 1970s and 1980s, bison on private land or animals that were a threat to human safety or property were shot. In 1989, the Wyoming Legislature authorized a reduction season for wild bison. To slow population growth, WGFD reinitiated hunting in 1998, outside the National Elk Refuge and the Grand Teton National Park, where bison could legally be hunted. Few bison have been killed, however, because the animals are mainly distributed within the refuge and park lands. The annual number of bison harvested ranged from a low of 4 in 1998 to a high of 47 in 2002.

Bison hunting was initiated under the EIS for the Bison and Elk Management Plan (FWS and NPS 2007b) in 2007. From 2007 to 2013, hunters harvested an average of 204 bison per year. This harvest level has been enough to prevent further growth of the Jackson bison herd, but sustained reduction in the population to the objective of 500 bison has not been achieved. As of winter 2014, there were approximately 825 bison in the Jackson herd.

The refuge accomplishments below correspond with the bison management topics in the Bison and Elk Management Plan:

Habitat Goals

Same as under "Elk" above.

Population Goals

- In 2007, we started an annual, public bison hunting season to reduce the population. The season length was increased several times to maximize harvest. We are offering a 157-day season in 2014–2015, from August 15 through January 18. Annual harvest is strongly linked to weather conditions and has varied from a high of 266 to a low of 139.

- In 2008, we developed the first memorandum of agreement with the Shoshone-Bannock Tribes to conduct a ceremonial bison event on the refuge. The tribes have harvested an average of five bison annually through this agreement.

- The bison winter population has been reduced from approximately 1,250 in 2007 to approximately 825 in 2014.

Information and Outreach Goals

Same as under "Elk" above.

Disease Prevention

- The refuge denied WGFD's request to administer the brucellosis vaccination to 700 bison using syringe darts during the winter of 2007–8. The effective retrieval of used syringes from bison using this untested approach was in question. Large numbers of unretrieved syringes littering the refuge would pose a safety hazard to refuge employees, hunters, and other wildlife. The WGFD decided the delivery system needed further refinement and did not make a similar subsequent request.

- In 2009, with the Wildlife Health Office in Bozeman, Montana (Tom Roffe), the refuge started a long-term project to monitor the health of elk and bison herds (same as under "Elk" above).

Planning

Same as under "Elk" above.

Bison in the Greater Yellowstone Ecosystem

The American bison is native to Jackson Hole (Ferris 1940, Fryxell 1928, Hall and Kelson 1959, Long 1965, Love 1972, McDonald 1981, Skinner and Kaisen 1947, Wright et al. 1976). Prehistoric bison remains have been found throughout the valley, along the Gros Ventre River, on the western slope of the Gros Ventre Range, on the National Elk Refuge, and along the Snake River south of Jackson (Ferris 1940, Fryxell 1928, Love 1972). Historically, bison likely lived in the northern areas of Jackson Hole as well, especially in summer. Areas where bison remains have been found represent key ungulate wintering areas, where most bison mortality would be expected to occur.

We do not know how many bison once lived in Jackson Hole. At least one reference exists, however, for an observation of "a large herd of buffalo in the valley" in June 1833 (Ferris 1940). The near extinction of the American bison occurred throughout the 19th century. By the 1820s, bison were confined almost exclusively to lands west of the Mississippi River. Many of these herds began to decline after 1830, as market hunting for hides accelerated, and prolonged drought in the 1840s further reduced bison numbers. After the Civil War, competition from



Lori Iverson / FWS

Moose

domestic cattle and the greatly intensified market hunting for "buffalo" robes and tongues decimated the Great Plains herds. Tourists on railroad-shooting excursions killed thousands more. A final contributing factor was the introduction of cattle-borne contagious diseases, which reached epidemic proportions in 1881 and 1882. The combination of cattle, hunting, and epidemic disease all but eradicated the once immense western herds. By 1890, only about 300 bison remained in the United States (Malone et al. 1976).

Bison were mainly extirpated from the Greater Yellowstone Ecosystem, including Jackson Hole, by the mid-1880s (Trenholm and Carley 1964). A small herd continued to live in Yellowstone National Park (Bailey 1930, as cited in Long 1965; Wright 1984). While private herds existed throughout the United States, by 1902 no more than 23 individual bison remained of the thousands that had occupied the Yellowstone area since prehistoric times (Callenbach 1996). A small group of 8–12 free-ranging bison, whose origin is unknown, persisted in west-central Wyoming's Red Desert until the mid-1950s (Love, personal communication, as cited in NPS and FWS 1996).

Jackson Hole Wildlife Park

Except for three Yellowstone National Park bison that wandered south into Jackson Hole in 1945 (Simon, no date), bison were absent from Jackson Hole from at least 1840 until 1948. That year, 20 animals (3 bulls, 12 cows, and 5 calves) from Yellowstone National Park were reintroduced to the 1,500-acre Jackson Hole Wildlife Park near the community of Moran. This was a private, nonprofit enterprise sponsored by the New York Zoological Society, the Jackson Hole Preserve, Inc., and the Wyoming Game and Fish Commission (Simon, no date). Jackson Hole Wildlife Park served as an exhibit of important large mammals as well as a biological field station for the Rocky Mountain area. The 20 bison were considered the property of Wyoming.

In 1950, the expansion of Grand Teton National Park took in the Jackson Hole Wildlife Park, and management of the bison shifted to the National Park Service. By 1963, the National Park Service coordinated most management actions with WGFD: winter feeding, capturing bison that escaped the confines of the wildlife park (which occurred several times annually), and routine brucellosis testing and vaccination. The national park kept a population of 15–30 bison in a large enclosure until 1963 when brucellosis was discovered in the herd. Several months later, the 13 adults were destroyed to rid the herd of the disease. The national park kept four yearlings that had been vaccinated against brucellosis as calves and five new calves, which had also been vaccinated. In 1964, 12 certified brucellosis-free bison (6 adult males and 6 adult females) from Theodore Roosevelt National Park were added to the Moran bison population, bringing the total number of animals to 21. These bison represented the latest in a long line of introductions from several herds (Shelley and Anderson 1989). In 1968, the population was down to 11 adults, all of which tested negative for brucellosis, and 4 or 5 calves. Later that year, the entire herd escaped the confines of the park. In 1969, the National Park Service eventually allowed the herd to range freely, partially because of recommendations contained in a report commissioned by the Secretary of the Interior on wildlife management in the national parks (Leopold et al. 1963).

Bighorn Sheep

Historically, bighorn sheep on the refuge were primarily winter residents that migrated from the Gros Ventre Range. From November to May, they occurred on the eastern slopes of Miller Butte and in the eastern parts of the refuge near Curtis Canyon. In recent years, small numbers of sheep have been observed on Miller Butte year-round, although peak numbers occur in winter, with most still migrating to the Gros Ventre Range. As many as 98 bighorn sheep were observed during on Miller Butte in 2012, and 62 sheep were observed in winter 2013. The herd has undergone two pneumonia outbreaks in the last 15 years, the first in 2001–2002 and the second in 2011–

2012. The most recent outbreak resulted in an approximately 30 percent population reduction.

Pronghorn

As many as 60 pronghorn have summered on the refuge in recent years. Occasionally, up to 34 pronghorn have wintered on the refuge, but survival for overwintering pronghorn is typically poor due to severe winter conditions and predation by coyotes.

In the past, as many as 450 pronghorn summered in Jackson Hole (including the Bridger-Teton National Forest, Grand Teton National Park, and National Elk Refuge). Although the population declined to approximately 175 in the early 2000s, recent surveys suggest there are approximately 400 pronghorn in Jackson Hole. Most pronghorn migrate south out of the valley, through the Gros Ventre Range, to winter range in the Green River Basin, which is about 100 miles one way.

Mule Deer

In spring through fall, a small number of mule deer can be found on the northern part of the refuge in the Gros Ventre Hills and along the Gros Ventre River. These deer may leave this area at the beginning of elk hunting season in October. Mule deer on the refuge winter primarily on Miller Butte, but their numbers have greatly declined since the refuge closed an old feed shed that allowed deer access to alfalfa pellets. No deer were seen on Miller Butte during the winters of 2001–2, 2002–3, 2003–4, or 2004–5; eight were seen in the winter of 2005–6.

Mule deer in Jackson Hole belong to the deer herd in Sublette County (southeast of Teton County), whose estimated population averaged 24,528 from 2007 through 2011, with an estimate of 21,969 for 2012 (WGFD 2013). The Sublette deer herd ranges from the Wind River Range north to the Gros Ventre Range, west to the Wyoming Range, southwest to the Green River Basin, and southeast to the Little Colorado Desert. A small proportion of these deer come into Jackson Hole, and they are not counted separately from the Sublette herd as a whole. Some mule deer winter in Jackson Hole and can often be seen in Jackson and on East Gros Ventre Butte.

Moose

The Jackson moose herd was an estimated 500 animals in winter 2014, with an average of 1,085 moose from 2007 through 2011 (WGFD 2013). Moose range covers the Bridger-Teton National Forest, Grand Teton National Park, and National Elk Refuge; however, only 3–14 moose winter on the refuge each year. In the past 20–30 years, moose used riparian habitat along the Gros Ventre River on the refuge during the winter. Both moose and elk browse on willow, aspen, and other woody shrubs. Bison do not typically browse on woody vegetation (except near feedgrounds), but they rub against trees and seek shelter in riparian areas. The decrease in woody vegetation because of large numbers of elk on the refuge likely has had a negative effect on moose on the refuge over the long term.

Gray Wolf

Gray wolves were deliberately exterminated from the Greater Yellowstone Ecosystem by the 1930s and were placed on the Federal endangered species list in 1973. After years of scientific research and public debate, 66 gray wolves from Canada were reintroduced into the Greater Yellowstone Ecosystem (31 wolves) and central Idaho (35 wolves) in 1995 and 1996 (FWS et al. 2003). They were classified as a nonessential, experimental population in accordance with the Endangered Species Act. This means that the species is treated either as proposed for listing in a national forest or as threatened in a national park or a national wildlife refuge (50 CFR 17). This nonessential, experimental population designation allows more flexibility to Federal, State, and tribal agencies, and private citizens in managing the wolf population. The wolf expanded rapidly under these protections, the population exceeded recovery goals, and wolves in Wyoming were removed from the Endangered Species list in 2012, but were returned to the Endangered Species list after a court case in 2014.

Because of changes in protected status, the wide-ranging nature of the species, and potential effects of wolves on elk numbers and distribution, the refuge cooperatively monitors wolf populations with WGFD and Grand Teton National Park. Wolves have been active on the refuge since 1999, and the first wolves denned on the refuge in 2005. The Pinnacle Peak pack has consistently denned and produced pups on the refuge from 2008 to 2014, and preliminary monitoring suggests that they denned on the refuge in 2014. Members of the pack are commonly observed by refuge visitors on the southern end of the refuge during the winter.

Studies in the Greater Yellowstone Ecosystem documented that elk compose more than 85 percent of wolf kills during the winter (FWS et al. 2003, Jaffe 2001, Mech et al. 2001). However, preliminary evidence suggests that winter elk mortality has not increased since wolves began using the refuge in 1999. This indicates that wolf activity on the refuge has resulted in compensatory rather than additive mortality in elk—this means that wolves have mostly been killing elk on the refuge that would have died anyway.

Coyote

Coyotes are plentiful in the Greater Yellowstone Ecosystem, including the refuge. Several family

groups live year-round on the refuge, but the number increases to nearly 100 as transient coyotes follow the elk herds to the refuge in the winter (F. Camenzind, biologist, Jackson Hole Alliance, Jackson, Wyoming, personal communication, 2003).

Coyotes are opportunistic predators that readily feed on carrion, but they also catch a variety of small mammals from mice, squirrels, and rabbits to fawns and calves. In addition, coyotes will feed on insects and fruit. In winter, elk and occasionally bison carrion on the refuge are an important part of the coyote diet. In spring, coyotes may take elk calves during the calves' first month of life. Coyotes rarely have the opportunity to kill bison calves because of the presence of the herd and protective mothers.

Mountain Lion

Mountain lions (also known as "cougars" or "pumas") occur throughout the Greater Yellowstone Ecosystem, including the refuge. A mountain lion and her three kittens were seen frequenting a cave on Miller Butte for 2 months during the winter of 1999. She was a skilled elk and deer hunter and provided a great wildlife-watching opportunity.

Mountain lions feed mainly on ungulates, primarily deer, throughout much of their distribution, but they can take elk, moose, and bighorn sheep. Where elk are abundant, they can become a large part of the mountain lion diet (Ruth 2004). Mountain lions have also been known to feed opportunistically on wild horses, beavers, porcupines, raccoons, and hares, indicating one of the most varied diets of any predator in the Western Hemisphere (Hansen 1992).

Mountain lions prey mostly on a combination of deer and elk in Jackson Hole, relying more on elk than in other areas of the country because of the large elk herd (Moody, personal communication, 2002; Quigley et al. 2005). The Teton Cougar Project began in January 2001 and is focusing field investigations on mountain lion predation (the Wildlife Conservation Society originally operated the project, which is now operated by Craighead Beringia South). Information collected shows that elk made up approximately 80 percent of 86 mountain lion kills from 2000 to 2004 (Quigley et al. 2005).

Black Bear

Black bears rarely occur on the refuge but are common in the Bridger-Teton National Forest and Grand Teton National Park. While black bear numbers are unknown, their population is considered stable. Inhabiting forested areas, they feed on nutritious, succulent vegetation and on grubs, fish, newborn ungulates, and carrion. Elk and bison carrion may occasionally provide valuable protein. Black bears are known to successfully prey on elk calves. Smith and Anderson (1996) reported that, from 1990 to 1992, 22 of 145 radio-collared calves died before July 15; black bears were responsible for 11 of these mortalities. During the late 1990s, black bears were responsible for 16 of 42 calf deaths (B.L. Smith, personal communication, 2003). In a north-central Idaho study, black bears killed 38 of 53 marked calves, or 72 percent (Schlegel 1976). Bison calves are not usually vulnerable to black bears because bison cows can adequately defend their young.

Small Mammals

Small mammals in Jackson Hole are abundant. Suitable habitat is the most important factor influencing the distribution and abundance of small mammal populations. Many small mammals occupy a wide variety of habitats, while others have specific needs that limit their distribution (refer to table 9). In general, most species prefer more mesic (neither wet nor dry) environments, and edge habitats generally support more species than interior habitats.

Small mammals depend on grasses for forage, as well as for cover from predators. Riparian areas and aspen typically support a greater abundance of small mammals and a greater diversity of species, although many of these species can be found in other habitats. Browsing by elk and bison has greatly altered some small mammal habitats on the refuge, which likely has changed the type of species found in affected areas. A small mammal study conducted on the refuge in the summers of 2000 and 2001 identified four species inhabiting cultivated fields—deer mice, voles, shrews, and short-tailed weasels (L. Swanekamp, master's student, Montana State University, Bozeman, Montana, personal communication, 2002).

Overgrazing by large numbers of elk and bison can limit the numbers of rodents that can survive in grassland and sagebrush shrubland habitats. Irrigation, especially flood irrigation, designed to increase elk forage, can have a negative effect on small mammals by flooding burrows. The effects of K-Line sprinkler irrigation on small mammal communities are unknown, but flooding effects of the K-Line system on small mammal populations are likely to be far less than with flood irrigation. The number of flood-irrigated acres has been greatly reduced under the new system, which could benefit some small mammal species and their predators.

Large Rodents

Large rodent species that occur in Jackson Hole are yellow-bellied marmot, porcupine, and beaver. Elk and bison probably do not affect marmots, but the decline of woody vegetation on the refuge because of browsing by elk and bison has likely reduced the amount of habitat available for porcupines and beavers:



Ann Hough / FWS

Pronghorn

- Marmots occupy rocky slopes of upper elevations, living in burrows in open areas and eating a variety of green vegetation.

- Porcupines occur in upland shrublands, riparian woodlands, and aspen woodlands. Porcupines feed on leaves, twigs, and green plants during the summer. In the winter, they subsist by chewing through the rough outer bark of trees to feed on the inner bark.

- Beavers are common in the Gros Ventre River area and in associated ponds on the northern end of the refuge. Historically, beavers occurred on the southern end of the refuge, but as willow habitat along Flat Creek declined in acreage and height, the beavers disappeared (Smith et al. 2004). Beavers inhabit rivers, streams, marshes, lakes, and ponds and use the adjacent woody, riparian areas. They feed on green plants and the bark of certain trees and shrubs, such as aspen, cottonwood, and willow.

Table 9. Small mammals that occur in various habitats on the National Elk Refuge, Wyoming.

Habitat	*Common mammals*		
Native grasslands and cultivated fields	Deer mouse Long-tailed vole	Merriam's shrew Northern pocket gopher Sagebrush vole	Uinta ground squirrel Wyoming ground squirrel Yellow pine chipmunk
Sagebrush shrublands	Deer mouse Dusky shrew Heather vole Least chipmunk Long-tailed vole	Masked shrew Meadow vole Merriam's shrew Montane vole	Northern pocket gopher Sagebrush vole Uinta ground squirrel Wyoming ground squirrel Yellow pine chipmunk
Riparian woodlands and aspen woodlands	Deer mouse Dusky shrew Golden-mantled ground squirrel Heather vole Long-tailed vole Masked shrew Meadow vole	Montane vole Muskrat Northern flying squirrel Northern pocket gopher Red squirrel Snowshoe hare Southern red-backed vole Uinta chipmunk	Uinta ground squirrel (aspen) Vagrant shrew Water shrew Water vole Western jumping mouse Wyoming ground squirrel Yellow pine chipmunk

Source: Based on the University of Wyoming, Geographic Information Science Center, Species Atlas, 2003, and cross-referenced with the National Elk Refuge wildlife observation database.

Midsize Predators

Other predators inhabiting the refuge include badger, bobcat, long-tailed weasel, ermine, mink, raccoons, red fox, and skunk. The presence of large predators and high densities of coyotes appears to limit the abundance of midsize predators. These species prey on small mammals, and a few may opportunistically feed on elk or bison carrion, but they do not depend on it as a food source. Bobcats may take an occasional elk calf, but calf-mortality studies show that this is not a substantial cause of mortality (Smith and Anderson 1996). Mink are not known to feed on bison or elk carrion. There have only been incidental observations of raccoons and skunks, and the absence of these animals potentially reduces nest predation on breeding birds. Red fox have increased in abundance in the past decade, but still occur at relatively low densities compared to surrounding areas.

Birds

Approximately 175 species of birds have been observed on the National Elk Refuge. This section describes neotropical migratory birds, grouse, waterbirds, and predatory and scavenger birds on the refuge.

Neotropical Migratory Birds

Neotropical migratory birds, which breed in North America and spend their winters in the tropics, have been experiencing population declines throughout their range (Terborgh 1989, USGS 1999). Habitat fragmentation by development, changes in plant communities associated with invasive plant species and ungulate herbivory, and destruction of winter range are among the factors believed to be responsible for these declines (Dobkin 1994, Dobkin and Wilcox 1986, George and Dobkin 2002, Martin and Finch 1995).

Many species of neotropical migratory birds are declining in North America because of an inability to raise young successfully rather than from mortality of adult birds (Herkert et al. 1993). Loss of habitat has long been suspected as contributing to nest failure and low survival of young birds, but habitat fragmentation plays an important role (Kaufmann 1996). In fragmented landscapes, neotropical species suffer high rates of nest predation by mammals and birds and high rates of nest parasitism by brown-headed cowbirds. Researchers have shown that habitat size, shape, and the amount and type of edge can all affect breeding success. Edge habitats support a larger variety and higher density of predators (Lompart et al. 1997).

Nest Predation and Parasitism

Potential nest predators, such as crows, magpies, and ravens and foxes, raccoons, and skunks are attracted to habitat edges, often preying on eggs and young birds in narrow strips of riparian habitat and near edges of larger forests (Wilcove 1985, Yahner 1988). In some forests, this edge-enhanced nest predation has been documented to extend more than 300 feet into the interior of the forest patch (Wilcove 1985). Martin (1988, 1993) found that nest predation can account for, on average, 80 percent of nesting failures, and Donovan et al. (1997) established that where habitats are fragmented, predators gain greater access to nests at forest edges.

Brown-headed cowbirds are common in Jackson Hole, and cowbird parasitism can reduce productivity for many neotropical migratory bird species. Cowbirds lay their eggs in the nests of other birds, often removing a host egg before laying one of their own. Cowbird chicks hatch earlier and grow faster than host chicks, which results in the cowbird young receiving most of the food and parental care from the foster parents. Female brown-headed cowbirds prefer edge habitats and can lay up to 77 eggs in a single season (Jackson and Roby 1992). Edge-tolerant songbird species can often recognize cowbird eggs and remove them from the nest, or they may abandon parasitized nests. These edge-tolerant species are often permanent residents or short-distance migrants and can nest several times in a season. This increases their chances of raising a successful brood, since cowbirds rarely parasitize late-season nests (Ehrlich et al. 1988). In contrast, interior-forest birds, which are usually long-distance migrants and only nest once or twice a year, often fail to raise any young of their own when forced to nest in edge habitats because they have not evolved behaviors to cope with nest parasitism. As a result, interior-forest species such as the veery and the American redstart disappear from small patches of forest habitat, and edge-tolerant species such as the American robin and house wren greatly increase (Herkert et al. 1993).

Habitat Size

On the refuge, small or narrow patches of riparian woodland and aspen woodland habitats often comprise sparse mature trees and lack of shrubs and small trees in the understory because of overbrowsing by ungulates. However, even if these patches are protected in some manner resulting in dense stands of small trees and shrubs, neotropical migratory birds may not benefit because of the size and shape of the individual patches for the reasons discussed above. To benefit tree- and shrub-nesting migratory birds, protection of stands from ungulate browsing should be limited to those stands that are large enough to support breeding populations of these species.

An example of a narrow habitat patch would be the cottonwood community along upper Flat Creek. This long riparian strip may always be too narrow to provide interior habitat for neotropical migratory birds that require interior-forest conditions for successful nesting. Some species of birds may avoid such areas and not attempt to nest, while others may make unsuccessful nesting attempts. For those birds that attempt nesting but fail to fledge young because of high predation and parasitism rates, this area may become (or possibly has always been) a "population sink." Nevertheless, small or narrow tracts of riparian woodland and aspen woodland habitats are still valuable to a variety of birds as stopover sites during migration and have other beneficial effects such as preventing streambank erosion and improving fish habitat.

Native Grasslands and Sagebrush Shrublands

Grassland and sagebrush shrubland plant communities provide important breeding habitat between May and mid-July for some neotropical migrant species, and these cover types are abundant on the refuge. Typical bird species that nest in sagebrush shrublands are Brewer's sparrows, sage sparrows, and sage thrashers. Many sagebrush bird species are declining as habitat throughout the West is converted to farmland and development. As riparian area and aspen habitats on the refuge are converted to sagebrush habitat because of heavy elk and bison browsing, more sagebrush shrubland habitat will become available to bird species that depend on that habitat.

Riparian Woodlands and Aspen Woodlands

In the arid West, riparian woodland and aspen woodland habitats with a shrub understory (1) support the most species-rich communities of breeding birds (Dobkin and Wilcox 1986; Knopf et al. 1988; Mitton and Grant 1996; Saab et al. 1995; Tewksbury et al. 2002), (2) provide important migration habitat for migratory landbirds (Dobkin 1994), and (3) are centers for biological diversity (Brussard et al. 1998). These habitats are crucial for breeding habitat and migration stopovers for 80 percent of migratory bird species (Krueper 1992), because they are used extensively for feeding, nesting, shelter, and travel corridors. The open canopies allow sunlight to reach the ground, producing a rich understory of shrub and herbaceous species offering structural diversity. The layered structure of these woodlands provides many niches for birds. Cavity nesters use snags for nest sites, while predatory birds perch on dead trees to scan for prey. Neotropical birds nest at different levels, and they feed on the diversity of insects found in woodlands.

The ecological health of a woody plant community can be directly measured by bird species composition, their relative abundance, and breeding success (Dobkin et al. 2002). Riparian woodlands and aspen woodlands shelter many bird species that have relatively narrow needs for breeding habitat. These species may occur chiefly or exclusively in willow, aspen, and cottonwood communities. In the southern part of the Greater Yellowstone Ecosystem, ecologically intact riparian woodlands or aspen woodlands can have 76 species of birds closely associated with it during the nesting season, and 23 species (neotropical migrants) will be common and relatively abundant (Dobkin et al. 2002).

Cattle and wildlife grazing and browsing, especially in arid systems, can greatly affect the quality of riparian habitat for neotropical migrants (Ammon and Stacey 1997, Roath and Krueger 1982, Saab et al. 1995, Taylor 1986). Upland aspen has been declining in Jackson Hole for the last several decades (Loope and Gruell 1973), as well as throughout the West (Kay 1998). Fire suppression is a major factor in the reduction of aspen (Kay 1998, Loope and Gruell 1973, White et al. 1998). On the refuge, ungulate browsing has greatly accelerated this decline (Anderson 2002, Dieni et al. 2000).

The mixture of riparian and upland aspen habitats found on the refuge is important to a variety of species. Anderson (2002) observed 25 bird species in riparian woodland habitats and 54 species in upland aspen habitat in Jackson Hole. Riparian woodlands and aspen woodlands that lack recruitment, such as those found on the refuge, are structurally simplified and support a less diverse community of bird species. Birds found in this simplified habitat generally have habitat needs that can be met in a wide variety of habitat types. Trabold and Smith (2001) found that European starlings on the National Elk Refuge overwhelmingly dominate the cottonwood riparian habitat along Flat Creek. This is typical of highly fragmented cottonwood habitat with low numbers of bird species (Gutzwiller and Anderson 1987). Many native cavity nesters cannot successfully compete with the highly aggressive starling. Aspen stands on the refuge also have low abundances of native bird species that are typically found in aspen, such as red-naped sapsucker and MacGillivray's warbler (Anderson and Anderson 2001). Some widespread habitat specialists are completely absent including broad-tailed hummingbird, calliope hummingbird, rufous hummingbird, veery, Swainson's thrush, orange-crowned warbler, black-headed grosbeak, fox sparrow, and song sparrow (Dieni and Anderson 1997).

The decline of woody vegetation on the refuge and the resultant decline in neotropical migrants is attributed to 100 years of heavy browsing by elk and almost 40 years of browsing by bison. Anderson

(2002) conducted a study in and around Jackson Hole specifically to determine the effect, if any, that supplementally fed elk were having on landbird distribution in willow and upland aspen habitats. Anderson's (2002) results are summarized below:

- Willow habitats that are heavily browsed by elk are characterized by (1) lower willow volume, (2) lower willow shrub diameter, (3) fewer willow habitat bird specialists, (4) fewer species that nest in willow, and (5) fewer aerially foraging species.

- Riparian areas closest to feedgrounds receive the heaviest elk use and experience the greatest loss in bird species that depend on riparian habitat, such as willow flycatcher, yellow warbler, MacGillivray's warbler, fox sparrow, and song sparrow. Species of birds that are abundant near feedgrounds include those that typically nest in grasslands or sagebrush shrublands, such as Savannah sparrow, vesper sparrow, western meadowlark, and Brewer's blackbird.

- Nest predators, such as common ravens and black-billed magpies, were also more common near feedgrounds, possibly because of the greater availability of elk carcasses. These nest predators may accelerate the decline of neotropical migrants.

- Aspen woodland habitats that were browsed heavily by elk were characterized by (1) less understory volume of vegetation, (2) lower densities of nonsapling live and dead trees, (3) greater proportions of dead aspen trees (nonsapling), (4) more regeneration of suckers less than 1.6 feet, (5) less recruitment to overstory, (6) a lower density of aspen saplings, (7) a lower proportion of the stands with saplings, (8) higher rates of sucker browsing, (9) a lower proportion of suckers, (10) more damage to bark, (11) a higher density of dead trees, and (12) a higher proportion of the stands with dead aspen trees.

- Aspen woodland habitats heavily browsed by elk were also characterized by (1) fewer species of birds that nest and feed in the understory, (2) fewer species of birds that nest and feed in forest canopies, (3) fewer ground-nesting species, and (4) a greater abundance of cavity-nesting birds, probably because of the higher rates of aspen decay and mortality.

- Aspen stands on the refuge that received high elk use (stands with the longest duration of high elk densities) had a substantially lower diversity of birds, and birds were less abundant as compared to aspen stands with low elk use. When aspen stands are converted to sagebrush shrubland habitat by high elk use, there is an exchange of approximately 20–40 bird species for 3–5 bird species that are generally more common than those found in aspen stands.

- Recruitment of willow and aspen was extremely rare both on the refuge and near the WGFD Gros Ventre feedgrounds.

Smith et al. (2004) corroborated Anderson's finding through an analysis of historical refuge photographs and experimental monitoring of fenced areas where elk and bison were excluded. They estimated that 95 percent of potential willow habitat had been lost on the southern end of the refuge due to browsing by elk and bison and that most willow, aspen, and cottonwood stands on the southern end of the refuge had insufficient regeneration to perpetuate themselves.

Cultivated Fields

Neotropical migrant species that can be found in the cultivated fields on the refuge include Brewer's sparrow, Savannah sparrow, vesper sparrow, and western meadowlark (Dieni 2011). These species also occur in native grasslands.

Ruffed Grouse

Ruffed grouse are generally widespread and common, occurring in deciduous and mixed woodlands. Conifer forests may be used for shelter, while decidu-



Lori Iverson / FWS

Bohemian Waxwing

ous habitats are primarily used for food. Because elk browse on the woody vegetation that ruffed grouse rely on for their winter diet, changes in woody vegetation can affect ruffed grouse populations on the refuge.

Sharp-tailed Grouse

Sharp-tailed grouse were eliminated from the refuge by the mid-20th century due to loss of willow and aspen habitat (Smith et al. 2004). However, as of 2001, small numbers of sharp-tailed grouse have returned to Jackson Hole, and the birds are occasionally observed in the Flat Creek area and the northern end of the refuge during the winter. Breeding has been confirmed for at least one location in Grand Teton National Park, which is the likely source of these grouse on the refuge. Given the dependence of this species on tall, dense deciduous shrub and aspen communities and the lack of this habitat on the refuge, it is unlikely that a breeding population of sharp-tailed grouse will become established on the refuge.

Waterbirds

Species of waterfowl, shorebirds, rails, and cranes that use the refuge are diverse and in most cases have habitat linked to aquatic or wetland features. They are vulnerable to predators because of their location on the ground, and they must rely on dense vegetation for camouflage or water levels high enough to impede nest raiders.

Several species of waterfowl—trumpeter swan, Canada goose, mallard, green-winged teal, gadwall, American wigeon, common goldeneye, Barrow's goldeneye, and common merganser—are year-round residents on refuge wetlands. However, most waterfowl and shorebird species in Jackson Hole are seasonal migrants. Rocky Mountain Canada geese nest on wetlands throughout Jackson Hole, and fall populations on the refuge number 300–500, with about 100 overwintering. Duck populations range from 200 to 500 annually, with gadwall, mallard, ring-necked duck, green-winged teal, cinnamon teal, and Barrow's goldeneye the largest contributors. Peak numbers of waterfowl in the fall are close to 3,000, and about 200–300 birds overwinter on the refuge.

Common shorebird and rail species that breed on the refuge include killdeer, long-billed curlew, willet, spotted sandpiper, Wilson's phalarope, and sora. These species occupy a wide range of plant communities from dry grasslands, in the case of the long-billed curlew, to dense cattail–bulrush marsh in the case of the sora rail.

The greater sandhill crane nests in small numbers in Jackson Hole, and fall concentrations of more than 150 birds have been observed on the refuge.

Predatory and Scavenger Birds

Jackson Hole has many resident species of predatory birds including the following:

- golden eagle
- bald eagle
- peregrine falcon
- prairie falcon
- northern harrier
- red-tailed hawk
- Swainson's hawk
- American kestrel
- rough-legged hawk
- great horned owl
- short-eared owl

Eagles and hawks are all predators, but their preferred prey varies widely. Small hawks typically feed on insects, while the larger hawks feed on birds and small mammals. Eagles may take prey as large as foxes. Falcons often specialize on birds but may also take rodents and insects. Some of these raptors feed opportunistically on carrion, especially in winter.

Black-billed magpies and common ravens are omnivores that eat a wide variety of insects, rodents, lizards, and frogs, as well as eggs and hatchlings of other birds. They often feed as scavengers on carrion and human garbage. Elk carrion is an important source of food in the winter for bird scavengers on the refuge.

Reptiles and Amphibians

Only 11 reptile and amphibian species are present in Jackson Hole because of the high altitude and its associated cool climate. Most species are observed throughout the valley floor and foothill regions, especially on the floodplains of the Buffalo Fork of the Snake River, main stem of the Snake River, and Gros Ventre River. Some reptiles and amphibians inhabit the mountains up to 10,000 feet in elevation.

Several reptile species are rare, with apparently restricted distributions, including the northern sagebrush lizard, gopher snake, and valley garter snake. The northern sagebrush lizard is found at elevations up to 8,300 feet and is commonly associated with thermal areas in Yellowstone National Park (NPS 1998), but has not been found on the refuge. The rubber boa often inhabits riparian zones and could be adversely affected by soil compaction or vegetation loss.

Amphibian surveys conducted in 2000–2003 documented the occurrence of five species of amphibians in Jackson Hole: blotched tiger salamander, boreal chorus frog, boreal toad, Columbia spotted frog, and the nonnative bullfrog (Patla and Peterson 2004).

Recent surveys conducted in the Flat Creek and Gros Ventre River drainages on the refuge have documented breeding sites for four amphibians (blotched tiger salamander, boreal chorus frog, boreal toad, and Columbia spotted frog) and the occurrence of the wandering garter snake (Patla 1998, 2000):

- Tiger salamanders are rare on the refuge, although they are quite common in Bridger-Teton National Forest.
- The most widespread amphibian on the refuge is the boreal chorus frog, which occurs in the Flat Creek and Gros Ventre River drainages at multiple sites, but their breeding populations are unexpectedly small and scattered (Patla 2000).
- Boreal toads are widespread on portions of the refuge, with breeding populations in the Flat Creek and Gros Ventre River drainages (Patla 1998, 2000, 2004b). Although boreal toad populations remain high, recent tadpole die-offs in Grand Teton National Park suggest that continued monitoring is warranted (Patla 2012).
- There are few Columbia spotted frogs in the Flat Creek drainage, including a significant breeding site on Nowlin Creek, where they produced record high numbers of egg masses in 2012 (Patla 2012). These frogs are widespread in the Gros Ventre River drainage.

Concentrated numbers of elk and bison can affect amphibians and their habitat by decreasing water quality, increasing streambank erosion, altering marsh and riparian vegetation, and possibly transporting chytrid fungus on their hoofs. Conversion from flood irrigation to sprinkler irrigation could reduce the amount of standing water available for amphibians.

The most significant and disturbing result of the amphibian surveys was the discovery in 2000 of amphibians on the refuge killed by chytridiomycosis (chytrid disease). This was the first time this disease had been documented in northwestern Wyoming, and boreal toads are particularly susceptible. Chytrid disease is caused by an aquatic fungus that has been associated with mass die-offs and population declines in many areas and may be contributing to the continuing and potentially escalating amphibian declines throughout the United State and the world (Patla 2000). A veterinarian with the U.S. Geological Survey has stated, "The diagnosis of chytridiomycosis has potentially dire implications for all species of frogs and toads in the National Elk Refuge and, possibly, western Wyoming" (Earl Green, personal communication, as quoted in Patla 2000).

Live amphibians on the refuge were tested for the presence of chytrid fungus on their skin; in 2003, 66 percent of the sampled amphibians tested positive for the fungus and in 2004, 71 percent (Patla 2004a, 2004b). However, skin tests on live animals may not accurately determine whether the amphibian is actually infected. As of the end of summer 2004, chytrid disease had not reduced the toad populations at the two main breeding sites on the refuge, and no indicators of a population decline on the refuge (such as mass mortality events or failed reproduction) have been observed (Patla 2004b). Since the discovery of chytrid disease on the refuge, chytrid fungus has been found in several locations in the Grand Teton and Yellowstone National Parks and one location in the Bridger-Teton National Forest.

Given global trends and the patchy distribution of amphibian breeding sites on the refuge, all amphibian species on the refuge are vulnerable to decline. Protection of breeding sites and continued monitoring of populations is warranted.

Fishes

The fish community in Jackson Hole is typical of cold waters. Eighteen species are present:

- mountain whitefish
- Snake River cutthroat trout (the only native trout in the area)
- three introduced trout species and one hybrid
- redside shiner
- several species of chub, dace, and sucker

Elk and bison can potentially affect fish habitat by reducing water quality, eroding streambanks, and suffocating spawning beds. Heavy browsing of riparian vegetation by elk and bison may raise water temperatures by removing shady vegetation. However, most fish populations in Jackson Hole are doing well, and these effects have been relatively minor or nonexistent.

Federally Listed Species and State Species of Greatest Conservation Need

There are several designated plant and animal species that we give special consideration: federally listed species, Federal candidate species, and Wyo-

ming SGCN. Appendix D shows the federally listed species and Wyoming SGCN that have been documented to occur on the refuge. The following sections explain the different designations, followed by descriptions of the listed species that occur on the refuge.

Federally Listed Species

The Endangered Species Act of 1973 requires Federal agencies to carry out conservation (recovery) programs for listed species and to ensure that agency actions are not likely to jeopardize the continued existence of listed species or adversely change or destroy their critical habitat. Section 7(a) of the act requires Federal agencies to evaluate their actions with respect to any species that is listed as endangered or threatened and with respect to its critical habitat, if any is being designated. Further, regulations implementing the interagency cooperation provision of the act are codified at 50 CFR part 402. Section 7(a)(2) requires Federal agencies to make sure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of any species listed as endangered or threatened, or to destroy or adversely change its critical habitat.

Federal Candidate Species

Candidate species are plants and animals for which we have sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act, but for which development of a proposed listing regulation is precluded by higher priority listing activities. A candidate species status is reviewed annually.

The Endangered Species Act gives no statutory protection to candidate species, and "take" as identified in the act does not apply to these species. However, we encourage the formation of partnerships to conserve these species because they are, by definition, species that may warrant future protection under the act. Furthermore, our policy requires that candidate species be treated as "proposed for listing" for purposes of intra-Service section 7 conference procedures (FWS 1998).

Species of Greatest Conservation Need

The WGFD has a State Wildlife Action Plan (2010a) that identifies 180 SGCN. These are species for which we may or may not have sufficient data to determine population trends, abundance, distribution, needs, and management actions. The designation as a SGCN can be derived from threats to a known population or habitat or a lack of sufficient information to adequately assess a species' status. These species do not receive the same degree of protection as endangered or threatened species, although decreasing numbers or loss of habitat makes them of concern to Federal land management agencies.

Grizzly Bear

In the lower 48 States, grizzly bear was listed as threatened in 1975. In the 1980s, a recovery plan was developed, and in recent years their numbers have increased to the point that delisting is expected in the near future.

Grizzly bears widely use the northern two-thirds of Grand Teton National Park, but can occur throughout the park and surrounding areas. Previously, grizzly bears had not been observed on the refuge since 1994, but a sow and three cubs were observed feeding on a bison gut pile in August 2013. We anticipate increased use of the refuge by grizzly bears.

Grizzly bears are omnivores that feed on nutritious succulent vegetation, grubs, insects, fish, newborn ungulates, and carrion. By mid-May grizzly bears begin preying on newborn elk calves (Gunther and Renkin 1990, Singer et al. 1997). Grizzly bears dominate other scavengers at carcasses (Servheen and Knight 1990), but many carcasses are consumed before being found by a bear (Green 1994). Individual bears are most likely to get their largest meals from adult moose and elk that are prey and from adult female bison that are scavenged (Mattson 1997).

In Yellowstone National Park from March through May, ungulate carrion (mostly elk and bison) is an important food source (Mattson 1997). This is not the case in Grand Teton National Park. Elk and bison in the Jackson herds have a low winter mortality rate because of the supplemental feeding program on the National Elk Refuge and in the Gros Ventre Range. Grizzly bears in Grand Teton National Park do not appear to depend as heavily on meat in the early spring compared to grizzlies that live to the north in Yellowstone National Park.

Bald Eagle

The bald eagle was delisted from federally threatened status in July 2007 but is protected under the Migratory Bird Treaty Act (16 U.S.C. 703) and the Bald Eagle Protection Act (16 U.S.C. 668). It is also a priority 2 species of special concern for Wyoming.

Most nesting territories in Jackson Hole are along major rivers or lakes within 3 miles of their inlets or outlets, or along thermally influenced streams or lakes. Historically, two bald eagle nesting territories have occurred on the refuge but no territories are active currently.

During the fall, as many as 100 bald eagles have been seen at one time in the cottonwood trees within the elk and bison hunting areas on the refuge (National Elk Refuge wildlife observation records). These eagles feed on the gut piles left by hunters. Typically, 5–20 bald eagles may be active on the refuge during the winter, and these birds feed primarily on the carcasses of elk that die during the winter.

Bald eagle winter habitat is generally associated with areas of open water, where fish or waterfowl congregate (Swenson et al. 1986), or ungulate winter range where eagles scavenge on carcasses of large mammals. Nearby food, suitable perches, and security from human activities are important habitat components for both nest and roost sites.

Greater Sage-Grouse

On March 5, 2010, our agency found that the greater sage-grouse warrants protection under the Endangered Species Act, but listing the species under the act was precluded by the need to address other listing actions of a higher priority. Therefore, the greater sage-grouse is a candidate species (75 Federal Register 13910). The northern portion of the refuge contains significant wintering habitat for greater sage-grouse, and much of the north end of the refuge falls within the State of Wyoming's core area policy for greater sage-grouse protection (Wyoming Executive Order 2011–5), more specifically, the Jackson core population area.

Greater sage-grouse that occupy the refuge are part of the Jackson Hole greater sage-grouse population, which is isolated from larger populations in the Green River Basin. The refuge collaborates with WGFD, Grand Teton National Park, and the Upper Snake River Basin Sage-Grouse Working Group to monitor population trends in this population by conducting lek counts each spring. The refuge hosts the North Gap lek and the Simpson lek, which are 2 of the 13 known, occupied breeding sites for the Jackson Hole greater sage-grouse population. Although grouse use of the Simpson lek has been minimal in recent years, maximum numbers of males observed on the North Gap lek were 18 in 2012 and 8 in 2013.

The northern end of the refuge contains valuable nesting and wintering habitat for the Jackson Hole greater sage-grouse population. Greater sage-grouse nest only in sagebrush shrubland habitat, using bunchgrasses and sagebrush plants as cover (Kaufman 1996). Other important habitats include meadows and grasslands close to sagebrush shrubland habitat. In Jackson Hole, Garton et al. (2011) estimated that the greater sage-grouse population is declining by 2.2 percent annually and is at risk of elimination. Factors that may be contributing to this local decline are loss of habitat to human development, prescribed burning and wildfire on winter range, birds killed by collisions with aircraft at the Jackson Hole airport, and browsing and grazing by livestock and large numbers of elk and bison. Holloran and Anderson (2004) indicated winter habitat was likely a limiting factor for this population based on the research conducted from 1999 to 2003. In general, wintering habitat consists of sagebrush plant communities that are tall enough to remain uncovered by snow.

Trumpeter Swan

The 2010 Wyoming State Action Plan classifies the trumpeter swan as a SGCN, which is a species that warrants increased management attention and consideration in conservation planning in Wyoming. The USDA Forest Service classified the swan as a sensitive species in its Regions 2 and 4. The refuge manages swan habitat to meet objectives of the "Pacific Flyway Management Plan for the Rocky Mountain Population of Trumpeter Swans" (Subcommittee on Rocky Mountain Trumpeter Swans 2012).

The trumpeter swan population on the refuge is part of the core Tri-State Area flock. The Tri-State Area refers to Idaho and the portions of Montana and Wyoming within the Pacific flyway. The core Tri-State area refers to the following:

- Idaho: Island Park region, Teton River drainage and Teton basin, Henrys and South Forks of the Snake River, and Camas National Wildlife Refuge
- Montana: Red Rock Lakes National Wildlife Refuge, Centennial Valley, Hebgen Lake, and Madison River and tributaries
- Wyoming: Yellowstone National Park, Grand Teton National Park, and the Snake River drainage including Jackson Hole south to Alpine

Trumpeter swans were likely eliminated from Jackson Hole during the late 1800s, but swans were reintroduced to the refuge in 1938 from Red Rock Lakes National Wildlife Refuge in Montana. Since that time, a persistent breeding population has been established, although nesting activity seems to fluctuate based on weather conditions. The refuge provides the largest wetland habitat for nesting trumpeter swans in the Snake River drainage of Wyoming. In general, dry warm spring conditions are most favorable for trumpeter swan productivity.

Most trumpeter swan nesting occurs in Flat Creek Marsh southwest of Miller Butte, with occasional nesting activity in the Pierre's Pond and Rom-

ney Pond complexes on the northern end of the refuge. In addition, there may be as many as 200 trumpeter swans on the refuge during fall migration, and 50 trumpeter swans may winter on the refuge. During the first 2 weeks in November, hundreds of swans congregate on Flat Creek Marsh before freeze-eup when most swans disperse to other wintering sites. Fall staging behavior may play an important role in swan social structure offering an opportunity for immature swans to initiate pair bonds. Average trumpeter swan production in recent decades is 3 nesting pairs, 7.3 cygnets hatched, and 6.3 cygnets fledged per year (Cole 2011b). From 2002 to 2012, swan pairs on the refuge produced 66 mature young, which composed 43 percent of the total swan production in the Snake River core area of Wyoming (WGFD unpublished data).

Long-Billed Curlew

The long-billed curlew is the largest North American shorebird and is listed as a SGCN by the State of Wyoming. The high levels of concern are due to the loss of the eastern third of the curlews historical breeding range, apparent population declines, and loss of shortgrass habitat that the birds use to nest (Fellows and Jones 2009). Because they breed in short dry grasslands common in the refuge's irrigation project area, we are concerned that irrigation activities could disturb nests of this species. As a result, the refuge staff surveys the irrigation project area to identify breeding pairs and potential nest sites each spring. Irrigation activities are delayed around potential curlew nest locations until August when the birds fledge. Typically, we identify two to five potential breeding territories for long-billed curlew in the irrigation project areas each season.



Tom Koerner / FWS

Greater Sage-grouse

Plants

No federally listed plant species occur on the refuge. However, the State of Wyoming has given special status to plant species that occur on the refuge (refer to appendix D).

The University of Wyoming's Wyoming Natural Diversity Database maintains lists of Wyoming plant species of concern. Inclusion is derived from four main factors contributing to the rarity of species: (1) restricted geographic range; (2) small population size; (3) highly specific habitat requirements; and (4) significant loss of habitat or heavy exploitation. These lists, which have no status under State legislation, are sometimes cited in development of sensitive species lists by Federal land management agencies and include 12 plant species that occur on the refuge (refer to appendix D).

3.3 Management Tools

Irrigation and farming are important management tools that the refuge uses to provide forage for elk and bison.

Irrigation

Irrigation is a common habitat management tool that we use to increase both the quantity and quality of forage available to elk and bison (see figure 11). We have used irrigation to produce forage for many years on the National Elk Refuge as a technique to reduce the reliance of wintering elk on supplemental feeding. Water available for irrigation depends more on snowpack than precipitation over the growing season.

In 2010, we upgraded our irrigation capacity by installing a state-of-the-art sprinkler system that has more than 50 miles of underground water-delivery pipe and an extensive aboveground moveable pipe and sprinkler pod system called K-Line. This new system can irrigate approximately 4,300 acres each year. This increased irrigation capacity will help us increase winter forage while decreasing water use. The irrigated acres have increased from approximately 900 acres that were flood-irrigated to 3,300 acres annually. The aboveground sprinkler system (170 units) is moved daily to specific locations using 4×4 utility vehicles. In most areas, the K-Line irriga-

tion replaces flood irrigation; however, some flood irrigation is still used in the Ben Goe and Pedersen management units. The refuge needs to retain the ability to irrigate with side-roll systems; when new areas are cultivated and planted, the use of K-Lines is impractical because dragging hoses over disturbed soil with utility vehicles is not conducive to grass establishment.

Historically, of the water diverted annually for flood irrigation, only an estimated 5–10 percent actually reached its destination (John Kremer, personal communication, as cited in FWS 1998). This loss was due in part to the porosity of refuge soils and to the state of disrepair of ditches and headgates. This, as well as annual precipitation, staff, other refuge activities, and access to and availability of water affected how many acres we irrigated using the old system.

Farming

The refuge conducts farming practices such as disking, seeding, sprinkler and drip irrigation, herbicide and fertilizer application, and crop harvesting. The refuge annually drags about 3,000 acres using a blanket harrow to break up and help decompose deposited elk and bison fecal matter and to aerate the soil.

Fencing

An 8-foot-tall big game fence is located along the western boundary of the refuge and is designed to keep elk and bison off Highway 89. Elk "jumps" are one-way openings in the fence that allow migrating elk to enter the refuge from the west but prevent them from traveling back west onto the highway. Seven earthen elk "jump" ramps are located on the west side of the fence, with a corresponding opening in the fence. Migrating elk can walk up the ramps to a height of 5–6 feet to the fence opening and jump down onto the refuge. Since there is no ramp on the east side of the fence, the abrupt height difference prevents the elk from getting back through the fence opening, which keeps them off the highway.

Wildland Fire Management

Historically wildfires were frequent and widespread but did not burn large expanses of the landscape except under extreme drought conditions (Gruell 1980). The last stand replacement fire to burn across the National Elk Refuge occurred in 1879. Much of the surrounding forests also burned at the same time (Smith et al. 2004). During most of the 20th century, the National Elk Refuge, along with other federal land management agencies in the area, suppressed wildfires with the intent to keep wildfires small. During the latter stages of the 20th century and into the 21st century, federal wildland fire policy has evolved to allow the opportunity for wildfires to be managed for benefits. Current wildfire management at the National Elk Refuge is to suppress all wildfires.

Prescribed fire is not currently used by the refuge. After issuance of this final CCP, completion of a revised Fire Management Plan (FMP), which is based on the goals and objectives of the CCP, is required.

3.4 Human History and Cultural Resources

The human history of the National Elk Refuge starts with the indigenous, or native, people who lived in the area. The arrival of Euro-Americans had a major effect on not only the indigenous people, but also on the environment. The remains of sites, structures, or objects used by these peoples in the past are cultural resources, which reflect and preserve the area's history and increase our understanding of human interactions and development over time.

Indigenous People of Western Wyoming

The most prominent groups that occupied the eastern Idaho and western Wyoming area before settlement by Euro-Americans were the Bannock, Eastern Shoshone, and Northern Shoshone tribes. Other American Indian tribal groups have some historical or continued association with lands now within the National Elk Refuge: Assiniboine, Athabascans, Comanche, Crow, Gros Ventre, Kiowa, Kootenai, Nez Perce, Salish, Teton Sioux, and Umatilla. In addition, the Arapaho, Blackfeet, Cheyenne, and other Siouan groups and people of the Plains made excursions into the region for hunting, warfare, and trade (Walker 2005).

The Bannock are related to the Northern Paiute and are Uto Aztecan speakers who migrated from Oregon into the Snake River Plains. There they lived

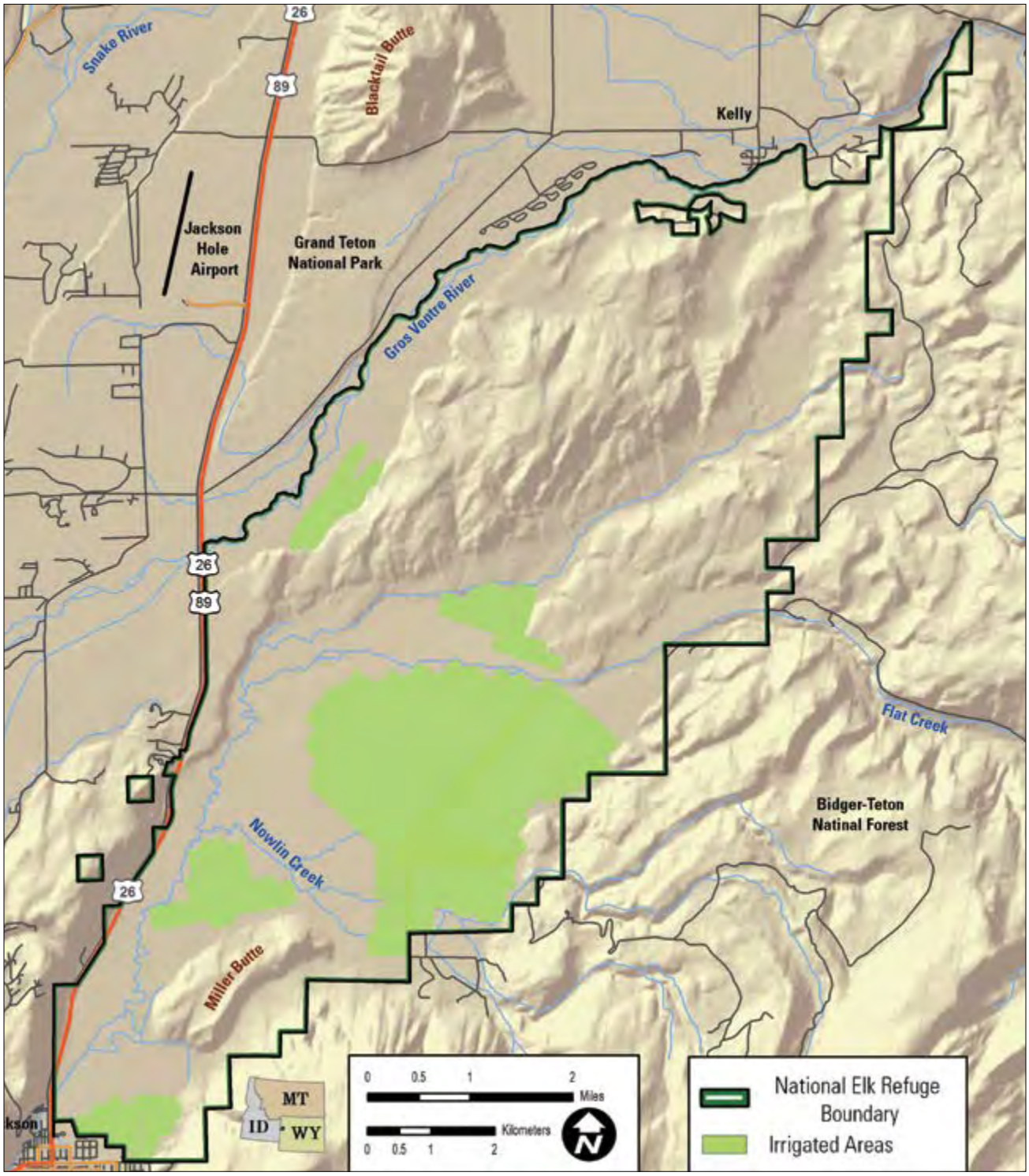


Figure 11. Map of irrigated areas on the National Elk Refuge, Wyoming.

in peaceful cooperation among the Shoshone speakers who had arrived from the Plains. The merged Bannock and Northern Shoshone developed a single amalgamated culture that exhibited strong Plains Indian influences.

The Bannock and Shoshone–occupied areas are designated as eastern Idaho and western Wyoming. This area, the upper Snake River Plains, received higher rainfall, providing adequate grasses and forage for bison to exist. Bison were by far the greatest food resource, providing an endless supply of food, clothing and shelter materials, and weapon and tool products. Bison were also viewed as an earthly link to the spiritual world. For many tribes even today, bison represent power and strength. For example, the Shoshone believe that spiritual power is concentrated in the physical form of the bison. Many contemporary tribes maintain a spiritual connection with bison. Emigration, continuing warfare among tribes, and gradual loss of forage after the 1840s limited the amount of bison taken for food supplies. The bison herds west of the Continental Divide were greatly diminished and decimated by 1850, primarily by Euro-American immigrants.

Another principal food was fish, which were taken in the spring, when other food supplies were low, and were either eaten fresh or preserved by sun-drying or smoking. Next in importance to bison and fish were elk. As the tribes began to compete for resources when emigrations diminished the major game on the Plains, they turned to the mountains. The mountains still provided game for subsistence, whether it was elk, bighorn sheep, moose, or deer. In addition, berries were still found along the riverbanks, and roots could still be dug in the surrounding hills. Native plants were also important to the prehistoric inhabitants of the Greater Yellowstone Ecosystem. Today, modern tribes still collect and use these plants for ceremonial and traditional purposes.

The Shoshone entered into a treaty with the United States on July 2, 1863, that set apart for the Shoshone Tribe a reservation of 44,672,000 acres located in Colorado, Idaho, Utah, and Wyoming. However, the Treaty of Fort Bridger of 1868 pared this down to less than 2.8 million acres, and the treaty established both the Fort Hall Reservation (Shoshone–Bannock) in Idaho and the Wind River Reservation in (Eastern Shoshone and Northern Arapaho) Wyoming. The Bannock and Shoshone experienced extreme hardship subsequent to the treaties and later agreements that separated them from their aboriginal territories. Prohibitions on off-reservation hunting, meager rationing, and diseases adversely affected the tribal populations and social health.

By the end of the 1800s, tribal land bases were greatly diminished, and tribal rights to hunt were curtailed. In Ward v. Race Horse (1896), tribal hunting beyond the boundaries of the reservations was curtailed because the U.S. Supreme Court reasoned that this provision was temporary, and when Wyoming was admitted into the Union, it did so on an equal footing with all other States without lands within the State being encumbered.

After additional treaties, congressional acts, Executive orders, and agreements, the Bannock and Shoshone now occupy the Fort Hall Reservation in eastern Idaho and the Duck Valley Reservation in southwestern Idaho. The Eastern Shoshone are on the Wind River Reservation in west-central Wyoming. At least 15 other American Indian tribal groups have some historical or continued association with lands now within the National Elk Refuge (Walker 2005).

Historical Euro-Americans

John Colter, a member of the Lewis and Clark expedition and later an explorer and trader for the Manuel Fur Company, might have visited Jackson Hole in 1807. Other trappers and traders from the Missouri Fur Company trapped the rivers and streams of Jackson Hole in 1810–11 (Daugherty 1999). During the 1820s and 1830s, Jackson Hole served as a crossroads of the fur trade in the northern Rocky Mountains.

Except for a few prospectors searching for gold, Jackson Hole was virtually deserted by Euro-Americans from the 1840s to the 1880s. However, three military surveys passed through the valley in the 1860s and early 1870s. These military surveys were followed by the Hayden surveys (1872, 1877, and 1878), sponsored by the U.S. Geological Survey, and explored the Jackson Hole and Yellowstone country. It was during the 1872 Hayden survey that William H. Jackson took the first photographs of the Teton Range.

In 1884, the first permanent settlers arrived and built cabins along Flat Creek inside the boundaries of the present-day National Elk Refuge. By 1900, 638 people resided in Jackson Hole (Daugherty 1999). The first homesteaders planted crops and raised cattle on small family ranches throughout the valley. Long cold winters with deep snows, poor soils, and dry conditions that required digging irrigation ditches to water crops made homesteading in Jackson Hole a difficult endeavor. By 1900, many of the original settlers had already left the valley (Daugherty 1999). In 1912, when the U.S. Government allocated money to buy up homesteads to set aside land for the National Elk Refuge, many homesteaders willingly sold their property and moved into town. In other parts of the

valley, cattle ranching continued and expanded through the 1930s (Daugherty 1999) and remained the mainstay of the economy into the 1960s (Charture Institute 2003a).

Before Euro-American settlement, some researchers believe that most elk migrated out of Jackson Hole in the winter. However, homesteaders gradually forced elk off traditional winter ranges both inside and outside the valley (Anderson 1958, Craighead 1952, Cromley 2000), and then these settlers cut and stacked elk winter forage in Jackson Hole to feed domestic livestock. Even before the Jackson Hole environment was changed by the arrival of homesteaders, early hunters and settlers noted that winters of unusually heavy snow caused thousands of elk to starve to death. This situation ultimately led to the establishment of the National Elk Refuge in 1912.

Bison played no role in early settlers' lives because bison had been eliminated from Jackson Hole by the 1840s. By 1900, less than 1,000 bison existed in the entire United States. Bison were reintroduced into Jackson Hole in 1948.

Ethnographic Resources

An ethnographic resource study (a scientific description of specific human cultures) is being conducted that pertains to past treaties and traditional cultural activities that occurred within the Grand Teton National Park, Yellowstone National Park, and National Elk Refuge (Walker 2005). The final report could influence future cultural resource surveys and management on the refuge, and it could yield more information on how tribes used the refuge and parks.

Archaeological Resources in Jackson Hole

Limited but documented archaeological evidence indicates that American Indians have used Jackson Hole for at least 11,000 years. Shifting climate patterns and the resulting change in plant and animal communities, along with drought and fire, determined how and when the valley was used. From 11,000 before present (B.P.) to around 5,800 B.P., American Indians occupied Jackson Hole sporadically to hunt and to obtain obsidian and other lithic (stone) material for tools. These people lived a hunter-gatherer lifestyle and traveled in small groups. Primarily gathering plants for food, medicine, and manufacturing materials, these prehistoric peoples also hunted mule deer, bison, elk, and bighorn sheep. Although bone does not preserve well, particularly in shallow soils, bison remains are present in 13 archaeological sites in Jackson Hole and elk remains in 8 locations (Cannon et al. 2001).

Evidence of permanent settlements by American Indians has not been found in Jackson Hole. In the northern part of Jackson Hole, most evidence indicates that large base camps were established along the shores of Jackson Lake, where a band of individuals lived during the spring and early summer (Wright 1984). As the weather improved, the band would disperse into family groups and move into the canyons and higher alpine meadows, following the emergence of edible plant species. After using the resources of the higher mountains, the entire band would move into areas such as Idaho to spend the winter. Many tools, fire hearths, and roasting pits dating after 5,800 B.P. have been found, particularly around Jackson Lake.

The peoples of southern Jackson Hole entered the valley from the Gros Ventre River drainage after wintering in the Green River, Wind River, or Big Horn basins of northwestern Wyoming. They followed the ripening plants south into the Gros Ventre Range and by the following winter had moved into the more mild intermountain basins east of Jackson Hole (Daugherty 1999).

Cultural Resources on the Refuge

About 20 percent of the refuge has been inventoried for cultural resources. There are 28 known cultural resources on the National Elk Refuge: 8 prehistoric sites and 20 historic sites. Six sites are eligible or potentially eligible for the National Register of Historic Places. Based on cultural resource inventories on surrounding lands, we expect that more historic and prehistoric resources are on the refuge. Although a comprehensive survey of the refuge will be the best method to identify and evaluate any unrecorded resources, additional survey is generally done on a project-by-project basis under section 106 of the National Historic Preservation Act. This act, in concert with other historic preservation laws and regulations, requires that we consider the effects our undertakings have on historic properties (cultural resources that are eligible for the National Register of Historic Places) and that we conduct consultation to identify, evaluate, and manage the significant resources.

The refuge has not been evaluated for the potential for the following:



Lori Iverson / FWS

Interior of the historic Miller House.

- Cultural landscapes—geographical areas that are significant because of their distinctive combination of cultural and natural features

- Traditional cultural properties—places associated with historical beliefs, customs, or practices of a living community

The diverse topography, wildlife, and habitats on the refuge along with the rich cultural history of the region provide an excellent combination for the existence of both cultural landscapes and traditional cultural properties.

Prehistoric Sites

Eight prehistoric archaeological sites have been recorded, which include roasting pits, stone circles, and a bison kill site. Tipi rings begin to appear in the archaeological record after 5,000 B.P., and a few tipi rings can be found on the refuge. Among the artifacts that have been discovered are bones from elk and bison, numerous flakes, choppers, scrappers, and projectile point pieces.

Historic Sites

The historic sites are primarily ditches and associated water control structures, artifacts and foundations associated with homesteads, and the remains of a local schoolhouse.

The historic Miller Ranch was one of the early homesteads in Jackson Hole and has three main structures: the Miller House, the Miller Barn, and a cabin. Miller House is a log home built in 1898, and was one of the first houses in Jackson Hole. Miller House and the surrounding land was the first property that the Federal Government bought to become part of the National Elk Refuge, and Miller House served as the original office and home for the first refuge manager.

In 1969, Miller House and the cabin were placed on the National Register of Historic Places. The National Register nomination was amended in 2001 to include the Miller Barn. These buildings are the only historic structural resources recorded on the refuge and listed on the National Register of Historic Places (48 TE903).

Although the exterior of Miller House looks much as it did during its period of historical significance, the interior has undergone at least three major construction events:

- In 1969, modifications made the house more comfortable and energy efficient for its use as a Government employee home.

- Miller House eventually fell into disrepair and, in the 1970s, the decision was made to destroy the house by having the local fire department burn it. Fortunately, the attempt to burn the structure was unsuccessful. Although the house was damaged from the attempted razing, it was later decided to restore and preserve the house. With help from the Grand Teton Association and other partners, the refuge restored the house to period standards and aesthetics, by removing or replacing contemporary fixtures and decorating the building with early 1900s décor and antique furniture. In the 1980s and 1990s, refuge staff occupied Miller House.

- Through a grant with the Community Foundation of Jackson Hole and the use of a specialized volunteer crew, a 2-week rehabilitation project in summer 2007 brought portions of the original house interior closer in feel to the historic period it represents.

When refuge employees vacated Miller House in April 2005, refuge managers decided that converting parts of the house to an interpretive site would be an adaptive use related to the goals of the refuge and would offer unique education opportunities. We opened Miller House to the public 2 months later, and the house is open for tour by the public during the summer. Eighteen other historic sites on the refuge include ditches and associated water-control structures, artifacts and foundations associated with homesteads, and the remains of a local schoolhouse. The volunteers who staff the Miller House provide

information and interpretive programming. In addition, the Grand Teton Association runs a seasonal sales outlet and bookstore in Miller House that provides merchandise with a historical theme. In 2013, the Miller House had 3,762 visitors, which is a 19-percent increase from 2012 and a 245-percent increase from 2007. The refuge contracted with the University of Wyoming's American Studies program to develop an initial interpretive and restoration plan for Miller House and the related buildings on the refuge.

Miller Barn is not open to the public. The barn is in fair overall condition, but it requires attention to ensure its preservation including foundation stabilization, improved drainage, repair of split or loose battens in the walls, and possible roof repairs. Subsequent to the needed rehabilitation, Miller Barn will expand the interpretive opportunities by having another restored building onsite that the public could view and that could be an alternate site for holding programs indoors when needed. The upper floor of the barn has outstanding potential for use as an interpretive site and a location for programs and events.

A USDA Forest Service cabin is the third building on the Miller Ranch property listed on the National Register of Historic Places. The cabin, not open to the public now, will need substantial rehabilitation before it could be opened to the public including cleaning the interior, replacing plaster and floor boards, repairing windows and doors, and installing lights.

3.5 Special Management Areas

We manage areas with official designations to retain the special features that led to their designation. There is no existing or potential wilderness on the refuge, as described under "Wilderness Review" below.

Wilderness Review

A wilderness review is the process we use to decide whether to recommend lands or waters to the U.S. Congress for designation as wilderness; the CCP process requires us to conduct this review. Lands or waters that meet the minimum criteria for wilderness will be identified in a CCP and further evaluated to figure out whether they merit recommendation for inclusion in the Wilderness System. To be designated as wilderness, land must meet certain criteria as outlined in the Wilderness Act of 1964:

- generally appears to have been affected primarily by the forces of nature, with the imprint of human work substantially unnoticeable
- has outstanding opportunities for solitude or a primitive and unconfined type of recreation



Chuck Mulcahy / FWS

A history demonstration is given at the Miller House.

- has at least 5,000 acres of land or is of sufficient size to make practicable its preservation and use in an unimpaired condition
- may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value

The refuge is next to the town of Jackson and is bordered by a major highway (89). In addition, private land next to the refuge has been developed for housing and other recreational purposes. The refuge has been altered by roads, ditches, and structures. Other development activity includes the refuge irrigating grasslands to provide more forage for wintering elk.

Although the National Elk Refuge does provide visitors with some opportunities for solitude and has educational and scenic value, overall the refuge does not meet the criteria for wilderness designation and we are not recommending any areas for inclusion in the Wilderness System.

Important Bird Area

The Flat Creek Marsh and Wetland Complex on the National Elk Refuge is recognized as an important bird area by the Audubon Society. Flat Creek Marsh is the largest wetland in northwestern Wyoming and the largest calcareous fen in the State. The area provides important breeding habitat for Wyoming SGCN such as trumpeter swan, redhead, lesser scaup, sandhill crane, and bobolink and is a critical migratory stopover for dozens of other bird species.

3.6 Visitor Services

The refuge provides numerous visitor services:

- oversees a large elk and bison hunting program and fishing program
- maintains and operates an interagency visitor center and exhibits that had more than 320,000 visitors in 2010
- maintains and operates a historic home and site that receives seasonal visitation of more than 3,000 people per year
- coordinates a contracted sleigh ride program in the winter that averages 22,000 riders per year
- organizes annual antler collection and sale that generates money for refuge habitat projects
- issues approximately 40 special use permits annually for a variety of activities
- serves an ambassador and leader in the community, including extensive involvement in a variety of partnerships
- hosts dignitaries traveling as guests with the U.S. State Department
- organizes special events
- maintains and updates the refuge Web site and social media sites
- maintains and expands the refuge's online photo gallery
- responds to extensive media and environmental education requests
- writes about 10 articles per year about refuge management and public use operations for internal and external audiences
- prepares and sends out 30 or more news releases per year
- manages and operates nine budget accounts including both Government and nongovernmental money
- recruits, trains, equips, and manages a volunteer program that logged more than 19,000 hours by individuals and volunteer groups in 2013
- provides training to seasonal and volunteer staffs
- collects fees
- develops and manages publications

Hunting

Hunting is both a wildlife management tool and a wildlife-dependent recreational opportunity at the refuge. The refuge's Web site contains a link that educates the public on the Service's position of allowing hunting as a recreational activity. A seasonal

display in the visitor center also offers information on the need and purpose for hunting on refuges.

Two large and significant hunting programs are conducted annually for elk and bison, each with their own seasons, regulations, and licensing system. The goal of these hunts is twofold: (1) to reduce elk and bison populations and achieve herd size objectives as specified in the Bison and Elk Management Plan; and (2) provide for wildlife-dependent priority public uses as legislated in the Improvement Act.

Jackson Hole is a popular destination for both resident and nonresident hunters. The refuge manages the hunts in cooperation with WGFD, and special permits are required. The refuge allows permitted elk and bison hunters to access areas of the refuge not open to the general public. In addition, the refuge has accommodations for hunters with disabilities. Depending on the hunt area, we allow hunters to use a variety of weapons: (1) rifles; (2) archery equipment; and (3) designated limited-range weapons such muzzle-loading rifles, shotguns with slugs, and handguns.

The best available data suggest that between 20 and 40 percent of refuge hunters use lead-free ammunition. Research confirms the negative effect that lead ammunition has on scavenging bird populations such as bald eagles and ravens. The large harvest of elk and bison on the refuge and the resultant boon of gut piles has altered the migration patterns in bald eagles and potentially other raptors, placing a large number of these scavengers at risk of ingesting lead from bullets in gut piles.

Elk

Hunting is the primary management tool used to control the size of the Jackson elk herd. Hunting is the herd's main cause of mortality. The first hunting season on the National Elk Refuge was in 1943, but hunting did not become an annual event until 1955. Refuge hunters apply for and receive refuge-specific permits online through a WGFD Web site. We have historically designated the first weekend of the season, usually in October, for young hunters (ages of 14 to 17). Bulls may be taken during the first week; the rest of the season is restricted to cow and calf hunting. From 2007 to 2011, WGFD issued an average of 3,724 hunting licenses for the Jackson elk herd, with an average of 1,465 elk harvested each season. In 2013, WGFD issued 3,082 licenses, and 1,481 elk were harvested. Of that total, 186 were harvested on the refuge.

Hunting on the refuge and the elk reduction program in Grand Teton National Park, along with harvest in Bridger-Teton National Forest and on non-Federal lands, takes place from late September to mid-December. These methods are used to bring total elk numbers as close as possible to the WGFD herd objective of 11,000. From 1998 to 2002 about 2,300 to 3,300 elk were harvested annually from the Jackson elk herd, resulting in removal of approximately 16 percent of the prehunt Jackson elk herd population each year. Hunter harvest accounted for nearly 90 percent of adult mortality in the Jackson elk herd during the 1990s (Smith 2000). The 2005 harvest of 1,776 elk removed about 14 percent of the estimated 13,000 elk in the herd. Over the last 20 years, harvest in the park has contributed about 25 percent to the total harvest, and harvest on the refuge has contributed about 10 percent. The remaining 65 percent of the harvest takes place mainly in the national forest (Teton Wilderness and the Gros Ventre River drainage).

Some wildlife managers believe that, in the past, the eastern migratory segment of the herd (those elk that migrate east of Grand Teton National Park during the fall) were overharvested, largely because of increased road and other access on national forest lands. At the same time, western migratory segments were believed to have grown, decreasing hunting opportunities as more elk migrated through protected park areas. Concerted attempts to increase numbers in the eastern segments and to reduce numbers in the western segments by regulating hunting seasons and harvest strategies since the late 1980s have met with some success. Nevertheless, the elk reduction program in the park and hunting on the refuge can affect hunting opportunities and numbers of elk outside these areas. Consequently, refuge and park staffs work closely with WGFD in developing annual hunting quotas and regulations, so management of the entire herd is based on a holistic framework that includes all land and wildlife management responsibilities.

Bison

Bison hunting first occurred on the refuge in 1989 and ended in 1990, with 39 bison taken during these two seasons. Hunting resumed in 2007 and continues to be popular on the refuge, attracting nonlocal, including out-of-state, hunters. The refuge provides one of the few opportunities in the Nation where hunters can pursue wild, unconfined bison in a fair chase hunt that could be eligible for a Boone and Crocket record. Since 2007, the total annual bison harvest in Jackson Hole has ranged from a high of 266 to a low of 139. Most bison cows are harvested on the refuge, usually after deep snows move them from the protection of the Grand Teton National Park onto the refuge. Hunting at current levels on the refuge and the national forest has been sufficient to halt the exponential growth of the Jackson bison herd. However, Grand Teton National Park is closed to bison

hunting, and this has become a safe zone that bison use to avoid harvest. As a result, the bison herd is still about 70 percent above the 500 population objective.

Presently, the Shoshone-Bannock Tribes enjoy a ceremonial bison hunt on the refuge.

Fishing

The refuge provides fishing opportunities during daylight hours as a compatible wildlife-dependent recreational opportunity from April 1 through October 31, with fly-fishing being the preferred technique. We allow carefully regulated fishing on the refuge to the extent that it does not conflict with objectives of the refuge and the State of Wyoming. The Gros Ventre River, Flat Creek, lower Nowlin Creek and Sleeping Indian Pond are open to fishing according to season dates and regulations set by WGFD. All other refuge ponds—Flat Creek downstream from the old Crawford Bridge site, and Nowlin Creek upstream from the posted fishing boundary—are closed to fishing. The fishing program is popular with local and visiting anglers, attracting about 4,500 anglers each season. Traffic to refuge waters supports local fishing tackle shops and fishing outfitters.

Refuge waters support a wild population of Snake River cutthroat trout, a unique variety of cutthroat species and the only trout native to the area. The refuge promotes quality fishing for wild native fish. The Flat Creek fishery is managed for a native, wild, and trophy-sized Snake River cutthroat trout population. Long-time devotees of Flat Creek report a decline in the opportunity to fish for large cutthroats. Furthermore, recent fish surveys show that nonnative trout (brook, brown, and rainbow) account for almost half of the trout population of the stream.



Lori Iverson / FWS

Fishing is popular on the refuge.

Lower Flat Creek opens to fishing on August 1 and is the most popular fishing water on the refuge. The section from the Jackson National Fish Hatchery to the old Crawford Bridge boundary is the most heavily fished area. This piece of stream is renowned for holding trophy-sized Snake River cutthroat trout. Locally, cutthroats over 20 inches in length are recognized as trophy-sized, and this part of stream annually produces fish in the 22- to 24-inch range. The stream is crowded with anglers from opening day through August, and then use tapers off until the October 31 closing.

In 2011, the refuge received two verbal comments from anglers about guided fishing trips on lower Flat Creek. Both parties believed that guided trips were unnecessary and undesirable and contributed to streamside crowding. The refuge issued nine permits for guided fishing in 2011, which accounted for an estimated 135 people (guides and clients) using the streamside on lower Flat Creek. Refuge law enforcement contacted three additional guided trips, without refuge permits, that included groups of seven, five, and three individuals. We do not know the extent of the illegal, unpermitted, guided fishing activity. Generally, it seems as if the refuge permit requirement is disrespected.

Wildlife Observation and Photography

In 2001, the refuge had 780,299 visitors participate in onsite interpretation and nature observation. Visitation included 24,664 sleigh riders, 304,987 stops at the visitor center, and 439,148 visitors using observational facilities such as auto turnouts. In 2013, 14 wildlife-viewing companies under special use permit made 604 trips with 2,540 clients, as documented in the special use reports required of the permittees at the end of the season.

Sleigh rides are a well-established activity and have been part of the refuge wildlife observation and outreach program for close to 50 years. During the 2011–12 winter season, ridership reached 20,705. The unique wildlife-viewing opportunity raises awareness of the refuge, receives national as well as inter-

national attention, and is frequently listed in travel-related articles, Web sites, and publications as a top attraction in Jackson Hole during the winter. Sleigh drivers are knowledgeable of wildlife viewing etiquette and are experienced in recognizing actions that cause stress to animals. The sleigh ride contract stipulates that the refuge receives a percentage of revenue generated by the sleigh ride operation; we use this money to hire a seasonal winter naturalist.

A 2002 survey of refuge sleigh ride visitors found that elk viewing was the most frequent local and nonlocal visitor activity, followed by sightseeing, snow skiing, and pleasure driving (Loomis and Caughlan 2004). The survey also asked about the overall importance of activities in terms of deciding to take recreation trips to Jackson Hole. The numbers reflect the average importance of an activity and its relative importance in terms of attracting people to Jackson Hole. Viewing the mountains was rated as the most important activity by local and nonlocal refuge visitors, followed by viewing elk, other wildlife, and bison (Loomis and Caughlan 2004).

Environmental Education and Interpretation

Public programming, such as daily talks at the visitor center and special events for families, is offered year-round. The North Highway 89 Pathway gives the refuge staff an area for guided walks to interpret wetland values. Refuge staff does extensive training and communication with the sleigh ride contractor and staff to make sure the operation offers a quality interpretive experience, expresses the mission of the refuge, and does not create conflicts with wintering wildlife.

However, the refuge does not have staff to meet the high public demand for environmental education and interpretation programs. The refuge uses nongovernmental money to hire winter naturalists or uses volunteers to meet the demand for environmental education and interpretive programs during the school year. During the summer months when visitor center visitation peaks, the refuge relies on a large residential volunteer workforce as the primary means to offer formal and informal interpretation.

Room for program attendees at the visitor center is extremely limited during winter or times of inclement weather. Further, it lacks sufficient accommodations for persons with physical disabilities and does not meet the requirements of the Architectural Barriers Act Accessibility Standard (United States Access Board 2013).

Jackson Hole and Greater Yellowstone Visitor Center

The Jackson Hole and Greater Yellowstone Visitor Center, on the southern end of the refuge, plays a critical role in Jackson's tourism-based economy, serving approximately 300,000 people each year and providing a wide range of visitor services. The visitor center is often the first place that people stop at for information during their visit to the Jackson area, and many hotels and businesses, including the chamber of commerce, encourage people to go the visitor center to get information. Displays in the visitor center give an overview of the role of Federal lands and State wildlife agency partners. The information is shared in presentations, talks to key groups, and in news releases when possible.

The visitor center building is more than 40 years old and has several maintenance deficiencies, including some that affect visitor safety, and the building does not meet requirements of the Architectural Barriers Act Accessibility Standard (United States Access Board 2013). The visitor center does not have space to hold programs for the large number of visitors that we see during peak visitation or for visiting youth and school groups.

The visitor center is an interagency facility, staffed and supported by area agencies and organizations—Bridger-Teton National Forest, Grand Teton Association, Grand Teton National Park, Jackson Hole Chamber of Commerce, and National Elk Refuge. Operation of the visitor center helps the partner agencies distribute information and permits vital to their organizations.

While directly quantifying the economic impacts of the visitor center is difficult because of a number of factors, the importance of the Center itself, as well as the value of the service and information provided to visitors by Refuge staff, should not be overlooked or discounted.

Other Uses

Areas such as North Highway 89 Pathway and North Park have special considerations and management. Also, we manage several commercial and noncommercial activities on the refuge under special use permit.

North Highway 89 Pathway

We constructed a multi-use pathway on the eastern side of the refuge that opened to the public on

May 1, 2011. The North Highway 89 Pathway runs adjacent to the refuge fence from Jackson to the Gros Ventre Junction and passes through several types of habitat. We do not allow pets on the pathway. Further, the refuge closes the pathway seasonally (between November 1 and April 30) to reduce the effects on migrating and wintering wildlife.

North Park

The town of Jackson manages North Park (located on the refuge) as a public park under a memorandum of understanding with the refuge. North Park is mowed, weeded, and otherwise maintained, similar to the way Jackson maintains its public parks. Currently, the Teton County Parks and Recreation Department uses an online system and collects fees for reserving North Park for activities such as weddings; however, reservations and fee collection are not in compliance with our agency policy.

Special Uses

The refuge issues about 50 special use permits per year, which the visitor services staff administers. The refuge allows several restricted public use activities under special use permit, providing services we could not otherwise offer to the public because of limited funding and staff. Refuge staff assesses each activity for which a special use permit is required and develops specific special conditions for that particular activity. Common special uses follow:

- guided wildlife-viewing tours
- guided hunting trips
- guided fishing trips
- elk and bison retrieval services
- commercial photography and filming
- Shoshone–Bannock Tribes ceremonial hunt
- antler collection (refer to "Partnerships" in section 3.8 below)
- grazing
- research

Wildlife Viewing

In 2014, 16 wildlife-viewing companies applied for special use permits to conduct tours on Elk Refuge Road. In addition, the refuge coordinates the winter sleigh ride contract. The refuge receives a percentage of the revenue generated by the sleigh ride operation. This money is collected and deposited into an account administered through the Grand Teton Association and is a source of nongovernmental money that we use to hire a seasonal winter naturalist.

Guided Hunting, Guided Fishing, and Retrieval Services

Game retrieval businesses have operated on the refuge for decades and provide a convenient service to hunters. Starting in 2008, two companies operating under special use permit provided guided hunts for elk and bison. In 2010, the refuge issued two permits to operators who each provided guided hunting and game retrieval services to hunters.

Commercial Photography and Filming

We require all photographers, videographers, and media to obtain a special use permit. Some requesters want access to areas of the refuge not open to the public. Permits specify what areas are allowed for access including stipulations for use of the areas.

The National Elk Refuge accommodates a large number of commercial photographers and film companies each year, especially during the winter. In addition, the refuge receives an extensive amount of local, regional, national, and international media attention. Media coverage includes print, electronic, and video and film venues. Responding to media requests has become an increasing part of the visitor service program's winter duties.

Because the refuge is a focus of media attention and millions of people visit this area each year, we have the opportunity to be an ambassador for the Refuge System and the mission of the U.S. Fish and Wildlife Service.

Weddings

A substantial number of people request to hold a wedding ceremony at the visitor center, at North Park, at Miller House, or on a sleigh ride. Many of the couples do not request permission to marry on the refuge, but rather show up with a justice of the peace or other official to conduct the ceremony.

Weddings in the visitor center can detract from other visitors' experience because the long, linear design of the building makes it difficult for groups to stand out of the way of people walking through the building, looking at the exhibits, or enjoying the views or wildlife-viewing opportunities. Depending on the size of the wedding party, a wedding at the visitor center can result in a loss of available parking spaces for visitors using the center to learn about the area and get visitor service information.

Occasionally, people hold weddings on the visitor center lawn or under a shelter area on the North

Park lawn without prior consent from the refuge or visitor center staff. The visiting public does not recognize the park as refuge property, and there is no notice that prohibits weddings on the park's lawn. Consequently, weddings frequently take place on the site. Again, this limits other visitors' opportunities to use these areas for other purposes.

Some of our seasonal employees live in Miller House during both the winter and summer seasons. Weddings at this location would have a significant adverse effect on these employees. In addition, no public rest rooms are available at Miller House.

Private sleigh rental to hold a wedding ceremony provides an economic benefit for the contractor and reduces effects on other refuge activities and users.

Access

Many visitors are interested in accessing the refuge to enjoy what it offers. Other people want to travel through the refuge to access private land or other Federal land.

General Access and Elk Refuge Road

Elk Refuge Road, which stems north of the east–west Broadway Avenue in Jackson, is the primary access to the refuge and the only legal entrance to the refuge for the public. Teton County has a perpetual easement for the operation, maintenance, and improvement of Elk Refuge Road from Broadway Avenue to the north side of the Twin Creek subdivision. The purpose of the easement is to provide the public and private landowners of property east of the refuge with ingress and egress across part of the southeast corner of the refuge. Because of the ease of access to the refuge and its proximity to town, local residents use Elk Refuge Road extensively for walking, jogging, and bicycling.

Access for Boating

The northern boundary of the refuge is the north shore of the Gros Ventre River, which places the Gros Ventre River on the refuge. Boaters floating down the Gros Ventre from Slide Lake are required to exit the river at the "jump cliff" site immediately on entering the refuge. This long-standing closure of the Gros Ventre River on the refuge has been in place because of the potential disturbance to wildlife and because this is not a wildlife-dependent activity.

The refuge segment of the Gros Ventre River upstream from the town of Kelly was recently designated as scenic under the Craig Thomas Snake River Headwaters Legacy Act of 2008. This act requires the refuge and the Grand Teton National Park to create a comprehensive river management plan to guide the management of each segment designated as wild, scenic, or recreational for a 15-year period. This public process has been completed and the plan has been completed and signed by these agencies.

Access to the National Forest

Winter users of the Goodwin Lake Ski Cabin on the Bridger-Teton National Forest have limited access across the refuge to reach the national forest boundary. The refuge plows a parking area for three cars and allows people to cross refuge lands to get to national forest lands. Our visitor services staff issues special use permits for this access.

3.7 Socioeconomic Environment

Jackson is the primary destination for visitor activities in Jackson Hole, and Jackson serves as the gateway community to the National Elk Refuge, Grand Teton National Park, Bridger-Teton National Forest, and Yellowstone National Park. Natural and scenic resource issues have a direct and profound effect on the economic well-being of Jackson Hole.

Most of the economic activity related to the Refuge is located within the two-county area of Teton County, Idaho, and Teton County, Wyoming; therefore, these counties comprise the local economic region for this analysis. The refuge is also a partner in the establishment and daily operations of the Jackson Hole and Greater Yellowstone Visitor Center located just minutes from the Refuge entrance.

Population, Ethnicity and Education

Table 10 compares population estimates and trends for Teton County, Idaho, and Teton County, Wyoming. In 2012, Teton County, Idaho, and Teton County, Wyoming, accounted for 0.6 percent and 3.8 percent of the Idaho and Wyoming populations, respectively. From 2000 to 2012, the population growth rate for Teton County, Idaho, was 67.6 percent, far outpacing that of the state as a whole (23.3 percent). The growth rate in Teton County, Wyoming, population was slightly higher than that of Wyoming (18.8 percent to 16.7 percent).

The percentage of the Teton County, Idaho, population aged 25 or older with at least a Bachelor's degree is higher than both the state and national averages (33.2 percent compared to 24.6 percent and 28.2 percent). Over half of the population of Teton County, Wyoming, (52.7 percent) aged 25 or older holds at least a Bachelor's degree, while only 24.2 percent of the population of the state of Wyoming holds at least a Bachelor's degree (United States Census Bureau 2012a).

In 2011, 81 percent of the population of Teton County, Idaho, self-identified as white, not of Hispanic or Latino origin, compared to 81.6 percent of the Teton County, Wyoming, population. Both of these figures were lower than the respective state averages (83.6 percent for Idaho and 85.5 percent for Wyoming). Meanwhile, 17.2 percent of Teton County, Idaho, residents (compared to 11.5 for the state of Idaho) and 15.4 percent of Teton County, Wyoming, residents (compared to 9.4 percent for the state of Wyoming) self-identified as of Hispanic or Latino origin (United States Census Bureau 2012a).

Regional Employment and Income

Table 11 shows the median household income, poverty, and unemployment rates for the two-county study area and corresponding states. As of 2011, median household income for Teton County, Idaho, was higher than that for Idaho ($52,444 compared to $46,890). The household median income of residents of Teton County, Wyoming, far exceeded that of the state as a whole ($73,627 compared to $56,380) (United States Census Bureau 2012a). In 2011, nonlabor income constituted 53.1 percent of total personal income for Teton County, Wyoming, compared to 35.7 percent for Teton County, Idaho, and the national average of 34.1 percent (Bureau of Economic Analysis 2012a).

In 2011, the percent of the population in Teton County, Idaho, living below the poverty line was lower than both the state and national figures (7.2 percent compared to 14.3 percent and 15.9 percent, respectively). Similarly, the percent of the population of Teton County, Wyoming, living below the poverty line was below that of Wyoming (7.6 percent compared to 10.1 percent, respectively). From 2000 to 2011, Teton County, Idaho, experienced a 4.4 percent increase in its unemployment rate, compared to a 1.3 percent increase for the state as a whole. The unemployment rate of Teton County, Wyoming, increased slightly by 0.6 percent over the same time period, though the unemployment rate of the state of Wyoming declined by 0.2 percent (United States Census Bureau 2012a). This is likely due to the high concen-

Table 10. State and county population estimates.

	Residents (2012)[2]	*Persons per square mile (2012)*[2]	*Percent population change (2000–2012)*[2]	*Percent bachelor's degree or higher*[1]
Idaho	1,595,728	19.1	23.3	24.6
Teton County	10,052	22.3	67.6	33.2
Wyoming	576,412	5.9	16.7	24.2
Teton County	21,675	5.1	18.8	52.7

Source: [1](United States Census Bureau 2012a) [2](United States Census Bureau 2012b).

Table 11. State and county income, unemployment, and poverty statistics.

	Median household income (2011)	*Percentage of individuals below poverty (2011)*	*Percentage unemployed (2011)*	*Change in percent unemployed (2000–2011)*
Idaho	$46,890	14.3	5.1	1.3
Teton County	$52,444	7.2	6.8	4.4
Wyoming	$56,380	10.1	3.3	-0.2
Teton County	$73,627	7.6	2.9	0.6

Source: (United States Census Bureau 2010a)

tration of service-related employment within these two counties.

Table 12 shows percent employment by sector for the two-county area. The combined two-county area had a total employment of more than 31,400 individuals in 2011. Farm employment accounted for nearly 2 percent of the workforce. The highest percentage of total employment was found in the accommodation and food service sectors (21.1 percent of non-farm employment). The real estate rental and leasing and government and government enterprises sectors had the second and third largest percentage of total non-farm employment (11.5 percent and 9.6 percent, respectively). Forestry, fishing and related activities accounted for less and 1 percent of non-farm employment (Bureau of Economic Analysis 2012b).

Table 12. Employment by sector, 2011, in Teton County, Idaho, and Teton County, Wyoming.

Industry	*2011*	*Percent of Total*
Total employment	31,459	
Wage and salary employment	20,600	65.5
Proprietors employment	10,859	34.5
Farm proprietors employment	370	1.2
Nonfarm proprietors employment	10,489	33.3
Farm employment	612	1.9
Private nonfarm employment	27,826	88.5
Forestry, fishing, and related activities	32	0.1
Mining	63	0.2
Utilities	*	0
Construction	2,706	8.6
Manufacturing	435	1.4
Wholesale trade	79	0.3
Retail trade	2,401	7.6
Transportation and warehousing	461	1.5
Information	431	1.4
Finance and insurance	1,963	6.2
Real estate and rental and leasing	3,608	11.5
Professional, scientific, and technical services	1,902	6
Management of companies and enterprises	56	0.2
Administrative and waste management services	1,465	4.7
Educational services	415	1.3
Health care and social assistance	1,155	3.7
Arts, entertainment, and recreation	1,456	4.6
Accommodation and food services	6,640	21.1
Other services, except public administration	1,423	4.5
Government and government enterprises	3,021	9.6
Federal, civilian	462	1.5
Military	160	0.5
State and local	2,399	7.6

Source: (Bureau of Economic Analysis 2012b)

* Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

Agriculture

In 2007, there were 299 farms in Teton County, Idaho, which reflects a decrease of 3 farms since 2002. Acreage of cropland also fell over this time period from 91,979 acres to 85,149 acres (U.S. Department of Agriculture 2007). Agricultural sales for Teton County, Idaho, in 2007 totaled $33 million which represents an increase in sales from the 2002 figure of $24.1 million. Ranking 26th statewide in total agricultural sales in 2007, the top selling products of Teton County, Idaho, were vegetables, melons, potatoes, and sweet potatoes ($16.2 million), cattle and calves ($3.4 million), and nursery, greenhouse, floriculture, and sod ($2.8 million) (U.S. Department of Agriculture 2007).

From 2002 to 2007, the total number of farms in Teton County, Wyoming, increased from 110 to 180, but the county experienced an overall decrease in total farmland, from 57,089 acres to 52,930 acres (U.S. Department of Agriculture 2007). During the same time period, the market value of agricultural products sold increased by 24 percent, from $7.4 million to $9.2 million. Cattle and calf sales totaled $5.3 million in 2007, accounting for more than half of total agricultural sales. Other top selling agricultural products within the county were, grains, oilseeds, dry beans, and dry peas sales worth $747,000 (U.S. Department of Agriculture 2007).

Recreation and Tourism

Angling, hunting, and wildlife viewing are popular recreational activities across Wyoming and Idaho and within the two-county area. According to our 2011 report, "National Survey of Fishing, Hunting, and Wildlife-Associated Recreation," approximately 838,000 and 775,000 residents and nonresidents participated in wildlife-associated activities in Idaho and Wyoming, respectively (FWS 2012). All visitors to

the refuge who engage in wildlife watching are considered away-from-home participants. In Idaho, residents and nonresidents spent over 3.2 million days hunting and over 5.5 million days fishing, with residents of the state accounting for 61 percent of hunting days and 86 percent of angling days. In Wyoming, residents and nonresidents spent over 1.7 million days hunting and over 5.3 million days fishing. Residents of the state accounted for 64 percent of hunting days and 38 percent of angling days.

For the purpose of the National Survey, wildlife watching is categorized into (1) away-from-home (activities taking place at least 1 mile from home) and (2) around-the-home (activities taking place within 1 mile of home). In 2011, residents and nonresidents in Idaho spent a total of 3.8 million days watching wildlife away from home, with residents accounting for 86 percent of wildlife watching days. In Wyoming, residents and nonresidents spent 3.1 million days watching wildlife away from home and residents accounted for 36 percent of wildlife watching days.

Across both states, in-state spending associated with these activities totaled $5.5 million (2011 dollars), with $3 million spent on trip-related expenditures, $2 million spent on equipment, and $526 thousand spent on other items (FWS 2012).

Important to the economies of both counties, travel- and tourism-related employment accounted for 46.8 percent of total private employment in Teton County, Wyoming, in 2011, and 15.6 percent of total private employment in Teton County, Idaho. The economic sectors comprising this category include retail trade, passenger transportation, arts, entertainment and recreation, and accommodations and food. Of these sectors, accommodations and food services jobs accounted for 35.4 percent of total private employment in Teton County, Wyoming, and 11.2 percent of private employment in Teton County, Idaho. Although a large portion of the employment in these counties is in these travel and tourism sectors, average annual wages in travel and tourism sectors were substantially lower than mean wages across all private sectors (United States Census Bureau 2013).

Among the major tourist attractions for Teton County, Idaho, are downhill and Nordic skiing, snowboarding, and snowmobiling, as well as the Teton Valley Great Snow Fest, which takes place in the city of Driggs. Teton County, Idaho, also hosts a summer festival, which includes a hot air balloon rally, craft fair, antique show, rodeo, and parade. Additional attractions include fly fishing, golfing, horseback riding, mountain biking, and river sports (Teton Valley Chamber of Commerce 2013).

The tourism industry in Teton County, Wyoming, benefits from the county's natural amenities, which offer year-round activities for visitors. In addition to two local ski areas, winter activities include snowmobiling, Nordic skiing, snowshoeing, dog sledding, wildlife tours, and scenic flights. Popular summer opportunities include hiking, camping, whitewater rafting, golfing, horseback riding, mountain biking, scenic tours, and wildlife tours. Noteworthy summer festivals include the Jackson Hole Art Fair, Grand Teton Music Festival, and the Teton County Fair (Jackson Hole Chamber of Commerce 2013).

Economic Contributions of the Refuge

The refuge contributes to the local economy in several ways:

- Refuge employees rely and spend money on local services in their personal lives.
- We locally buy many supplies and services to manage the refuge.
- The visitors who the refuge brings to Jackson Hole spend money in the area.

U.S. Fish and Wildlife Service Employment

Refuge employees reside and spend their salaries on daily living expenses in the local area, thereby generating impacts within the local economy. Household consumption expenditures consist of payments by individuals or households to industries for goods and services used for personal consumption.

Current annual salaries total approximately $1,021,000. It is estimated that salary spending by refuge personnel generates the annual secondary effects of three jobs, $120,300 in labor income, and $225,200 in value added in the local economy.

Antler Sales

Since the late 1950s, the Jackson District Boy Scouts have picked up elk antlers on the refuge each spring under a special use permit, and then the Scouts sell the antlers. Approximately 75 percent of the proceeds from the auction go to the refuge for elk management. The amount received in 2012 was $90,469 for 7,398 pounds of antlers. The 10-year average is 8,369 pounds of antlers yielding $76,941.

Visitor Spending

Spending associated with recreational visits to national wildlife refuges generates substantial economic activity. The Service report, Banking on



Mike Pfiel / FWS

Local Boy Scouts collect antlers on the refuge every year for an auction that also benefits elk refuge management.

Nature: The Economic Benefits of National Wildlife Refuge Visitation to Local Communities, estimated the impact of national wildlife refuges on their local economies (Carver and Caudill 2013). More than 46.5 million people visited the national wildlife refuges in fiscal year 2011, which generated $2.4 billion of sales in regional economies. Accounting for both the direct and secondary effects, spending by national wildlife refuge visitors generated over 35,000 jobs and $792.7 million in employment income (Carver and Caudill 2013). Additionally, spending on refuge recreation generated approximately $342.9 million in tax revenue at the local, county, State, and Federal levels (Carver and Caudill 2013).

3.8 Operations

Operations involve the administrative, or logistical, aspects of managing the refuge: money, staff, facilities, and partners.

Funding and Staff

In 2008, the Service conducted a nationwide staff analysis for all national wildlife refuges. At that time, the refuge had 10 permanent FTE positions, but the analysis found that a minimum of 18 permanent FTE positions was necessary to conduct the programs—a 45-percent staff deficit. The current staff level of 10.5 FTE positions is insufficient to achieve the refuge goals. To address this need for staff, we rely on 12.5 FTEs of volunteers and seasonal staff, counting on uncertain nongovernmental money, to conduct refuge programs. A list of the additional, nonpermanent assistance follows:

- 1 volunteer for biological program fieldwork
- 8 seasonal irrigators
- 1 seasonal operator for supplemental feeding
- 8 detailed (from other refuges) law enforcement officers to patrol during the May 1 national forest opening for antler collection
- 2 seasonal National Park Service law enforcement officers for hunting season enforcement
- 20 volunteers to staff the visitor center and Miller House
- 3 winter naturalists

Facilities

We rely on facilities such as the visitor center, maintenance buildings, and refuge housing to give the public and our staff a safe, inviting place to visit and to work, respectively. Other infrastructure, such as pathways and roads, let visitors have on-the-ground experiences in the refuge and help our staff efficiently carry out management activities.

Visitor Buildings

Several refuge buildings are more than 50 years old and qualify for protection under the National Historic Preservation Act. The continued maintenance, use, and staffing of these buildings preserves their historic value while providing the public with a connection to refuge history.

The refuge has two primary visitor services facilities: Jackson Hole and Greater Yellowstone Visitor Center and Miller House. The maintenance and use of these facilities are vital in achieving refuge goals for environmental education and interpretation.

At the Jackson Hole and Greater Yellowstone Visitor Center, each partner agency is required to provide only minimal staff at the information desk. The refuge staff manages and maintains the facility; only one partner in the visitor center helps with the operations or maintenance costs with short-term funding. However, in accordance with the Grand Teton Association's establishing mission and guidelines, the nonprofit organization returns a portion of sales projects to the refuge for educational and interpretive programs. Routine operational costs, including heating and cooling, cleaning, electricity, gas, phone and Internet service, snow removal, and supplies were about $80,000 in 2011. The collaborative partnership approach to funding the operation of the visitor center enables the refuge to provide important visitor services to more people than it could under current budget levels. The visitor center manager is a refuge employee, benefitting the other partner agencies at no cost to their organizations. The manager has the following duties:

- compiling and disseminating a weekly schedule for approximately 30 people that work at the center
- training employees and volunteers on all aspects of information desk services
- presenting education and interpretation programs



Lori Iverson / FWS

Jackson, Wyoming

- managing the center budget and ordering supplies (such as trash bags, light bulbs, office supplies for the information desk, rest room supplies, paper products, and maps)
- taking care of routine maintenance and other center issues
- serving as the refuge volunteer coordinator for the region's largest volunteer program

Refuge Housing

Government housing is available for rent on the refuge for approximately six families and up to eight seasonal employees. Sharing a seasonal housing unit may limit or deter some employees or volunteers. All refuge housing suitable for permanent staff is occupied. Seasonal irrigators are housed in refuge travel trailers as part of their compensation package.

Parking sites for recreational vehicles and trailers with water, sewer, and electrical hookups are available to accommodate about 25 volunteers who can provide their own recreational travel trailers. We provide these sites free to volunteers who work a minimum of 20 hours per week per person.

Elk Refuge Road

Elk Refuge Road, Flat Creek Road, and the Curtis Canyon Road are open to the public for wildlife observation and access to the national forest from May 1 through November 30. During winter, 3.5 miles of Elk Refuge Road are open to provide access to private property (and minor access to the national forest), as well as to provide wildlife-viewing opportunities such as for bighorn sheep.

Elk Refuge Road provides safe, reasonable, uninterrupted access (ingress and egress) for the refuge staff, the public, and private owners year-round. The road has 12 turnouts that are plowed by refuge staff during winter to encourage vehicles to move off the road to view wildlife. There is a no-stopping regulation for people driving on Elk Refuge Road.

Teton County has an easement on Elk Refuge Road, retaining the responsibility for general maintenance and improvements to the road. Traffic on the road has no limits for the number of vehicles allowed, including people conducting commercial operations on the roadway. Magnesium chloride (salt)-treated water, applied by Teton County for dust abatement during the summer, remains on the road surface throughout the year.

The refuge has authority to control parking along a 30-foot right-of-way on either side of Elk Refuge Road. We maintain parking space for several vehicles at a marked trailhead at our boundary with the Bridger-Teton National Forest.

Partnerships

The National Elk Refuge has a history of fostering partnerships that help accomplish the refuge programs. We have entered into various projects and activities with many partners including conservation organizations, private companies and businesses, other Federal agencies, State agencies, universities, local schools, and county and city governments. The refuge also has an active volunteer program, primarily for visitor services. The refuge could not begin to meet the needs of the thousands of refuge visitors without these volunteers.

Partnerships are essential for operating the Jackson Hole and Greater Yellowstone Visitor Center. Information about wildlife and the different missions and uses of the various Federal lands in Jackson Hole enhances the public's understanding about the purpose of the refuge. In addition, the visitor center provides an important service to the public by providing information about area accommodations, services, and available recreational activities.

Partners have assisted in wildlife and habitat management, visitor services, land protection, law enforcement, and community outreach. Several of these relationships have developed into formalized partnerships with written agreements or memoranda of understanding, while others remain more informal. The following describes some of our ongoing partnerships:

- Bridger-Teton National Forest and Grand Teton National Park
- Craighead Beringia South
- Grand Teton Association
- Greater Yellowstone Coordinating Committee
- Jackson District Boy Scouts
- Jackson Hole Weed Management Association
- Teton County
- Wyoming Game and Fish Department

Bridger-Teton National Forest and Grand Teton National Park

Cooperative agreements between the refuge, the Bridger-Teton National Forest, and the Grand Teton National Park provide important wildfire suppression capability that the refuge does not have. Fire is a natural ecosystem process, but wildfires (unplanned) can be destructive to agency facilities and sometimes obstruct wildlife management efforts. For example, a wildfire in September that would remove most of the refuge forage intended for use by wintering elk and bison would be counterproductive to the refuge's management strategy. This partnership helps prevent damage to wildlife habitat, refuge structures, and adjacent private lands.

Craighead Beringia South

The discovery of elevated blood-lead levels in scavenging birds on the refuge and Grand Teton National Park is a good example of positive involvement by a nongovernmental organization. Craighead Beringia South—a private, nonprofit, wildlife research organization—not only conducted the research that identified the blood-lead level problem, but they also obtained private money to help mitigate the problem. As a result of their involvement, a program for voluntary use of lead-free ammunition was established for Federal lands in Jackson Hole and is showing positive results in reducing lead exposure to specific wildlife populations.

Grand Teton Association

The Grand Teton Association has shown exceptional leadership and remarkable assistance in supporting the Jackson Hole and Greater Yellowstone Visitor Center. In 2011, the association completed the purchase of the visitor center building, which they promptly donated to the refuge, a gift valued at $1 million. This facility serves more than 300,000 visitors annually and is a tremendous asset to Jackson's tourist-based economy. Financial support from the association has been invaluable in providing temporary staff to run the visitor center when key positions are vacant. We use proceeds from the visitor center sales outlet that is run by the Grand Teton Association to support environmental education, interpretation, and wildlife research programs.

The Grand Teton Association coordinates with a private concessionaire to conduct winter sleigh ride tours that serve 20,000 to 25,000 refuge visitors each year. The refuge does not have the resources to provide this program to the public, and the sleigh rides are only made possible through our partnership with the Grand Teton Association and the private sleigh ride contractor.

The visitor center and sleigh rides are integral to wildlife observation, photography, and interpretation on the refuge and generate revenue used to provide these programs.

Greater Yellowstone Coordinating Committee

The Greater Yellowstone Coordinating Committee is a coalition of all Federal land management agencies within the Greater Yellowstone Ecosystem. The refuge has been a member of the committee since 2002. Members include national wildlife refuge managers, national park superintendents, and national forest supervisors for their units within the ecosystem. A memorandum of understanding provides a vehicle for mutual cooperation and coordination in the management of these Federal lands. The committee periodically identifies resource management issues where coordination across the Greater Yellowstone Ecosystem is desirable. By leveraging financial and management efforts, these Federal land managers can best address ecosystem-wide threats and opportunities.

Jackson District Boy Scouts

The refuge has enjoyed a 55-year partnership with the Jackson District Boy Scouts. Hundreds of Scouts have earned badges of achievement while conducting outdoor activities on the refuge.

The most popular activity for the Scouts is helping the refuge with the collection of shed elk antlers each spring, which they do under special use permit. This program reduces damage to feeding equipment, prevents trespassing and antler poaching, and stops unnecessary disturbance to the elk herds. These antlers pose a hazard to refuge equipment because they can puncture vehicle tires and damage track assemblies, especially during the supplemental winter feeding operations and spring programs like harrowing and irrigating. The antlers can become obscured by snow and dried grasses, making them impossible to see and avoid by vehicle and equipment operators.

The antlers are sorted, bundled, weighed, tagged, and sold at the Boy Scouts of America Elk Antler Auction in the Jackson town square on the Saturday before Memorial Day weekend each year. About 120 bidders from 28 States, representing local buyers, western export houses, and regional crafts people, usually attend. The 10-year average is 8,369 pounds of antlers yielding $76,941. The Scouts donate 75 percent of the proceeds from the auction to the refuge.

We use this money primarily for habitat projects like the operation of the irrigation system to provide more forage for wintering elk. In the past, we have used the proceeds to acquire equipment to improve habitat and pay for seasonal irrigators.

Jackson Hole Weed Management Association

Invasive plants like spotted knapweed and cheatgrass reduce natural vegetation diversity and are a problem throughout Jackson Hole. Our participation and cooperation with the Jackson Hole Weed Management Association has resulted in a partnership to address this landscape problem on and off the refuge. These partners have given us technical and plant control assistance for eradication efforts on the refuge. In addition, control efforts for invasive plants in Jackson Hole, especially next to the refuge, help prevent new infestations on the refuge.

Teton County

Our coordination of the North Highway 89 Pathway with Teton County has expanded public opportunities for wildlife observation, photography, and interpretation on the refuge. The refuge works with Teton County and other private, nonprofit organizations to inform the public of use restrictions on the pathway that are necessary for compatibility. This has helped reduce conflicts with wildlife and has reduced violations. Public compliance with these restrictions helps ensure that use of the pathway remains a compatible use and that the pathway is open to the public in the future.

Wyoming Game and Fish Department

Cost sharing with partner organizations for projects of mutual interest and benefit is a common approach to leveraging limited refuge money. An example of cost sharing is our cooperation with WGFD to monitor chronic wasting disease on the refuge and in Jackson Hole. The refuge has contributed money to help defray the cost of seasonal technicians who collect samples from hunter-harvested deer and elk. The WGFD supervises these technicians, coordinates the sampling schedule, analyzes the samples, and writes the annual report. This cost-sharing partnership enables a disease detection program on the refuge that is vital to both agencies and likely could not be conducted at a high level of confidence without this collaboration.

Chapter 4—Management Direction



Ann Hough / FWS

Teton Mountain Range

This chapter contains the specific objectives and strategies that will be used to carry out the final CCP for the National Elk Refuge. We are recommending this as the alternative that could best achieve the refuge's purposes, vision, and goals while helping to fulfill the Refuge System mission. The stepdown management plans listed in section 4.11 near the end of the chapter will provide implementation details for specific refuge programs. In addition, appendix E contains the compatibility determinations (required) for public and management uses associated with the final CCP.

The objectives and strategies presented in this chapter will be carried out over the next 15 years. This CCP will serve as the primary management document for the refuge until it is formally revised. We will carry out the final CCP with help from partner agencies, organizations, and the public.

As stated in the Improvement Act, the primary mission of our Refuge System is wildlife conservation. Multiple policies and guidance documents have been developed to accomplish this mission, including the policy on biological integrity, diversity, and environmental health and the 2011 "Conserving the Future" document developed in collaboration with our stakeholders and the public. The biological integrity, diversity, and environmental health policy provides directives for maintaining and restoring the biological integrity, diversity, and health of the Refuge System, whereas "Conserving the Future" articulates the desired roles for refuges and provides recommendations for the next decade and beyond (FWS 2011). This document states, "At the root of these challenges [that the Refuge System must address] is the increasing consumption of natural resources, which has caused loss, degradation and fragmentation of habitat around the world. Habitat loss is largely responsible for the current extinction event, in which the Earth may lose half of its species in the next 100 years."

This chapter describes the management focus of the CCP, followed by the objectives and strategies to achieve the refuge goals. The last sections of the chapter describe the staff needed to carry out the plan (section 4.10), stepdown management plans (section 4.11), monitoring and evaluation (section 4.12), and plan amendment and revision (section 4.13).

4.1 Management Focus

Our focus and planning approach for the National Elk Refuge is consistent with the visions and principles promoted in the Improvement Act; the policy on biological integrity, diversity, and environmental health; and "Conserving the Future." This includes conserving native communities and species of concern and developing "quantifiable objectives" that "integrate the conservation needs of the larger landscape (including the communities they support)."

Vision for the National Elk Refuge

Nestled below the majestic Teton Range, adjacent to the historic gateway town of Jackson, the National Elk Refuge provides crucial big game wintering habitat in the Greater Yellowstone Ecosystem. Across the refuge's grassland, wetland, woodland, and sagebrush shrubland communities, visitors view wintering elk and other wildlife populations that are balanced with their habitats. The public enjoys quality hunting and fishing as well as year-round interpretative opportunities. Effective outreach and strong public and private partnerships ensure understanding and protection of refuge resources for future generations.

Promote Natural Habitats and Enhance Public Use

The CCP along with the vision and goals for the National Elk Refuge collectively focus objectives and associated management strategies on achieving sustainable, diverse, native communities that will conserve native species of concern at landscape and local scales. Achieving this vision represents the greatest contribution we at the refuge can make in addressing current and future threats to natural resources in the Greater Yellowstone Ecosystem. Threats include, but are not limited to, increasing habitat fragmentation and decreasing landscape connectivity, adverse effects on water quantity and quality, and cumulative risks associated with a changing climate and energy production. To alleviate these risks and to meet the purposes of the refuge require us to consider multiple perspectives:

- Refuge System policies and guidance
- the current understanding of native community ecology
- increasing human demands on natural resources
- continued landscape change
- our need to collaborate with the public and our partners on projects that extend beyond refuge boundaries

4.2 Overview of Goals and Objectives

Under each goal in this section, we describe the objectives and strategies that will serve as the steps needed to achieve the refuge vision. While a goal is a broad statement, an objective is a concise statement that indicates what is to be achieved, the extent of the achievement, who is responsible, and when and where the objective should be achieved—all to address the goal. The strategies are the actions needed to achieve each objective. Unless otherwise stated, the refuge staff will carry out the actions in the objectives and strategies. The rationale for each objective provides context such as background information, assumptions, and technical details. The plan has objectives for the following:

4.3 Climate Change
4.4 Landscape-Scale Conservation
4.5 Habitat and Wildlife Goal
4.6 Cultural Resources Goal
4.7 Visitor Services Goal
4.8 Visitor and Employee Safety and Resource Protection Goal
4.9 Administration Goal

4.3 Climate Change

The following objectives deal with our involvement in the landscape-scale and local aspects of climate change.

Climate Change Objective 1

For the life of the plan, continue involvement with partner organizations, especially land management agencies in the Greater Yellowstone Coordinating Committee, to stay apprised of the developing science of climate change and the resulting information that can have Greater Yellowstone Ecosystem–wide application.

Strategies

- Take part in climate change conferences, webinars, and seminars.
- Engage in the Greater Yellowstone Coordinating Committee's climate change planning efforts.

Rationale

The refuge's limited staff will make it difficult for the refuge to remain current with the ever-growing knowledge of climate change and to conduct land management planning that reflects the latest science. The refuge could leverage our limited biological staff by staying involved with and relying on other Federal land management units in the Greater Yellowstone Coordinating Committee with large staffs to develop climate change expertise and coordinate ecosystem-wide planning efforts.

Climate Change Objective 2

For the life of the plan, participate in the climate change assessments and long-term monitoring efforts initiated by the Greater Yellowstone Coordinating Committee.

Strategies

- Conduct vulnerability assessments on the refuge that correspond and complement efforts of the Greater Yellowstone Coordinating Committee in predicting climate change effects.
- Collect long-term monitoring data for key habitats and wildlife populations, focusing on surrogate species when possible. (Note: Surrogate species is a recently adopted but yet to be implemented planning approach for the Refuge System. Surrogate species represent the needs of a wide array of wildlife species, and these needs will be used for conservation planning that supports multiple species and habitats within a defined landscape or geographic area.)

Rationale

Cooperation and coordination with surrounding Federal land management agencies through the Greater Yellowstone Coordinating Committee will enable us to collect long-term monitoring information that complements and adds value to ecosystem-wide efforts. Participation in climate change assessments conducted by other land management agencies on the committee will give the refuge the analysis expertise to address refuge-specific concerns.

Climate Change Objective 3

For the life of the plan, carry out mitigation actions identified in the Greater Yellowstone Area climate action plan (Fiebig 2011) to reduce the refuge's carbon footprint.

Strategies

- Continue to improve the energy efficiency of buildings and the vehicle fleet.
- Use a gravity-flow irrigation system to reduce the energy-related costs of pumping.

Rationale

The Greater Yellowstone Coordinating Committee completed a comprehensive assessment of greenhouse gas emissions and corresponding mitigation plans for each Federal land management unit in the Greater Yellowstone Ecosystem. Following the specific mitigation recommendations for the refuge will reduce our carbon footprint. Reduction of greenhouse gas emissions will support the goals of our agency's "Strategic Plan for Responding to Accelerating Climate Change, 2009" (FWS 2010).

4.4 Landscape-Scale Conservation

The following objectives describe our responsibilities for involvement in landscape-scale conservation.

Landscape-Scale Conservation Objective 1

For the life of the plan, participate in the Greater Yellowstone Coordinating Committee to support

landscape-scale conservation in the Greater Yellowstone Ecosystem.

Strategies

- Participate on the board and committees of the Greater Yellowstone Coordinating Committee.
- Contribute money as available toward priority projects that provide ecosystem-wide benefits.
- Share information and resources such as equipment and staff.

Rationale

Working with others will improve our ability to coordinate management of Federal lands at a landscape scale.

Landscape-Scale Conservation Objective 2

Within 5 years, determine the feasibility of a Service conservation easement program, and if appropriate, pursue authority for conservation easements in Teton County.

Strategies

- Inventory and identify tracts of high biological value that support the refuge vision.
- Develop a preliminary project proposal.
- Develop a land protection plan.

Rationale

Off-refuge resources and activities affect our ability to achieve refuge goals. Wildlife often travel across administrative boundaries to meet their seasonal life cycle needs. Protection of off-refuge resources will help meet these seasonal wildlife needs.

Landscape-Scale Conservation Objective 3

For the life of the plan, work with partners to use non-Service (private, nongovernmental organization, or other agency) easements to support refuge-specific conservation goals in the CCP and Bison and Elk Management Plan.

Strategies

- Set up a program with the Jackson Hole Land Trust and others to establish conservation easements with refuge-specific conservation goals.
- Consider partnership opportunities to build wildlife crossings for Highway 89.



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Spotted Sandpiper

Rationale

Off-refuge resources and activities affect our ability to achieve refuge goals. Wildlife often travel across administrative boundaries to meet their seasonal life cycle needs. Protection of off-refuge resources will help meet these seasonal wildlife needs. Use of privately funded wildlife and habitat protection easements might be more desirable to some landowners than Government-funded easements. Furthermore, private money might be available to finance easement programs when Government money was unavailable. Wildlife crossings could reduce collisions between vehicles and animals.

Landscape-Scale Conservation Objective 4

Within 10 years, evaluate potential land exchanges with adjacent landowners (agencies and private landowners) to change the refuge boundary to improve the effectiveness of refuge programs.

Strategies

- Discuss potential land exchanges with adjacent landowners.
- Prioritize tracts for different refuge goals such as bison, elk, swan, bald eagle, or greater sage-grouse.

Rationale

Identifying and obtaining tracts of land that could improve wildlife benefits under our management will support refuge purposes. Some areas like the northeastern part of the refuge might better fit with other agency missions and provide benefits to the public (lands are managed by agencies according to different missions and policies).

Landscape-Scale Conservation Objective 5

Within 10 years, work with the State Land Board and WGFD to evaluate the effects of the potential sale of Wyoming State trust land and Wyoming Game and Fish Commission–owned lands near the refuge (for example, Dry Hollow section 36 and Crystal Butte section 36) and consider protection options.

Strategy

- Work with local community to share information and effects.

Rationale

The potential sale of State of Wyoming lands next to or near the refuge to private landowners might have serious consequences to the management of the National Elk Refuge. Before lands are under consideration for sale, the refuge needs to determine and address the possible effects of access, rights-of-way, and human disturbance to elk and bison herds during sensitive winter and spring seasons.

Landscape-Scale Conservation Objective 6

Meet annually with the Regional Fisheries Supervisor for WGFD and the Jackson Hole Fish Hatchery Manager to explore cooperative project opportunities in the ecosystem.

Strategy

- Identify opportunities to leverage agency resources in ways that expand impacts of Snake River cutthroat trout conservation projects across the ecosystem.

Rationale

The Greater Yellowstone native trout fishery will benefit from identifying cooperative projects that enhance the resiliency of Snake River cutthroat trout populations.

4.5 Habitat and Wildlife Goal

Adaptively manage bison, elk, and other wildlife populations and habitats as outlined in the Bison and Elk Management Plan. Contribute to the conservation of healthy native wildlife populations and their habitats. Restore and sustain a native fishery that provides quality fishing opportunities.

Native Grasslands Objective

Within 10 years, manage 500–1,000 acres of native grassland habitat on northern end of the refuge to increase elk and bison use of these areas.

Strategies

- Use wildland fire to help accomplish the objective and reduce hazardous fuel.
- Control invasive plant species.
- Seed sites with desired plant species.

Rationale

The Bison and Elk Management Plan calls for reduced reliance on supplemental feeding. Encouraging elk and bison use of grassland habitats on the northern end of the refuge will reduce forage use and conserve forage on the southern end of the refuge, reducing the need for supplemental feeding.

Sagebrush Shrublands Objective 1

Within 5 years, define existing structural characteristics of sagebrush shrubland communities on the refuge, and protect existing sagebrush shrubland communities from disturbance or degradation.

Strategies

- Cooperate with other agencies to obtain imaging for the refuge using the light detection and ranging (LIDAR) technology.
- Until the sagebrush shrubland habitat is defined, fully suppress wildfires in this habitat.
- Conduct prescribed burns only after the current characteristics of sagebrush shrublands are defined.
- Limit off-road vehicle use.
- Do not expand feedgrounds into sagebrush shrubland communities on the northern end of the refuge.

Rationale

Mapping of plant community types conducted between 2007 and 2009 identified 8,990 acres of sagebrush-associated plant communities on the refuge, but height and density of sagebrush within these areas has not been quantified at a fine scale. These communities on the refuge provide important habitat for the Jackson Hole greater sage-grouse population, and identifying and, when appropriate, protecting greater sage-grouse habitat is the highest priority for sagebrush-associated plant communities.

Sagebrush Shrublands Objective 2

Within 10 years, manage an estimated 1,000–3,000 acres of sagebrush shrubland communities to promote desired habitat conditions of sagebrush at least 11 inches tall with more than 15-percent canopy cover to assure no net loss of these sagebrush areas.

Strategies

- Manage sagebrush shrublands to prevent degradation, maintain native structural and compositional characteristics, and allow degraded areas to recover, especially areas used by greater sage-grouse and other sagebrush-dependent species.
- Use wildland fire to help accomplish the objective and reduce hazardous fuel.
- Minimize off-road vehicle use.
- Limit elk feeding to current areas.
- Conduct habitat treatments in greater sage-grouse core areas in accordance with Wyoming Executive Order 2011–5.

Rationale

Holloran and Anderson (2004) suggested greater sage-grouse wintering habitat was the principal limiting factor on the Jackson Hole greater sage-grouse population and recommended protecting mature sagebrush stands from disturbance. The "Upper Snake River Basin Sage-Grouse Conservation Plan" (WGFD 2014) recommended maintaining and protecting tall sagebrush (11- to 31-inch-high stands with more than 15-percent canopy cover) as forage sites for wintering greater sage-grouse. Because the refuge needs a detailed inventory of the sagebrush

shrubland plant community structure, 1,000–3,000 acres is an imprecise estimate of the acreage that we will need to manage or provide special protection to meet management objectives. A more exact acreage will be determined through Sagebrush Shrublands Objective 1.

Wetlands Objective 1

Within 5 years, replace water control structures for the three existing Romney Ponds and Bill's Bayou, and over the life of the plan construct two new ponds in the Romney Pond complex.

Strategies

- Develop funding partnerships with WGFD and nonprofit organizations.
- Evaluate the current and replacement water control structures for fish passage and screening.
- Replace existing water control structures with inline water control structures with beaver-proof screens.
- Construct two new ponds to the north of the existing Romney Ponds and use inline water control structures and beaver-proof screens.

Rationale

The ability to manipulate water levels is necessary to meet habitat management objectives for trumpeter swans, but water control structures in the Romney Pond complex and Bill's Bayou are near the end of their operational life and vulnerable to beaver damage. The Gros Ventre River channel is shifting to the south and eroding the Pierre's Pond dikes; maintaining these ponds is no longer practical. Unlike the Pierre's Pond complex, the Romney Pond complex is not vulnerable to river damage. Construction of two new ponds in the Romney Pond complex will replace the swan habitat lost when Pierre's Ponds fail.

Wetlands Objective 2

Within 10 years, maintain 30–50 percent pondweed cover and 10–20 percent emergent vegetation in artificial ponds that have water management capability.

Strategies

- Gradually reduce water levels in spring and maintain low water levels until the following spring on a 4- to 7-year rotating schedule for each pond to increase pondweed cover.
- Use wildland fire to help accomplish the objective and reduce hazardous fuel.

Rationale

Water management will develop nesting and brood-rearing habitat for trumpeter swans. Squires and Anderson (1995) suggested that pondweed tubers ranked among the highest in nutritional quality for trumpeter swans, and water level manipulations have been shown to promote sago pondweed (Kantrud 1990). Some emergent vegetation is preferred for swan breeding sites (Lockman et al. 1987).

Wetlands Objective 3

Within 5 years, inventory and map invasive plant species in the Flat Creek wetland complex, and for the life of the plan limit cover of listed noxious weeds to less than 1 percent of the Flat Creek wetland complex.

Strategies

- Use high-resolution photography at peak flowering periods to search for large infestations of perennial pepperweed and purple loosestrife in inaccessible locations.
- Inventory invasive plant species in the Flat Creek wetland complex using watercraft.
- Pull, bag, and remove invasive plants if found.
- Use appropriately labeled herbicide where applicable.

Rationale

Early detection of invasive plants is critical to the effective control of infestations (Dewey and Andersen 2004).

Riparian Woodlands and Aspen Woodlands Objective 1

Within 5 years, identify and map sites within the lower Flat Creek riparian zone with the highest potential for willow restoration. Over life of the plan, restore 200 acres of willow communities in the lower Flat Creek riparian zone to class 1 or class 2 conditions (refer to page 49 of the Bison and Elk Management Plan for definitions).

Strategies

- Map areas with existing willow along fish-bearing stream channels in Flat Creek.
- Install exclosures around high-priority mapped areas.
- Consider planting willows within fenced exclosures to speed restoration.
- Remove fences to exclude elk and bison around mapped areas after recovery. Rotate fences to restore new areas.

Rationale

Willow restoration will support fish habitat and habitat for birds. The Bison and Elk Management Plan indicates that 800 acres of willow habitat will be restored to class 1 or class 2 condition using 500- to 1,000-acre exclosures, but the refuge has not begun any significant efforts to achieve this objective to date. Results from experimental exclosures (Smith et al. 2004, refuge unpublished data) suggest that, even with the complete exclusion of elk and bison, it will take at least 10 years for class 4 willow communities to recover to class 1 condition. Given these limitations, we need to limit restoration to areas with the greatest potential for restoration (existing class 4 willow patches along fish-bearing stream channels).

Riparian Woodlands and Aspen Woodlands Objective 2

Over the life of the plan, restore 100 acres of the riparian, narrowleaf cottonwood community to class 1 or class 2 condition in the upper Flat Creek riparian zone (refer to page 49 of the Bison and Elk Management Plan for definitions).

Strategies

- Use separate exclosures to allow movement of elk and bison between the McBride and Chambers management units.
- Consider using prescribed fire to stimulate regeneration in areas where exclosures are in place.
- Install exclosures around high-priority mapped areas.
- Consider planting willows within fenced exclosures to speed restoration.
- Remove fences used to exclude elk and bison after vegetation recovery.

Rationale

Elk and bison browsing has modified the cottonwood plant community in the upper Flat Creek riparian zone to class 3 and class 4 conditions (Smith et al. 2004). Even if elk and bison population objectives were met, the refuge will need to completely exclude elk and bison from these areas to recover to class 1 or class 2 condition.

Riparian Woodlands and Aspen Woodlands Objective 3

Within 10 years, inventory the class condition (refer to page 49 of the Bison and Elk Management Plan for definitions) of willow, cottonwood, and aspen stands in the Gros Ventre River riparian area and Gros Ventre Hills. For the life of the plan, maintain or increase the existing acreage of class 1 and class 2 condition willows, cottonwood, and aspen.

Strategies

- Inventory existing structural characteristics using remote sensing (LIDAR) combined with field ground-truthing.
- Limit elk and bison browsing pressure in class 1 and class 2 willow, cottonwood, and aspen by limiting prescribed burning next to these stands, maintaining high hunting pressure on the northern end of the refuge,



Ann Hough / FWS

Scarlet Paintbrush

hazing elk and bison off the refuge during summer, using exclosure fences, and protecting wolf den sites from human disturbance.

- Consider using prescribed fire to stimulate regeneration in areas where exclosures are in place.

Rationale

The refuge will need a comprehensive class condition inventory to figure out where and when restoration efforts should occur. Objectives in the Bison and Elk Management Plan call for restoration of 800 acres of willow, 1,000 acres of cottonwood, and 1,000 acres of aspen to class 1 or class 2 condition, with the greatest opportunity for cottonwood and aspen restoration on the northern end of the refuge. Although the analysis for the Bison and Elk Management Plan predicted that large-scale exclosures will be necessary to restore aspen in the Gros Ventre Hills, new data for this area suggests limited recovery of aspen has occurred without exclosures since 2005 (Keigley et al. 2009).

Flat Creek Enhancement Objective 1

From 2014 to 2016, carry out the cooperative Flat Creek enhancement project by treating approximately 1.2 miles of Flat Creek each year.

Strategies

- Assess existing structures, tree revetments (streambank support), and other treatments for functionality and habitat values.
- Remove, rehabilitate, or replace previously installed treatments with more suitable treatments, including removal of deteriorating instream structures, riprap, and an old, broken walkway.
- Specify appropriate stream habitat structures based on lessons learned from failed structures.
- Enhance riffle and pool habitats to increase spawning, rearing, and juvenile habitats for native Snake River cutthroat trout.
- Modify meanders.
- Stabilize severe streambank erosion where it jeopardizes project success.
- Provide for continued irrigation and diversion activities such that habitat enhancement and channel restoration activities are not jeopardized.
- Map, remove, treat, and control infestations of reed canarygrass along both sides of Flat Creek.
- Install woody and sod vegetation.
- Schedule construction during September to November to avoid cutthroat trout spawning, Flat Creek opening to anglers, elk and bison hunting and feeding periods, and the winter range restriction period.
- Continue to cooperate with WGFD and allow ample access to the refuge for fisheries management activities.

Rationale

Instream treatments along with riparian area restoration are necessary to restore stream form and function to Flat Creek, which will provide increased hydrologic stability as well as more habitat for all stages of the native Snake River cutthroat trout. WGFD, as the lead for the Flat Creek enhancement project, and the refuge have support for this project from several partners: Rocky Mountain Elk Foundation, Teton County Conservation District Board, and Trout Unlimited.

Flat Creek Enhancement Objective 2

In 2015, after the initial enhancement work in Flat Creek (objective 1) is done, monitor the treatments for effectiveness and to make any needed adjustments.

Strategies

- Assess the stability and functionality of structures.
- Assess the bioengineering treatment (live material used in engineered treatments) establishment, such as willows used in bank stabilization.
- Assess the disturbed area reclamation and revegetation.
- Assess the achievement of overall project goals (described in chapter 3, "3.8 Alternative D" under "Flat Creek Enhancement" in the habitat section of the draft CCP).

Rationale

Based on the results of monitoring, we can apply adaptive management strategies to adjust the treatments, as needed, to increase the ecological benefits and better achieve the goals and objectives for the Flat Creek enhancement project. Monitoring can provide case study information, educational materials, and learning opportunities that we can use to make sure that future projects are carried out as effectively and efficiently as possible.

Flat Creek Enhancement Objective 3

Within 10 years, fully restore at least 1 mile of lower Flat Creek to improve fish habitat, support productive native trout populations, and promote natural and stable river morphology characteristics.

Strategies

- Support and carry out the Flat Creek enhancement project as described in objectives 1 and 2.
- Continue to cooperate with WGFD and allow ample access to the refuge for fisheries management activities.

Rationale

Part of the habitat and wildlife goal is to restore and sustain a native fishery that supports quality fishing opportunities. Restoration of this portion of Flat Creek to promote natural and stable river morphology characteristics will enhance cutthroat trout habitat, potentially increase cutthroat trout populations, and provide quality fishing opportunities for native trout.

Invasive Species Objective 1

Throughout the life of the plan, treat more acreage as needed to ensure that the total of all noxious weed and other invasive plant infestations does not exceed the current 1,100 acres.

Strategies

- Control the spread of invasive plant species to additional areas.
- Control invasive plants using integrated pest management including biological, cultural, mechanical, and chemical methods.
- Prevent new infestations of invasive plants including noxious weeds, nonnative grasses, and aquatic invasive species by preventing the artificial transportation of seeds and materials onto the refuge through efforts like public education, weed-free-hay rules, and the cleaning of all excavation and

angling equipment before entering the refuge.

- Increase monitoring and rapid response for new infestations including invasive species of aquatic plants and animals.

- Identify and consider removing invasive plants that are not considered noxious weeds, but are nonnative plant species such as crested wheatgrass, reed canarygrass, meadow foxtail, and yellow sweetclover.

Rationale

The National Elk Refuge has 1,100 acres of invasive plants, including noxious weeds, and no known occurrence of invasive animals or aquatic invasive species at this time. Noxious weed species threatening establishment and of greatest concern are Dalmatian toadflax, perennial pepperweed, and whitetop. Other weed species present and of concern include yellow toadflax; spotted, diffuse and Russian knapweed; sulfur cinquefoil; Dyer's woad; oxeye daisy; plumeless thistle; black henbane; houndstongue; and common burdock. Weed species such as Canada and musk thistle are well established and of lower priority but still require control to prevent dense stands that negatively affect native vegetation and wildlife forage.

Invasive Species Objective 2

Over the life of the plan, reduce the existing 420-acre spotted knapweed infestation along the Gros Ventre River corridor by 50 percent.

Strategies

- Develop large-scale invasive plant eradication programs (greater than 100 acres of infestation) where possible.

- Identify and develop suitable funding sources for monitoring, treatment, restoration, and public information.

- Use existing partnerships and private contractors.

- Focus efforts on proven methods with using effective herbicides and applicable mixes and insects.

Rationale

Spotted knapweed is localized, infests 420 acres within the National Elk Refuge, and is mostly contained within the Gros Ventre River corridor and adjacent lands. The spotted knapweed population on the refuge represents a major risk for new infestations in other parts of the Greater Yellowstone Ecosystem. Within the refuge boundary, migration of spotted knapweed from the river corridor into the adjacent uplands will have a significant effect on existing greater sage-grouse populations and their habitat. Infestations will substantially degrade the vital, large ungulate, winter habitat and reduce the refuge's winter population carrying capacity.

Data from elk radio collars and GPS collars suggest that 90 percent of elk migration routes from the refuge transect the Gros Ventre River corridor (Cole and Ketchum 2011, Smith and Robbins 1994). There is considerable evidence that wild and domestic ungulates facilitate the transport of invasive plant species seeds (Schiffmam 1997) and might be responsible for colonization of invasive plant species into new areas (Boulanger et al. 2011). Seed ingestion and viability in feces has been documented in various studies (Malo et al. 2000, Olson et al. 1997), and seed transport in the coats of wild and domestic ungulates is also substantiated (Constible et al. 2005, De Clerke-Floate 1997). Because elk that winter on the refuge migrate as far as Yellowstone Lake, the risk of seed transport by elk and colonization of spotted knapweed in uninfested parts of the Greater Yellowstone Ecosystem is significant. A major reduction in spotted knapweed density in the Gros Ventre River corridor will reduce the threat of new infestations in Grand Teton National Park, Teton Wilderness, and the southern part of Yellowstone National Park.

Migratory Birds Objective

Within 5 years, institute a monitoring program for migratory birds to evaluate the effects of habitat management activities on trumpeter swan, long-billed curlew, and other migratory bird species potentially affected by refuge habitat management activities.

Strategies

- Conduct post-treatment migratory bird surveys in K-Line experimental areas and compare to 2010 pretreatment data as defined by Dieni (2011).

- Continue monitoring trumpeter swans during nesting season to determine the number of breeding pairs, number of active and successful nests, number of cygnets hatched per nest, and number of cygnets fledged per nest.

- Continue monitoring long-billed curlews at a level sufficient to identify nesting territories and to avoid irrigating these areas until after birds have fledged.

- Continue coordination with WGFD to monitor swans and long-billed curlews.

- Conduct baseline surveys of breeding birds in areas subject to habitat management.

Rationale

Trumpeter swans and long-billed curlews are sensitive migratory species potentially affected by refuge management activities. Their small population sizes and relatively large breeding territories warrant species-specific monitoring. Large-scale habitat modifications are ongoing or planned in irrigated grasslands; sagebrush grasslands; and willow, aspen, and cottonwood plant communities. Baseline surveys of breeding birds in proposed treatment areas will allow managers to evaluate the effects treatments on bird communities and adaptively adjust treatments if necessary.



Eric Cole / FWS

Wolf

Aquatic Species Objective

Within the life of the plan, decrease nonnative trout prevalence in Flat Creek by 25 percent.

Strategies

- Continue to cooperate with WGFD and allow ample access to the refuge for fisheries management activities.

- Remove all nonnative trout captured during fish surveys.

- Aggressively target brook trout for removal from Flat Creek during the fall spawning period using electrofishing and trapping techniques.

- Continue angler education efforts about the effect of nonnative species on the native fishery and encourage angler harvest of nonnative trout.

- Design and install a fish passage screen at the Southpark diversion to prevent nonnative trout in the Gros Ventre River from entering Flat Creek.

- Support and carry out habitat restoration of Flat Creek as described in the restoration plan (Biota 2013a) on file at the refuge.

Rationale

Nonnative trout populations can be substantially reduced by direct removal, preventing their introduction into irrigation systems, and by improving stream habitat conditions that provide a competitive advantage to native trout populations.

Disease Management Objective 1

Within 5 years, develop a comprehensive disease contingency plan in coordination with WGFD and Grand Teton National Park.

Strategies

- Identify current and potential wildlife diseases.
- Develop response plans for disease outbreaks.

Rationale

Wildlife populations and associated pathogens do not recognize land management boundaries or agency jurisdictions. Developing interagency response plans to disease outbreaks before occurrence increases the likelihood of mitigating negative effects (Mörner et al. 2002).

Disease Management Objective 2

Within 5 years, quantify baseline patterns of elk group size, distribution, and density for elk on the refuge.

Strategy

- Use high-resolution, photograph-based mapping to count elk groups on the refuge.

Rationale

There is considerable evidence that high animal density adds to disease risk (Gross and Miller 2001, Maichak et al. 2009), but there is no fine-scale data to evaluate current elk density conditions on the refuge. Quantifying elk density patterns will facilitate modeling to predict the potential effects of disease outbreaks and allow the refuge to adaptively manage elk density compared to baseline conditions (Gortazar et al. 2006).

Disease Management Objective 3

Retest fish for whirling disease in next 5 years.

Strategy

- Conduct whirling disease sampling during electroshocking operations conducted by WGFD.

Rationale

During routine monitoring in 2003, sampled sent to the WGFD laboratory tested positive for Myxololus cerebralis, the parasite that causes whirling disease. Infection levels were low and no population-level declines have been documented. No further testing has been done since 2003.

Federally Listed Species and State Species of Greatest Conservation Need Objective 1

Within 5 years, develop an inventory and monitoring plan for all federally listed threatened, endangered, and candidate species and State species of concern that potentially exist on the refuge.

Strategies

- Create a list of potential Federal threatened and endangered species and State species of concern that exist on the refuge.
- Document existing and historical records of occurrence and survey data for relevant species.
- For species with sufficient available data, document the species' status and trend.
- For species with insufficient data, develop monitoring plans to supply information needs.
- Follow and carry out Wyoming Executive Order 2011–5 for the greater sage-grouse.

Rationale

Habitat manipulations are proposed in many refuge plant communities, but the status and trend of Federal threatened and endangered species and State species of concern are unknown. Adequate baseline population information for these species will make sure that refuge actions could be adaptively managed to prevent negative effects on these populations.

Federally Listed Species and State Species of Greatest Conservation Need Objective 2

Within 1 year, develop a protocol to salvage, hatch, and return trumpeter swan cygnets to nests threatened by flooding in the Flat Creek Marsh.

Strategy

- Cooperate with WGFD and the Wyoming Wetland Society to develop and implement the swan egg salvage protocol and to install floating nest structures near breeding territories most at risk to flooding.

Rationale

Past monitoring suggests that water diverted from the Gros Ventre River combined with spring runoff causes flooding that destroys swan nests in the Flat Creek Marsh. Egg salvage and installation of floating nest platforms will mitigate this effect and improve nest success and cygnet survival.

Research and Monitoring Objective

Within 5 years, develop a comprehensive inventory and monitoring plan designed to evaluate habitat management objectives, migratory bird populations, Federal threatened and endangered species, State species of concern, and Bison and Elk Management Plan objectives.

Strategies

- Rank information needs and identify areas where insufficient information exists.
- Develop study designs to answer questions of interest.
- Work with cooperating agencies, nongovernmental organizations, and volunteers to pay for inventory and monitoring projects and help with fieldwork.
- (Also refer to strategies for species of concern, migratory birds, and disease management.)

Rationale

The inventory and monitoring plan will help set priorities for research and monitoring tasks to make sure that critical information is being collected to guide management decisions.

4.6 Cultural Resources Goal

Preserve and interpret cultural resources in a way that allows visitors to connect to the area's rich history and conservation heritage.

Cultural Resources Objective

Protect and preserve cultural resources on the refuge through coordination with the Region 6 cultural resources branch, which helps refuge staff in meeting the requirements of section 106 of the National Historic Preservation Act and other cultural resources–related legislation.

Strategies

- Inform the Region 6 cultural resources staff of refuge projects early in planning by using the Cultural Resources Review Form.
- Develop exhibits and signage to enhance educational opportunities.
- Encourage collaboration with interested tribes in developing relevant materials and correct interpretation of cultural resources.
- Identify facility needs for interpretive programs and assessment for any rehabilitation work done on the historic Miller Barn.

Rationale

It is important to protect the integrity of known cultural resources and make sure our activities do not affect unknown resources. Accurate information will help the refuge develop effective educational and interpretive materials for the public that will explain and encourage preservation of cultural resources.

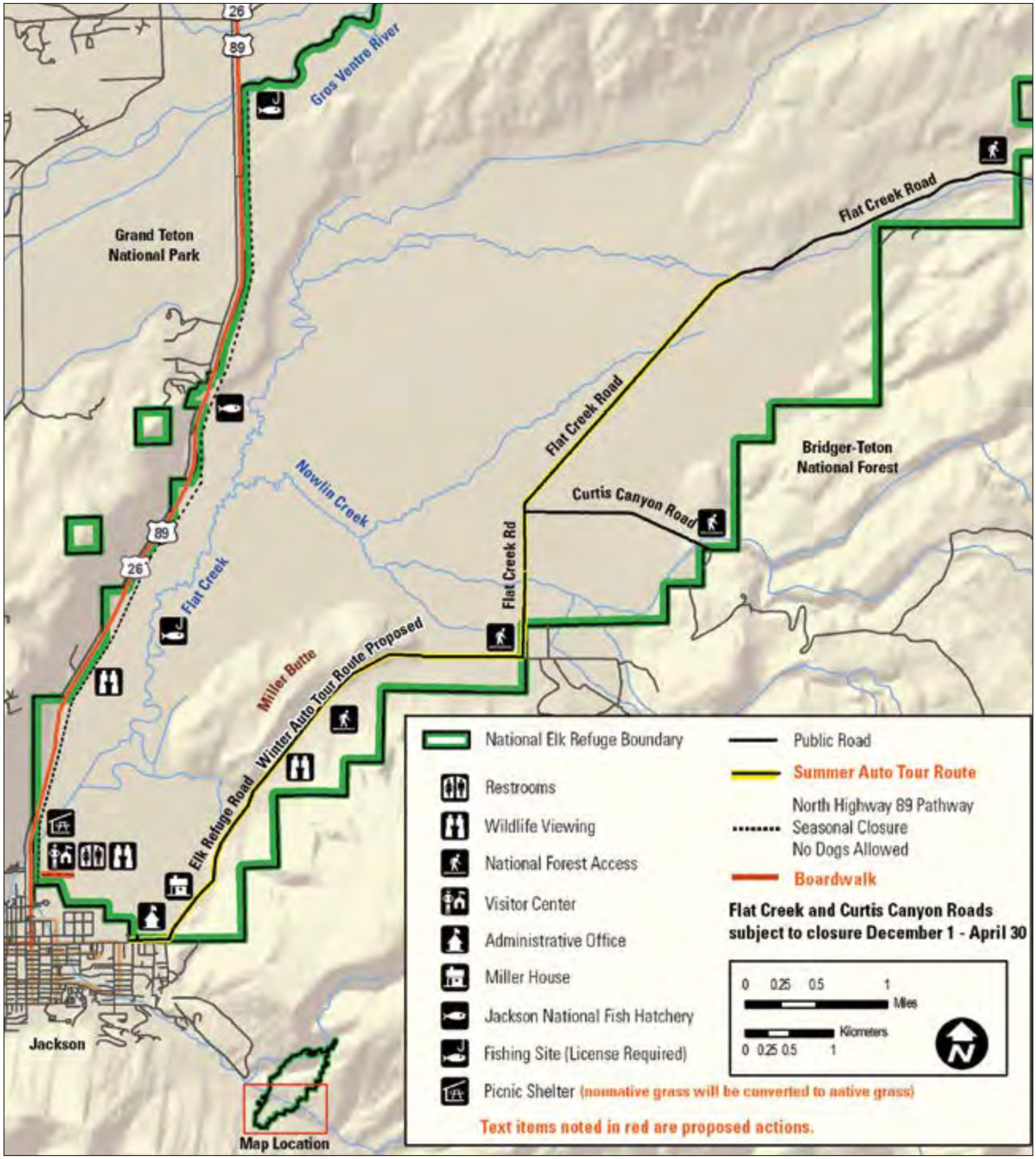


Figure 12. Map of visitor services on the southern end of the National Elk Refuge, Wyoming.

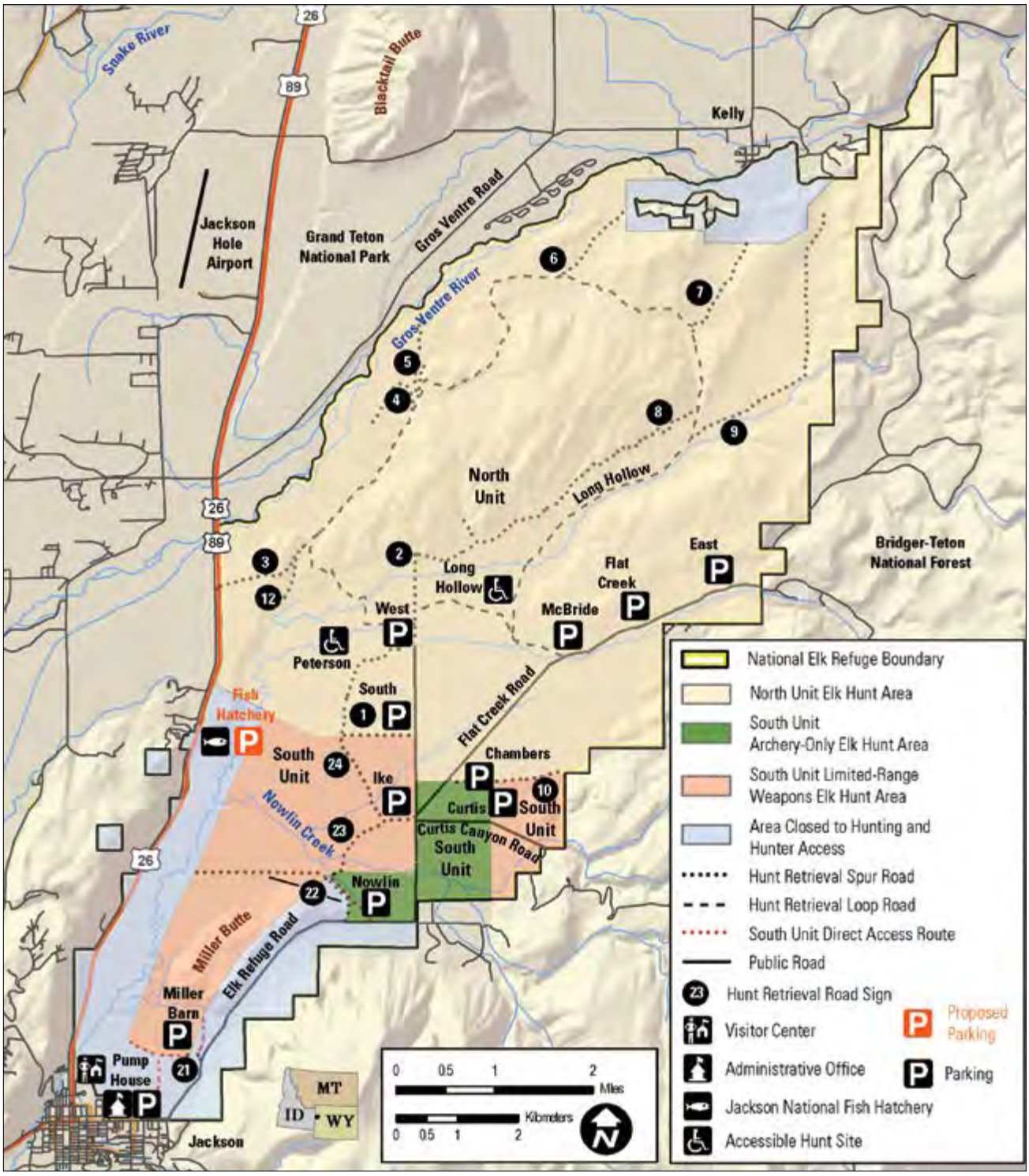


Figure 13. Map of the elk hunting program on the National Elk Refuge, Wyoming.

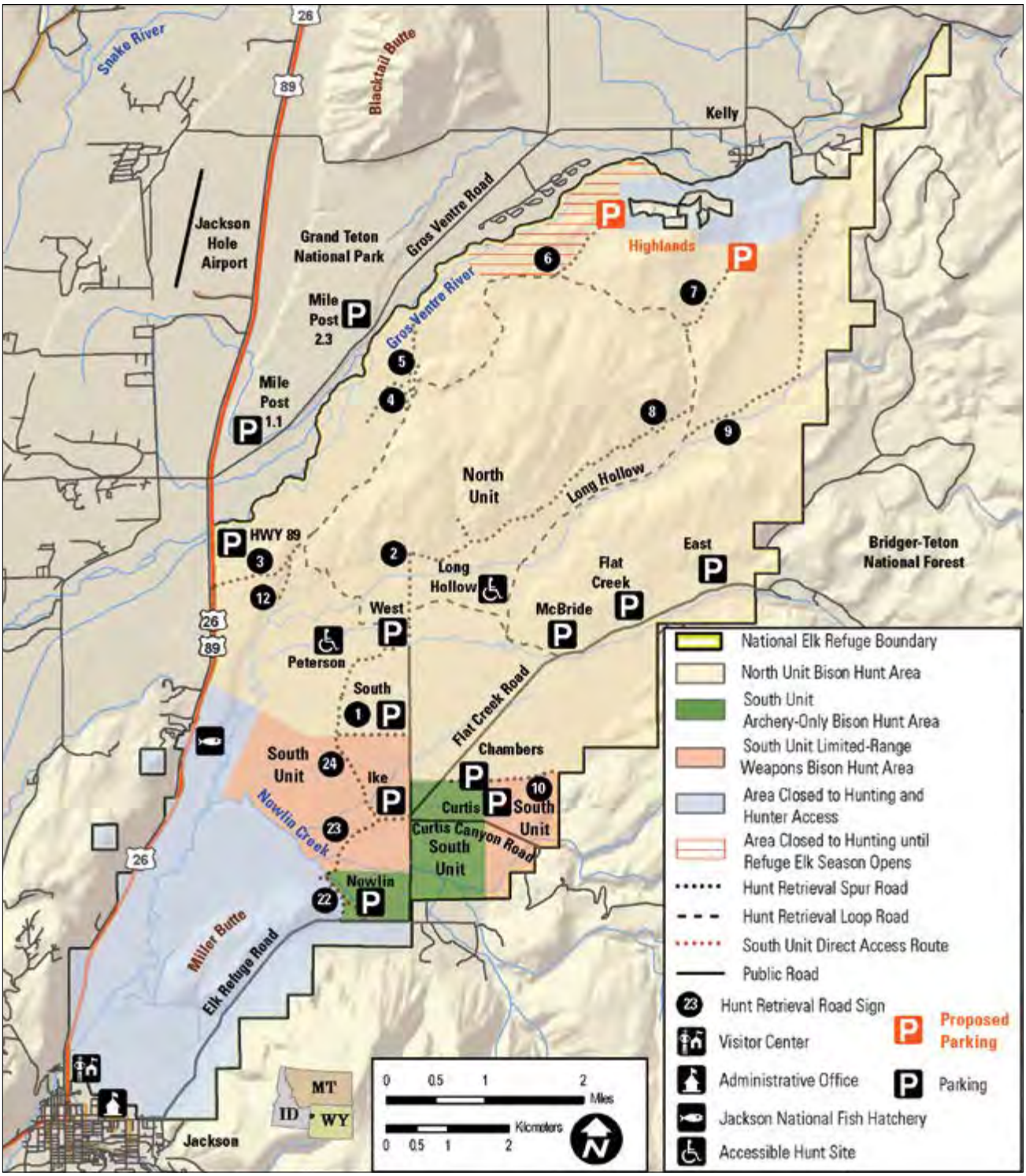


Figure 14. Map of the bison hunting program on the National Elk Refuge, Wyoming.

4.7 Visitor Services Goal

Enable a diverse audience to understand and appreciate the refuge's wildlife conservation role in Jackson Hole, while safely enjoying year-round opportunities for wildlife-dependent recreation.

Visitor services are concentrated on the southern end of the refuge where most of the public use occurs because of the adjacency to the town of Jackson. Figure 12 shows this area, including several of the proposed uses. In addition, figures 13 and 14 reflect access and hunt areas during the elk hunting and bison hunting seasons, respectively.

Hunting Objective 1

Within 10 years, develop a hunting program for young people that provides quality hunting opportunities.

Strategies

- Cooperate with WGFD to develop hunting season proposals.
- Work with the Boy Scouts of America and other outdoor-focused youth groups to identify important traits for a youth hunt.
- Move the existing youth hunt to a time later in the hunting season when there are likely large elk numbers present on the refuge.

Rationale

Recruiting young hunters into the hunting culture is critical for continued public support of hunting as an accepted wildlife-dependent recreational activity, continued use as a wildlife management tool, and as the primary funding source for modern wildlife management. Key elements of any hunt for young people are preventing competition for game from adult hunters, adult supervision and mentoring, and quality opportunities to see and interact with wildlife.

Hunting Objective 2

Within 5 years, develop regulations for proper storage of bear attractants and for bear-deterrent practices on the refuge that address hunters and hunting practices.

Strategies

- Develop regulations that focus on reducing attractants to parking areas and vehicles.
- Provide guidelines for refuge staff when a bear is present on the refuge.
- Provide educational material and guidelines to hunters on bear behavior and what to do in the presence of a bear, including carrying and using bear spray.
- Review refuge bear spray policy in 5 years instead of at the expiration of the CCP. If the potential for aggressive bear encounters with hunters increases and evidence of increased use of bear spray by hunters will result from a bear spray carry requirement, the refuge bear spray policy can be modified.

Rationale

A significant population of grizzly bear lives at Grand Teton National Park and Bridger-Teton National Forest. The bears are habituated to hunter-killed elk and bison and gut piles, and these food sources are an important part of their fall diet. The refuge hunting program produces large quantities of both carcass remains and gut piles throughout the refuge. Grizzly bears have discovered this food source and were present on the refuge after the bison hunt began in August 2013.

Hunting Objective 3

Within 10 years, develop a hunting opportunity for bull elk on the refuge.

Strategies

- Work cooperatively with WGFD to develop a bull elk license specifically for the refuge.
- Provide educational and outreach material to other refuge users and the public to educate them about the Refuge System's mandate to provide recreational hunting opportunities when they are compatible with the purpose of the refuge.



Hunting is one of many wildlife-dependent activities available on the refuge.

Rationale

Congress has identified hunting as a priority wildlife-dependent use for the Refuge System. The National Elk Refuge uses hunting as an important wildlife management tool. Other opportunities such as a limited-quota bull hunt could be made available to hunters as long as these opportunities supported the purpose of the refuge. A limited-quota bull hunt will increase hunting interest in the refuge, attract more hunters to participate in the annual cow hunt, and introduce more hunters to the purpose and vision of the National Elk Refuge.

Hunting Objective 4

Within 10 years, develop hunter-use management tools to better manage hunt program opportunities.

Strategies

- Work cooperatively with WGFD to develop hunter checkpoints and hunter success surveys.
- Consider requiring mandatory reporting of tag use and harvest.

Rationale

Our current tools provide only minimum estimates of harvest and do not provide any data about hunter success or tag use on the refuge. More complete hunter use data will allow refuge staff to better manage refuge hunting opportunities and optimize refuge hunter use, distribution, and harvest management.

Hunting Objective 5

Within 5 years, develop and implement guidelines for a commercial guided hunting and retrieval.

Strategies

- Coordinate with WGFD and Wyoming State Board of Outfitters and Guides.
- Develop guidelines for outfitters to follow in an effort to minimize conflicts with unguided permit holders.
- Set limits for the number of permits issued each season for guided hunting.

- Set limits for the number of trips, guides, and clients per day per company.
- Establish a permit fee for commercial hunting guides.

Rationale

Guided hunting and retrieval could increase hunter success and help meet population objectives for bison and elk.

Hunting Objective 6

Within 5 years, re-evaluate the voluntary non-lead ammunition program.

Strategies

- Continue to review published literature pertaining to use of lead ammunition and the effects on wildlife.
- Collect information to determine compliance with voluntary non-lead ammunition program.
- Keep abreast of policy discussions regarding use of non-lead ammunition at the national level.

Rationale

Research conducted on the National Elk Refuge and the surrounding area indicates the use of lead ammunition by hunters results in elevated blood-lead levels in eagles and ravens, resulting in negative impacts on these species. Data from 2014 suggest that approximately 59 percent of the successful elk hunters on the refuge use non-lead ammunition.

Fishing Objective 1

Within 5 years, develop and implement guidelines for a commercial guided fishing program, with special attention to the lower Flat Creek area.

Strategies

- Coordinate with WGFD to conduct an angler survey.
- Set limits for the number of permits issued each season for guided fishing.
- Set limits for the number of trips, guides, and clients per day per company.
- Establish a permit fee for commercial fishing guides.
- Provide accessible opportunities for fishing.

Rationale

Unlimited commercial guiding has degraded the fishing experience for unguided individuals fishing on lower Flat Creek. Controls placed on the total number of guides permitted to work the refuge, as well as the total number of clients they are allowed to guide on each trip, will remove much of the congestion caused by large guided groups and improve the quality of experience had by all anglers on Flat Creek. Permit fees collected from commercial guides will help to pay for law enforcement activities and education and outreach materials.

Fishing Objective 2

Within 5 years, increase education of commercial guides and anglers on the negative effects of nonnative fish on the native Snake River cutthroat trout fishery and encourage angler harvest of nonnative trout.

Strategies

- Work cooperatively with WGFD and Trout Unlimited to develop support for this program.
- Through increased education of commercial guides and anglers, increase angler harvest of nonnative trout.

Rationale

Fish harvest systems have a powerful effect on fish populations. By encouraging guided anglers to harvest nonnative trout within creel limits, many

more will be removed than by employing management activities alone. The refuge will focus on guided anglers because they generally have better fish identification skills than the average angler.

Fishing Objective 3

Continue angler education about the negative effects of nonnative fish on the native Snake River cutthroat trout fishery and encourage angle harvest of nonnative trout.

Strategies

- Work cooperatively with WGFD and Trout Unlimited to develop support for this program.
- Use public outreach to improve identification of fish species.
- Update fishing regulations and refuge brochures.

Rationale

Fish harvest systems have a powerful effect on fish populations. By encouraging anglers to harvest nonnative trout within creel limits, many more will be removed than by employing management activities alone. The 10-year timeframe will give us ample time to develop outreach materials and identification aides.

Wildlife Observation and Photography Objective 1

For the life of the plan, enrich existing wildlife observation and photography opportunities on the refuge (25 percent of people report an enhanced experience).

Strategies

- Maintain access to turnouts, trails, and other observation sites:
  - Second-story, visitor center viewing platform.
  - Bert Raynes Boardwalk and remote-viewing platform near the visitor center.
  - Turnout just north of the visitor center and Flat Creek Bridge.
  - Elk jump turnout along Highway 89 (seasonal summer use only).
- Support a contracted, winter interpretive sleigh ride program.
- Allow wildlife-touring companies to operate on the refuge through a special use permit that outlines special conditions for operation.
- Lead winter wildlife outings.
- Loan equipment like binoculars, scopes, and backpacks through various Service initiatives and programs to increase opportunities for experiences and observation on the refuge.

Rationale

Visitor surveys conducted by the Jackson Hole Chamber of Commerce have consistently documented that 80–90 percent of valley tourists identify natural resource–based activities as their primary reason for visiting Jackson Hole. Viewing the mountains, bison, elk, birds, and other wildlife was rated as an important activity by local and nonlocal refuge visitors (Loomis and Caughlan 2004). Wildlife viewing and photography are two of the six priority public uses (wildlife-dependent recreational uses) of the Refuge System.

Wildlife Observation and Photography Objective 2

Over the life of the plan, implement at least five new, accessible wildlife observation opportunities on the refuge.

Strategies

- Develop a more prominent access route across the visitor center lawn to the existing remote-viewing platform.

- Develop a boardwalk through already disturbed wetlands near the visitor center.
- Build a photo blind along the boardwalk for noncommercial photography.
- Use webcams on the refuge to provide remote wildlife-viewing opportunities.
- Incorporate accessible opportunities into wildlife observation and photography programs.
- Develop a wildlife checklist.

Rationale

Public use will increase at area-specific, intensive use locations, resulting in increased development in some areas of the refuge. Visitors will have enhanced options to experience the refuge.

Environmental Education and Interpretation Objective 1

For the life of the plan, provide a variety of opportunities for environmental education and interpretation.

Strategies

- Maintain and improve diverse and dynamic interpretive displays, new media, and handout literature that continually enhance and increase visitors' interest in exploring the refuge.
- Develop a self-guided, interpretive tour route on Elk Refuge Road.
- Offer improved programs at the Jackson Hole and Greater Yellowstone Visitor Center, Miller House, and offsite areas with more permanent or seasonal interpreters.
- Produce short video segments on a variety of topics related to the Service and share with audiences through multiple venues.
- Use the Miller Barn as an interpretive site once stabilization and restoration work is completed.

Rationale

Environmental education is a process designed to teach citizens and visitors of all ages the history and importance of conservation and scientific knowledge about the Nation's natural resources. Through improved facilities and increased displays and presentations, we could better help to develop awareness, knowledge, attitudes, skills, motivation, and commitment for the public to work cooperatively toward conservation.

Environmental Education and Interpretation Objective 2

For the life of the plan, use the North Highway 89 Pathway to interpret the refuge purposes and mission of the Refuge System.

Strategies

- Use the existing Jackson Hole Community Pathways to interpret wetland values.
- Coordinate with Jackson Hole Community Pathways about pathway traffic flow, develop trailside interpretive signage, and encourage wildlife viewing.
- Cooperate with Jackson Hole Community Pathways to evaluate pathway effects on wildlife and habitat and adjust seasonal use as appropriate.

Rationale

Refuge staff will use the pathway during the open season as an interpretive venue. This will maximize the season and opportunity for interpretation without affecting wildlife.

Visitor Center Objective 1

Within 5 years, secure annual funding from visitor center partners to help with operation expenses, and document the financial assistance in a signed multiyear partnership agreement.



Steve Miller / FWS

Environmental education at the refuge occurs at a variety of locations and events.

Strategies

- Regularly meet with partners to provide an overview of visitor center visitation and expenses incurred for seasonal operational periods.
- Provide partners with expense reports that detail the annual costs of goods and services needed for critical visitor center operations.
- Use partner contributions as a sustainable way to pay for visitor center operations.
- Monitor information desk questions to document the benefits of the visitor center operation to each agency.
- Keep current a partnership agreement between the organizations and an annual operating plan.

Rationale

The Jackson Hole and Greater Yellowstone Visitor Center is an interagency facility, staffed and supported by area agencies and organizations. Each visitor center partner will continue to gain substantial financial benefit from our staff and visitor services rather than having to staff and provide a visitor contact location of their own. Sharing the financial burden among the agencies of operating the center, including purchasing supplies, will make it equitable for each of the partners.

Visitor Center Objective 2

Within 10 years, rehabilitate the existing building or build a new visitor center to address the aging building's maintenance deficiencies.

Strategies

- Document maintenance issues as they occur.
- Continually evaluate and keep current the building condition assessment through the Service's reporting procedures.
- Prioritize the maintenance needs in our agency maintenance reporting systems.
- Complete evaluations or surveys that will need to be done before new construction.



FWS

Ciliate Bluebells

Rationale

The visitor center building was formerly owned by the Wyoming Department of Transportation and served as a State Information Center for the Wyoming Division of Tourism. The building is more than 40 years old and has many significant maintenance issues such as deficiencies in the electrical system, annual flooding in the crawlspace, rotted wood on the remote-viewing platform, and noncompliance with the Architectural Barriers Act Accessibility Standard (United States Access Board 2013). A rehabilitated or new visitor center will also address the lack of space for interpretive programs or presentations to school or other large groups.

North Park Objective

Within 3 years, manage North Park in accordance with Service policies, restore the park area to native habitat, and develop interpretive services.

Strategies

- Revise the memorandum of understanding with the town of Jackson to do away with the reservation and fee-collection system for the picnic shelter.
- Develop and provide public information about appropriate and compatible uses of the refuge.
- Develop interpretive displays to support and explain the refuge purposes and Refuge System mission.
- Renovate habitat to reduce the lawn and restore native vegetation.

Rationale

The refuge will work toward its goal of limiting public use to appropriate and compatible wildlife-dependent recreational uses as identified our agency policies. The refuge will shift away from fringe uses or those that are prohibited by agency policy.

Other Uses Objective

Throughout the life of the plan, provide proper and compatible opportunities for wildlife-dependent recreation and non-wildlife-dependent recreation

that support the six priority public uses or contribute to public appreciation of the refuge.

Strategies

- Allow the following compatible and proper uses as long as wildlife is not disturbed and when areas are not closed for safety reasons:
  - access to the Bridger-Teton National Forest
  - North Park at the visitor center
- Potentially adjust seasonal dates on the North Highway 89 Pathway prior to the 15-year expiration of the CCP if there are notable, significant effects in the area due to climate change or other factors over an extended number of years; additionally, adaptively manage the pathway to minimize disturbance to wildlife and maximize seasonal use for the public based on the results of monitoring and data collection.
- Allow under special use permit the following compatible and proper uses as long as wildlife is not disturbed:
  - commercial photography
  - commercial tours for wildlife viewing
  - commercial guiding and game retrieval for hunting
  - commercial guiding for fishing
  - ceremonial tribal bison hunt up to five bison
- Prohibit the following incompatible uses:
  - general collection of shed antlers
  - collection of berries, fruit, roots, wildflowers, and mushrooms
  - collection of reptiles and amphibians
  - weddings
  - boating
  - swimming
- Phase out commercial horseback trail rides.
- Review requests for other non-wildlife-dependent activities for compatibility and appropriateness case-by-case.

Rationale

The Improvement Act states that other uses can occur within the Refuge System, but they must support or not conflict with a priority public use. Furthermore, a use may not keep a refuge from accomplishing its purposes or the mission of the Refuge System.

Special Use Permit Objective 1

Within 5 years, identify an appropriate level of commercial operations on the refuge. Within 10 years, manage commercial operations to achieve appropriate levels of use for guided fishing, guided hunting, and wildlife-viewing companies.

Strategies

- Monitor ongoing commercial uses.
- Limit special use permits for commercial operations (such as hunting, fishing, and wildlife-viewing tours) to reduce traffic and effects on the refuge.
- Charge fees for commercial companies (guided hunting and fishing, hunting retrieval services, operation of commercial wildlife-viewing tours, and professional photography and videography) to offset administrative costs.
- Include special conditions with each permit to reduce effects on resources and other activities.
- Evaluate and potentially prohibit requests for special access that could be precedent-setting and will demand excessive refuge resources.

Rationale

We recognize that an appropriate level of commercial services can enhance visitor experience by providing programs that the refuge does not have the ability (resources) to provide. There will be no fee

required when a special use is related to habitat improvement or wildlife research. If a special use permit resulted in a company profiting from the refuge, a fee to offset administrative costs will be justified. Charging a fee will help offset the costs of the administrative time involved in processing special use permits and compiling annual use information.

Special Use Permit Objective 2

Within 5 years, complete a special use permitting system that has a fee schedule for the processing of permits and the associated costs for accommodating commercial filming or photography activity.

Strategies

- Work with the regional office to implement national guidance on a fee schedule for collecting fees associated with commercial photography and filming.
- Communicate with the Grand Teton National Park permits office to make sure there is not a large discrepancy in the amount of fees charged on the refuge versus those same activities in the neighboring national park.

Rationale

The National Elk Refuge accommodates a large number of commercial photographers and film companies each year, especially during the winter months. Responding to media requests has become an increasing part of the winter duties for the visitor services staff. Making contacts with the permittee, evaluating the request, writing special conditions, completing the permit, and accommodating the request takes refuge staff a substantial amount of administrative time. A fee system will allow the refuge to recuperate some of the administrative costs associated with the activity.

Public Outreach Objective

For the life of the plan, disseminate information about elk and bison management, refuge management practices, and visitor services programs to increase awareness of the National Elk Refuge.

Strategies

- Maintain email contact lists for distribution of refuge information to elected officials, Federal and State partners, nonprofit conservation and partner organizations, key community and business leaders, and regional and national Service contacts.
- Prepare and send out news releases via established email lists.
- Prepare and send out articles via established email lists.
- Use electronic media, including maintaining and keeping current the refuge Web site as well as using our agency's new media and photo-sharing sites.
- Conduct media interviews and accommodate film crews for local, national, and international audiences as workload allows.
- Use refuge leaders in an ambassadorial and leadership role in the community, including extensive involvement in a variety of partnerships.
- Coordinate with the Bridger-Teton National Forest on a winter closure to the public beyond the Twin Creek subdivision.

Rationale

Outreach is critical because of the National Elk Refuge's high profile location, its "flagship refuge" status, and the complexity and controversial nature of many of the management issues. Effective outreach—by giving the media a source of readily available resources and material—will streamline our response to the demand for information from local, regional, national, and international media and decrease the inaccuracy of stories compiled by others.

4.8 Visitor and Employee Safety and Resource Protection Goal

Provide for the safety, security, and protection of visitors, employees, natural and cultural resources, and facilities throughout the refuge.

Visitor and Employee Safety Objective 1

Over the life of the plan, eliminate lost-time worksite accidents and reduce all other accidents by 75 percent.

Strategies

- Continue to talk about safety procedures with employees and volunteers.
- Continue to develop job hazard analyses for new activities.

Rationale

Visitor and employee safety is the refuge's highest priority. We are required to provide a safe and hazard-mitigated environment for all refuge users and our employees.

Visitor and Employee Safety Objective 2

Within 5 years, document road hazards and vehicle accidents.

Strategy

- Monitor and report accidents.

Rationale

Visitor and employee safety is the refuge's highest priority. We are required to provide a safe and hazard-mitigated environment for all refuge users and our employees.

Visitor and Employee Safety Objective 3

Within 10 years, reduce road accidents in identified risk areas by 50 percent.

Strategies

- Enforce no stopping and no parking in the roadway.
- Improve signage.
- Incorporate safety conditions in all special use permits.
- Revoke special use permits when violations occur, and restrict or limit the ability of revoked permittees to obtain future special use permits.

Rationale

Visitor and employee safety is the refuge's highest priority. We are required to provide a safe and hazard-mitigated environment for all refuge users and our employees.

Visitor and Employee Safety Objective 4

Within 5 years, document hunting accidents, violations, and unsafe practices. Over the life of the plan, reduce hunting accidents, violations, and unsafe practices in risk areas and activities by 50 percent.

Strategies

- Revise hunt area boundaries.
- Incorporate safety conditions in hunting publications.
- Increase signage.
- Notify hunters of other public users that might be using the area (such as birders, cyclists, and users of the auto tour route).
- Increase the law enforcement presence during hunting season.
- Revoke hunting permits when safety violations occur, and restrict or limit the ability of hunters with revoked permits to obtain future hunting permits.

Rationale

Visitor and employee safety is the refuge's highest priority. We are required to provide a safe and hazard-mitigated environment for all refuge users and our employees.

Resource Protection Objective 1

Protect wildlife and other natural and cultural resources from disturbance, damage, theft, or illegal taking to preserve resources for the public and to prevent their unnatural decline.

Strategies

- Enforce hunting, fishing, and other regulations in accordance with the CFR, State laws, and refuge-specific regulations to protect habitat and wildlife.
- Close areas and adjust hunting and fishing seasons to support wildlife management, promote migration, and protect wildlife from human disturbance when necessary.
- Use law enforcement and education to protect cultural resources in accordance with Federal, State, and tribal laws, policies, and guidelines.
- Keep a minimum of two dual-function law enforcement officers or one dual-function and one full-time, permanent law enforcement officer.
- Provide ample and easy access to refuge regulations through various media such as printed leaflets, the Web site and social media, and six information kiosks located throughout the refuge.

Rationale

Adequately staffing refuges with sufficient officers to protect wildlife and habitat and to make refuges safe places for staff and visitors is a top priority for the Refuge System. "Conserving the Future" (FWS 2011), Recommendation 16, charges us to: Conduct a new, independent analysis of refuge law enforcement to measure progress and to name needed improvements.



BJ Baker / FWS

Osprey

Resource Protection Objective 2

Within 5 years, increase law enforcement patrols by 25 percent and develop shift coverage for high-visitor-use seasons.

Strategies

- Detail (temporarily assign) officers from other refuges to the National Elk Refuge.
- Hire a law enforcement officer.
- Obtain a dual-function position.
- Develop special operations for hunting and antler collecting seasons.

Rationale

More law enforcement will be needed to manage the current public use as well as the additional use from increased visitor services programs.

4.9 Administration Goal

Provide facilities and effectively use and develop staff resources, funding partnerships, and volunteer opportunities to maintain the long-term integrity of habitats and wildlife resources of the refuge.

Funding and Staff Objective 1

Over the life of the plan, increase permanent staff by 16.5 FTE positions to help realize the enhancement potential of all refuge programs.

Strategies

- Include more positions in the Refuge Operation Needs System to get future funding.
- Brief our regional leaders about the refuge staff needed to accomplish the refuge goals and the effects of the current staff shortfall.

Rationale

Current Government staff levels are inadequate to accomplish the work of the refuge. The refuge relies on volunteers and positions paid by nongovernmental money to accomplish objectives. In 2011–2013, the refuge used more volunteer and nongovernmentally funded positions (12.5 FTEs) than Government-funded positions (10.5 FTEs). Although we are extremely fortunate to have volunteers and nongovernmentally funded positions, for the long term, the refuge cannot rely on these uncertain sources of assistance. The lack of a full-time assigned volunteer coordinator to conduct the recruiting, hiring, training, and logistics for the needed volunteers will continue to affect refuge programs. Providing necessary staff levels through Government-funded positions will provide the long-term consistency required for management excellence.

Funding and Staff Objective 2

Over the life of the plan, increase the refuge's annual base funding to cover all operational costs and increased staff costs while maintaining a 75:25 staff to maintenance capacity ratio.

Strategy

- Brief our regional leaders about the need for an increased and stable budget to eliminate the severe staff shortfall and be able to accomplish the refuge goals.

Rationale

Current annual base funding is a minimum of $200,000 short for funding adequate staff and management. Establishing an adequate annual budget will ensure long-term stability in management programs for the refuge.

Facilities Objective 1

Over the life of the plan, increase refuge housing to accommodate an increase in staff.

Strategy

- Brief our regional leaders about the need for increased refuge housing.

Rationale

The high cost of permanent and temporary housing in the Jackson area is an impediment to recruiting staff to work at the refuge. Having the option of reasonably priced, Government rental housing is an important factor in recruiting quality employees to fill lower-graded positions at the refuge.

The refuge will coordinate with Teton County when planning and constructing new buildings. However, we are under no legal obligation to follow county regulations; coordination with the county will be a courtesy rather than complying with a legal requirement.

Facilities Objective 2

Over the life of the plan, relocate the Calkins House to the Nowlin Gate area.

Strategy

- Move the Calkins House and all outbuildings to the Nowlin Gate area when money becomes available.

Rationale

Relocation of the Calkins House will consolidate refuge housing and eliminate the need to maintain communications and transportation facilities to an outlying facility. This will also allow that part of the hunt unit around the Calkins House to be open for firearms, which could result in a minor increase in elk and bison harvest.

Elk Refuge Road Objective 1

Within 5 years, monitor winter use of Elk Refuge Road to identify the magnitude of use, safety issues, and visitor experience.

Strategies

- Install traffic counters.
- Conduct visitor surveys.
- Share use information with Teton County and identify safety concerns.

Rationale

With baseline information on road use, the staff will be able to address safety concerns and other issues associated with the road.

Elk Refuge Road Objective 2

Within 10 years, manage year-round use of Elk Refuge Road to improve safety and the visitor experience.

Strategies

- Add new regulatory signing to prohibit stopping or parking on or along roadway.
- Permit parking only in designated lots and turnouts.
- Add mounted scopes at turnouts to encourage people to get out of their cars.
- Improve and increase the number of turnouts along the road for winter use.
- Add numbered turnouts (ending at the Twin Creek subdivision) and interpretive information to correspond with a winter auto tour brochure.
- Create and disseminate an interpretive brochure for a winter and summer auto tour route.
- Increase road maintenance (plowing, turnouts, sanding, and pulling ditches) in the winter for safety purposes.
- Work with Teton County to reduce dust abatement.
- Increase enforcement of current regulations.
- Consider moving the entrance kiosk and parking area to the west side of the Elk Refuge Road entrance.

Rationale

High traffic volume and numbers of people using Elk Refuge Road for recreation and exercise creates user conflicts that might lead to safety issues. More signing, turnouts, and enforcement will increase user safety. Visitors will have more information available to learn about refuge resources.

Elk Refuge Road Objective 3

Within 5 years, eliminate overnight use of Elk Refuge Road for the opening of the national forest winter range.

Strategies

- Prohibit overnight parking, camping, staging, and tailgating on the refuge associated with antler collection on national forest lands.
- Consider alternate gate opening times, for example, opening the refuge access gate later than the other national forest access gates.
- Use educational outreach to explain the change in management to the public.

Rationale

Refuge System policy does not allow overnight camping on the refuge. This use creates a safety hazard because it obstructs the road for emergency vehicles and other users and substantially increases law enforcement costs for the refuge. Enforcing the restriction on overnight use will help protect roadside resources, reduce traffic congestion, improve visitor and employee safety, and reduce refuge costs.

Partnerships Objective

Work with partners to accomplish mutually beneficial projects including the nonmotorized pathway, aerial photography, GIS mapping, wildlife disease monitoring, and habitat and corridor protection and restoration.

Strategy

- Participate with the town of Jackson and Teton County, and provide data if available, to identify relatively important wildlife habitat and understand the cumulative impacts of development and different development types on wildlife.
- Continue to collaborate with Jackson Hole Trout Unlimited, Rocky Mountain Elk foundation, Snake River Fund, and WGFD to improve the fish-bearing streams for native cutthroat trout.

Rationale

Land use and habitat conditions off the refuge affect wildlife on the refuge. Teton County recently approved a comprehensive land use plan and will be developing regulations to carry out this plan. Sharing resources and close coordination between the refuge and the town of Jackson and Teton County through data sharing and project partnerships will help the refuge meet the habitat and wildlife goal.

4.10 Staff

Current staff within the complex consists of 10.5 permanent full-time employees. Table 13 shows the current staff and additional staff required to fully

Table 13. Current and proposed staff at the National Elk Refuge, Wyoming.

Government-funded position	*Current position (full-time equivalents [FTEs])*	*Proposed added position (FTEs)*
Refuge manager (GS[1]–485–14)	1	—
Deputy refuge manager (GS–485–13)	1	—
Outdoor recreation planner (GS–0023–12)	1	—
Park ranger (GS–0025–9, visitor center manager)	1	—
Wildlife biologist (GS–486–12)	1	—
Refuge land management officer (GL[2]–1801–9)	1	—
Office assistant (GS–0303–5)	0.5	—
Heavy mobile equipment mechanic (WG[3]–5803–11)	1	—
Maintenance mechanic (WG–4749–9)	1	—
Engineering equipment operator (WG–5716–8)	—	1
Budget analyst (GS–0560–11, business team)	1	—
Rangeland management specialist (GS–454–9)	1	—
Biological science technician (GS–404–5/7)	—	1
Refuge land management officer (GL–1801–7/9)	—	1
Environmental education specialist (GS–0025–7/9)	—	1
Maintenance program supervisor (WG–5716–9)	—	1
Three permanent seasonal park rangers (GS–0025–5/7, winter interpretive naturalists)	—	1.5
Six permanent seasonal biological technicians (GS–404–4, irrigators)	—	3
Eight permanent seasonal park rangers (GS–0025–4, visitor center)	—	4
Two permanent seasonal engineering equipment operators (WG–5716–7)	—	1
Three permanent seasonal park rangers (GS–0025–5)	—	2

[1] GS=General Schedule classification and pay system.

[2] GL= General Schedule classification and pay system for law enforcement officers.

[3] WG= Wage Grade classification and pay system.

implement the CCP. Because of the area of responsibility and added complexities of this plan, we will evaluate all grade levels for current staff. If all positions were funded, the staff will be able to carry out all aspects of the CCP, which will provide the most long-term benefit to wildlife, habitat, and ecosystems; improve facilities; and provide visitor services. Projects that have adequate budgets and staff will receive priority for accomplishment.

4.11 Stepdown Management Plans

This CCP is a broad umbrella plan that provides general concepts and specific wildlife, habitat, visitor services, and partnership objectives over the next 15 years. Stepdown management plans, in turn, provide detail for our managers and employees so they can more effectively carry out the specific actions and strategies in the CCP. Table 14 lists needed plans.

Table 14. Stepdown management plans for the National Elk Refuge, Wyoming.

Stepdown plan	*Planned completion*
Comprehensive disease contingency	2016
Visitor services	2016
Habitat management	2017
Inventory and monitoring	2017
Hunt management	2018
Fire management	2018
Integrated pest management	2019
Cultural resource management	2020

4.12 Monitoring and Evaluation

Our agency proposes that the uncertainty surrounding habitat management can be dealt with most efficiently within the paradigm of adaptive resource management (figure 15) (Holling 1978, Kendall 2001, Lancia et al. 1996, Walters and Holling 1990). This approach provides a framework within which we can make objective decisions and reduce the uncertainty surrounding those decisions. The key components of an adaptive resource management plan follow:

- clearly defined management goals and objectives
- a set of management actions with associated uncertainty as to their outcome
- a suite of priority models representing various alternative working hypotheses describing the response of species or communities of interest
- monitoring and assessment of the response of target organisms
- use of monitoring and assessment information to direct future decisionmaking through the selection of a best model

The first three components (goals, actions, and models) are largely defined before initiating an adaptive resource management plan, while the latter two (monitoring and directed decisionmaking) comprise an iterative process, whereby each year the predictive ability of models are tested against what was observed during monitoring. This might result in a new best model, greater support for the existing best model, or new models constructed from emerging hypotheses. In this way, management can evolve as information is gained and uncertainty is reduced.

Development of adaptive resource management plans for habitat management will allow the refuge to "learn by doing," while maintaining a focus on objectives. Knowledge gained from assessing management actions is as integral to the process as the management actions themselves. Emphasizing gaining knowledge about the refuge creates a situation where

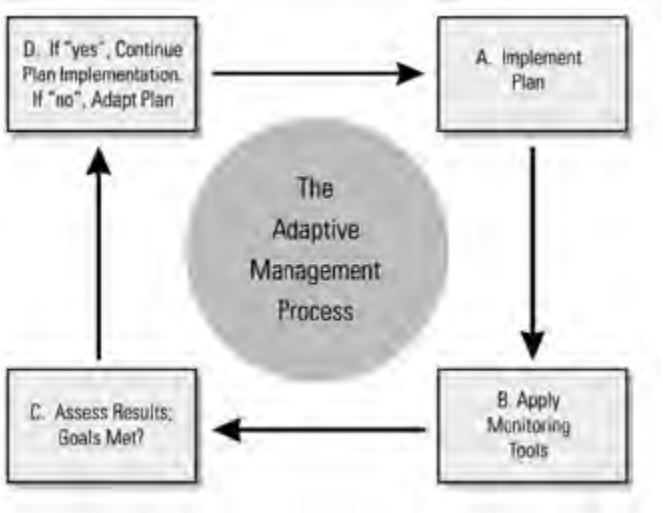


Figure 15. The adaptive resource management process.

we can refine its habitat management with feedback between management and assessment. Reducing the uncertainty of habitat management via adaptive resource management plans will greatly help us develop long-term habitat management plans.

4.13 Plan Amendment and Revision

The final CCP will be augmented by detailed stepdown management plans to address the completion of specific strategies in support of the CCP goals and objectives. To determine the need for revision, the CCP will be reviewed annually. A revision will occur if and when significant information became available, such as a change in ecological conditions. Revisions to the CCP and the stepdown management plans will be subject to public review and compliance with the National Environmental Policy Act.

At a minimum, the final plan will be evaluated every 5 years and revised after 15 years.

Glossary

accessible—Pertaining to physical access to areas and activities for people of different abilities, especially those with physical impairments.

adaptive resource management—The rigorous application of management, research, and monitoring programs to gain information and experience necessary to assess and change management activities; a process that uses feedback from research, monitoring programs, and evaluation of management actions to support or change objectives and strategies at all planning levels; a process in which policy decisions are carried out within a framework of scientifically driven experiments to test predictions and assumptions inherent in management plan. Analysis of results helps managers decide whether current management should continue as is or whether it should be modified to achieve desired conditions.

Administration Act—National Wildlife Refuge System Administration Act of 1966.

alternative—A reasonable way to solve an identified problem or satisfy the stated need (40 CFR 1500.2); one of several different means of accomplishing refuge purposes and goals and contributing to the Refuge System mission (Draft Service Manual 602 FW 1.5).

amphibian—A class of cold-blooded vertebrates including frogs, toads or salamanders.

annual—A plant that flowers and dies within 1 year of germination.

baseline—A set of essential observations, data, or information used for comparison or a control.

biological control—The use of organisms or viruses to control invasive plants or other pests.

biological diversity, also biodiversity—The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur (Service Manual 052 FW 1.12B). The National Wildlife Refuge System's focus is on indigenous species, biotic communities, and ecological processes.

biotic—Pertaining to life or living organisms; caused, produced by, or comprising living organisms.

candidate species, Federal—A plant or animal species proposed for addition to the Federal endangered and threatened species list. These species have formerly been referred to as category 1 candidate species. From the February 28, 1996, Federal Register, page 7597: "those species for which the Service has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list but issuance of the proposed rule is precluded."

canopy—A layer of foliage, generally the uppermost layer, in a vegetative stand; mid-level or understory vegetation in multilayered stands. Canopy closure (also canopy cover) is an estimate of the amount of overhead vegetative cover.

carrion—Dead animal body.

CCP—See comprehensive conservation plan.

CFR—See Code of Federal Regulations.

channel—The linear route along which surface water and ground water flow is concentrated.

channel morphology—the form and structure (such as width and depth) of a channel.

Code of Federal Regulations (CFR)—The codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government. Each volume of the CFR is updated once each calendar year.

compatibility determination—See compatible use.

compatible use—A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director of the U.S. Fish and Wildlife Service, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge (Draft Service Manual 603 FW 3.6). A compatibility determination supports the choice of compatible uses and identified stipulations or limits necessary to make sure that there is compatibility.

comprehensive conservation plan (CCP)—A document that describes the desired future conditions of the refuge and provides long-range guidance and management direction for the refuge manager to accomplish the purposes of the refuge, contribute to the mission of the Refuge System, and to meet other relevant mandates (Draft Service Manual 602 FW 1.5).

concern—See issue.

cover, also cover type, canopy cover—Present vegetation of an area.

cultural resources—The remains of sites, structures, or objects used by people in the past.

cygnet—A young swan.

EA—See environmental assessment.

ecosystem—A dynamic and interrelating complex of plant and animal communities and their associated nonliving environment; a biological community, with its environment, functioning as a unit. For administrative purposes, the Service has designated 53 ecosystems covering the United States and its possessions. These ecosystems generally correspond with watershed boundaries and their sizes and ecological complexity vary.

emergent—A plant rooted in shallow water and having most of the vegetative growth above water such as cattail and hardstem bulrush.

endangered species, Federal—A plant or animal species listed under the Endangered Species Act of 1973, as amended, that is in danger of extinction throughout all or a substantial part of its range.

endangered species, State—A plant or animal species in danger of becoming extinct or extirpated in a particular state within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a substantial degree.

endemic species—Plants or animals that occur naturally in a certain region and whose distribution is relatively limited to a particular locality.

environmental assessment (EA)—A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action and alternatives to such action, and provides sufficient evidence and analysis of effects to decide whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).

extinction—The complete disappearance of a species from the earth; no longer existing.

extirpation—The extinction of a population; complete eradication of a species within a specified area.

Federal trust resource—A trust is something managed by one entity for another who holds the ownership. The Service holds in trust many natural resources for the people of the United States of America as a result of Federal acts and treaties. Examples are species listed under the Endangered Species Act, migratory birds protected by international treaties, and native plant or wildlife species found on a national wildlife refuge.

Federal trust species—All species where the Federal Government has primary jurisdiction including federally endangered or threatened species, migratory birds, anadromous fish, and certain marine mammals.

forb—A broad-leaved, herbaceous plant; a seed-producing annual, biennial, or perennial plant that does not develop persistent woody tissue but dies down at the end of the growing season.

fragmentation—The alteration of a large block of habitat that creates isolated patches of the original habitat that are interspersed with a variety of other habitat types; the process of reducing the size and connectivity of habitat patches, making movement of individuals or genetic information between parcels difficult or impossible.

Friends group—Any formal organization whose mission is to support the goals and purposes of its associated refuge and the National Wildlife Refuge Association overall; Friends organizations and cooperative and interpretive associations.

FWS—See U.S. Fish and Wildlife Service.

geographic information system (GIS)—A computer system capable of storing and manipulating spatial data; a set of computer hardware and software for analyzing and displaying spatially referenced features (such as points, lines and polygons) with nongeographic attributes such as species and age.

GIS—See geographic information system.

GL—General Schedule classification and pay system for law enforcement officers.

goal—Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (Draft Service Manual 620 FW 1.5).

GS—General Schedule classification and pay system.

habitat—Suite of existing environmental conditions required by an organism for survival and reproduction; the place where an organism typically lives and grows.

habitat disturbance—Substantial alteration of habitat structure or composition; may be natural (for example, wildland fire) or human-caused events (for example, timber harvest and disking).

habitat type, also vegetation type, cover type—A land classification system based on the concept of distinct plant associations.

hydrologic regime—The system of a water cycle and its changes with time.

impoundment—A body of water created by collection and confinement within a series of levees or dikes, creating separate management units although not always independent of one another.

Improvement Act—National Wildlife Refuge System Improvement Act of 1997.

indigenous—Originating or occurring naturally in a particular place.

integrated pest management (IPM)—Methods of managing undesirable species such as invasive plants; education, prevention, physical or mechanical

methods of control, biological control, responsible chemical use, and cultural methods.

introduced species—A species present in an area because of intentional or unintentional escape, release, dissemination, or placement into an ecosystem as a result of human activity.

invasive plant, also noxious weed—A species that is nonnative to the ecosystem under consideration and whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health.

issue—Any unsettled matter that requires a management decision; for example, a Service initiative, opportunity, resource management problem, a threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition (Draft Service Manual 602 FW 1.5).

listed species—A species, subspecies, or distinct vertebrate population segment that has been added to the Federal lists of Endangered and Threatened Wildlife and Plants as they appear in sections 17.11 and 17.12 of Title 50 of the Code of Federal Regulations (50 CFR 17.11 and 17.12).

management alternative—See alternative.

migration—Regular extensive, seasonal movements of birds between their breeding regions and their wintering regions; to pass usually periodically from one region or climate to another for feeding or breeding.

migratory birds—Birds that follow a seasonal movement from their breeding grounds to their wintering grounds. Waterfowl, shorebirds, raptors, and songbirds are all migratory birds.

mission—Succinct statement of purpose or reason for being.

mitigation—Measure designed to counteract an environmental effect or to make an effect less severe.

monitoring—The process of collecting information to track changes of selected parameters over time.

national wildlife refuge—A designated area of land, water, or an interest in land or water within the National Wildlife Refuge System, but does not include coordination areas; a complete listing of all units of the Refuge System is in the current "Annual Report of Lands Under Control of the U.S. Fish and Wildlife Service."

National Wildlife Refuge System (Refuge System)—Various categories of areas administered by the Secretary of the Department of the Interior for the conservation of fish and wildlife including species threatened with extinction, all lands, waters, and interests therein administered by the Secretary as wildlife refuges, areas for the protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, and waterfowl production areas.

National Wildlife Refuge System Improvement Act of 1997 (Improvement Act)—Sets the mission and the administrative policy for all refuges in the National Wildlife Refuge System; defines a unifying mission for the Refuge System; establishes the legitimacy and appropriateness of the six priority public uses (hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation); establishes a formal process for determining appropriateness and compatibility; establishes the responsibilities of the Secretary of the Department of the Interior for managing and protecting the Refuge System. This Act amended parts of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.

native species—A species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

neotropical migrant—A bird species that breeds north of the United States and Mexican border and winters primarily south of this border.

nest success—The percentage of nests that successfully hatch one or more eggs of the total number of nests started in an area.

nongovernmental organization—Any group that is not comprised of Federal, State, tribal, county, city, town, local, or other governmental entities.

noxious weed, also invasive plant—Any living stage (including seeds and reproductive parts) of a parasitic or other plant of a kind that is of foreign origin (new to or not widely prevalent in the United States) and can directly or indirectly injure crops, other useful plants, livestock, poultry, other interests of agriculture, including irrigation, navigation, fish and wildlife resources, or public health. According to the Federal Noxious Weed Act (PL 93–639), a noxious weed (such as invasive plant) is one that causes disease or has adverse effects on humans or the human environment and, therefore, is detrimental to the agriculture and commerce of the United States and to public health.

objective—A concise target statement of what will be achieved, how much will be achieved, when and where it will be achieved, and who is responsible for the work; derived from goals and provide the basis for determining management strategies. Objectives should be achievable and time specific and should be stated quantitatively to the extent possible. If objectives cannot be stated quantitatively, they may be stated qualitatively (Draft Service Manual 602 FW 1.5).

patch—An area distinct from that around it; an area distinguished from its surroundings by environmental conditions.

perennial—Lasting or active through the year or through many years; a plant species that has a lifespan of more than 2 years.

plant community—An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site such as soil, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community, such as ponderosa pine or bunchgrass.

prescribed fire—The skillful application of fire to natural fuels under conditions such as weather, fuel moisture, and soil moisture that allow confinement of the fire to a predetermined area and produces the intensity of heat and rate of spread to accomplish planned benefits to one or more objectives of habitat management, wildlife management, or hazard reduction.

priority public use—One of six uses authorized by the National Wildlife Refuge System Improvement Act of 1997 to have priority if found to be compatible with a refuge's purposes. This includes hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation.

proposed action—The alternative proposed to best achieve the purpose, vision, and goals of a refuge (contributes to the Refuge System mission, addresses the significant issues, and is consistent with principles of sound fish and wildlife management).

public—Individuals, organizations, and groups; officials of Federal, State, and local government agencies; American Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have shown an interest in Service issues and those who do or do not realize that Service decisions may affect them.

public involvement—A process that offers affected and interested individuals and organizations an opportunity to become informed about, and to express their opinions on, Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management.

purpose of the refuge—The purpose of a refuge is specified in or derived from the law, proclamation, Executive order, agreement, public land order, donation document, or administrative memorandum establishing authorization or expanding a refuge, refuge unit, or refuge subunit (Draft Service Manual 602 FW 1.5).

raptor—A carnivorous bird such as a hawk, a falcon, or a vulture that feeds wholly or chiefly on meat taken by hunting or on carrion (dead carcasses).

refuge purpose—See purpose of the refuge.

Refuge System—See National Wildlife Refuge System.

refuge use—Any activity on a refuge, except administrative or law enforcement activity, carried out by or under the direction of an authorized Service employee.

resident species—A species inhabiting a given locality throughout the year; nonmigratory species.

restoration—Management emphasis designed to move ecosystems to desired conditions and processes, such as healthy upland habitats and aquatic systems.

revetment—A structure to support a streambank.

riffle—The shallow zone between pools in a stream.

riparian area or riparian zone—An area or habitat that is transitional from terrestrial to aquatic ecosystems including streams, lakes, wet areas, and adjacent plant communities and their associated soils that have free water at or near the surface; an area whose parts are directly or indirectly attributed to the influence of water; of or relating to a river; specifically applied to ecology, "riparian" describes the land immediately adjoining and directly influenced by streams. For example, riparian vegetation includes all plant life growing on the land adjoining a stream and directly influenced by the stream.

riprap—A loose foundation of irregular rock fragments used under water for streambed protection or in soft materials to prevent streamside erosion.

scoping—The process of obtaining information from the public for input into the planning process.

section 7—The section of the Endangered Species Act that requires all Federal agencies, in consultation with the U.S. Fish and Wildlife Service, to ensure that their actions are not likely to jeopardize the continued existence of listed species or result in destruction or adverse modification of critical habitat.

sediment—Material deposited by water, wind, and glaciers.

Service—See U.S. Fish and Wildlife Service.

shelterbelt—Single to multiple rows of trees and shrubs planted around cropland or buildings to block or slow down the wind.

shorebird—Any of a suborder (*Charadrii*) of birds such as a plover or a snipe that frequent the seashore or mudflat areas.

spatial—Relating to, occupying, or having the character of space.

special use permit—A permit for special authorization from the refuge manager required for any

refuge service, facility, privilege, or product of the soil provided at refuge expense and not usually available to the public through authorizations in Title 50 CFR or other public regulations (Refuge Manual 5 RM 17.6).

species of concern—Those plant and animal species, while not falling under the definition of special status species, that are of management interest by virtue of being Federal trust species such as migratory birds, important game species, or significant keystone species; species that have documented or apparent populations declines, small or restricted populations, or dependence on restricted or vulnerable habitats.

stepdown management plan—A plan that provides the details necessary to carry out management strategies identified in the comprehensive conservation plan (Draft Service Manual 602 FW 1.5).

strategy—A specific action, tool, or technique or combination of actions, tools, and techniques used to meet unit objectives (Draft Service Manual 602 FW 1.5).

suppression—All the work of extinguishing a fire or confining fire spread.

threatened species, Federal—Species listed under the Endangered Species Act of 1973, as amended, that are likely to become endangered in the future throughout all, or a substantial part, of their range.

threatened species, State—A plant or animal species likely to become endangered in a particular state within the near future if factors contributing to population decline or habitat degradation or loss continue.

travel corridor—A landscape feature that facilitates the biologically effective transport of animals between larger patches of habitat dedicated to conservation functions. Such corridors may facilitate several kinds of traffic including frequent foraging movement, seasonal migration, or the once in a lifetime dispersal of juvenile animals. These are transition habitats and need not contain all the habitat elements required for long-term survival or reproduction of its migrants.

trust resource—See Federal trust resource.

trust species—See Federal trust species.

USDA—U.S. Department of Agriculture.

U.S. Fish and Wildlife Service (Service, FWS)—The principal Federal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people. The Service manages the 93-million-acre National Wildlife Refuge System comprised of more than 530 national wildlife refuges and thousands of waterfowl production areas. It also operates 65 national fish hatcheries and 78 ecological service field stations, the agency enforces Federal wildlife laws, manages migratory bird populations, restores national significant fisheries, conserves and restores wildlife habitat such as wetlands, administers the Endangered Species Act, and helps foreign governments with their conservation efforts. It also oversees the Federal aid program that distributes millions of dollars in excise taxes on fishing and hunting equipment to State wildlife agencies.

U.S. Geological Survey (USGS)—A Federal agency whose mission is to provide reliable scientific information to describe and understand the earth; decrease loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

USGS—See U.S. Geological Survey.

vision statement—A concise statement of the desired future condition of the planning unit, based primarily on the Refuge System mission, specific refuge purposes, and other relevant mandates (Draft Service Manual 602 FW 1.5).

wading birds—Birds having long legs that enable them to wade in shallow water including egrets, great blue herons, black-crowned night-herons, and bitterns.

waterfowl—A category of birds that includes ducks, geese, and swans.

waterfowl production area—Land that the National Wildlife Refuge System acquires with Federal Duck Stamp money for restoration and management, primarily as prairie wetland habitat critical to waterfowl and other wetland birds.

watershed—The region draining into a river, a river system, or a body of water.

wetland management district (WMD)—Land that the Refuge System acquires with Federal Duck Stamp money for restoration and management primarily as prairie wetland habitat critical to waterfowl and other wetland birds.

WG—Wage Grade classification and pay system.

WGFD—Wyoming Game and Fish Department.

wildfire—A wildland fire originating from an unplanned ignition caused by lightning, volcanoes, unauthorized and accidental human-caused fires, and escaped prescribed burns.

wildland fire—A general term describing any nonstructure fire that occurs in the wildland.

wildlife-dependent recreational use—Use of a refuge involving hunting, fishing, wildlife observation, photography, environmental education, or interpretation. The National Wildlife Refuge System Improvement Act of 1997 specifies that these are the six priority public uses of the Refuge System.

woodlands—Open stands of trees with crowns not usually touching, generally forming 25- to 60-percent cover.

Appendix A
Key Legislation and Policy

This appendix briefly describes the guidance for the National Wildlife Refuge System and other policies and key legislation that guide the management of the National Elk Refuge.

A.1 National Wildlife Refuge System

> The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

(National Wildlife Refuge System Improvement Act of 1997)

Goals

- Fulfill our statutory duty to achieve refuge purposes and further the Refuge System mission.
- Conserve, restore where appropriate, and enhance all species of fish, wildlife, and plants that are endangered or threatened with becoming endangered.
- Perpetuate migratory bird, interjurisdictional fish, and marine mammal populations.
- Conserve a diversity of fish, wildlife, and plants.
- Conserve and restore, where appropriate, representative ecosystems of the United States, including the ecological processes characteristic of those ecosystems.
- Foster understanding and instill appreciation of fish, wildlife, and plants, and their conservation, by providing the public with safe, quality, and compatible wildlife-dependent public use. Such use includes hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

Guiding Principles

There are four guiding principles for management and general public use of the Refuge System established by Executive Order 12996 (1996):

- *Public Use*—The Refuge System provides important opportunities for compatible wildlife-dependent recreational activities involving hunting, fishing, wildlife observation, photography, environmental education, and interpretation.
- *Habitat*—Fish and wildlife will not prosper without quality habitat and without fish and wildlife, traditional uses of refuges cannot be sustained. The Refuge System will continue to conserve and enhance the quality and diversity of fish and wildlife habitat within refuges.
- *Partnerships*—America's sportsmen and women were the first partners who insisted on protecting valuable wildlife habitat within wildlife refuges. Conservation partnerships with other Federal agencies, State agencies, tribes, organizations, industry, and the general public can make significant contributions to the growth and management of the Refuge System.
- *Public Involvement*—The public should be given a full and open opportunity to participate in decisions regarding acquisition and management of our national wildlife refuges.

A.2 Legal and Policy Guidance

Management actions on national wildlife refuges are circumscribed by many mandates including laws and Executive orders.

American Indian Religious Freedom Act (1978)—Directs agencies to consult with native traditional religious leaders to figure out proper policy changes necessary to protect and preserve Native American religious cultural rights and practices.

Americans with Disabilities Act (1992)—Prohibits discrimination in public accommodations and services.

Antiquities Act (1906)—Authorizes the scientific investigation of antiquities on Federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.

Archaeological and Historic Preservation Act (1974)—Directs the preservation of historic and archaeological data in Federal construction projects.

Archaeological Resources Protection Act (1979), as amended—Protects materials of archaeological interest from unauthorized removal or destruction and requires Federal managers to develop plans and schedules to locate archaeological resources.

Architectural Barriers Act (1968)—Requires federally owned, leased, or financed buildings and facilities to be accessible to persons with disabilities.

Clean Water Act (1977)—Requires consultation with the U.S. Army Corps of Engineers (404 permits) for major wetland modifications.

Dingell–Johnson Act (1950)—Authorized the Secretary of the Department of the Interior to provide financial help for State fish restoration and management plans and projects. Financed by excise taxes paid by manufacturers of rods, reels, and other fishing tackle. Known as the Federal Aid in Sport Fish Restoration Act.

Endangered Species Act (1973)—Requires all Federal agencies to carry out programs for the conservation of endangered and threatened species.

Executive Order 11988 (1977)—Requires Federal agencies to provide leadership and take action to reduce the risk of flood loss, decrease the effect of floods on human safety, and preserve the natural and beneficial values served by the floodplains.

Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System (1996)—Defines the mission, purpose, and priority public uses of the National Wildlife Refuge System. It also presents four principles to guide management of the Refuge System.

Executive Order 13007, Indian Sacred Sites (1996)—Directs Federal land management agencies to accommodate access to and ceremonial uses of American Indian sacred sites by American Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where proper, keep the confidentiality of sacred sites.

Federal Noxious Weed Act (1990)—Requires the use of integrated management systems to control or contain undesirable plant species and an interdisciplinary approach with the cooperation of other Federal and State agencies.

Federal Records Act (1950)—Requires the preservation of evidence of the Government's organization, functions, policies, decisions, operations, and activities, as well as basic historical and other information.

Fish and Wildlife Coordination Act (1958)—Allows the U.S. Fish and Wildlife Service to enter into agreements with private landowners for wildlife management purposes.

Migratory Bird Conservation Act (1929)—Establishes procedures for acquisition by purchase, rental, or gifts of areas approved by the Migratory Bird Conservation Commission.

Migratory Bird Hunting and Conservation Stamp Act (1934)—Authorizes the opening of part of a refuge to waterfowl hunting.

Migratory Bird Treaty Act (1918)—Designates the protection of migratory birds as a Federal responsibility; and enables the setting of seasons and other regulations, including the closing of areas, Federal or non-Federal, to the hunting of migratory birds.

National Environmental Policy Act (1969)—Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate this Act with other planning requirements, and prepare

proper documents to facilitate better environmental decisionmaking. [From the Code of Federal Regulations (CFR), 40 CFR 1500]

National Historic Preservation Act (1966), as amended—Establishes as policy that the Federal Government is to provide leadership in the preservation of the Nation's prehistoric and historic resources.

National Wildlife Refuge System Administration Act (1966)—Defines the National Wildlife Refuge System and authorizes the Secretary of the Department of the Interior to allow any use of a refuge, provided such use is compatible with the major purposes for which the refuge was established.

National Wildlife Refuge System Improvement Act of 1997—Sets the mission and administrative policy for all refuges in the National Wildlife Refuge System; mandates comprehensive conservation planning for all units of the Refuge System.

Native American Graves Protection and Repatriation Act (1990)—Requires Federal agencies and museums to inventory, find ownership of, and repatriate cultural items under their control or possession.

Refuge Recreation Act (1962)—Allows the use of refuges for recreation when such uses are compatible with the refuge's primary purposes and when sufficient money is available to manage the uses.

Rehabilitation Act (1973)—Requires programmatic accessibility and physical accessibility for all facilities and programs paid for by the Federal Government to make sure that any person can take part in any program.

Rivers and Harbors Act (1899)—Section 10 of this Act requires the authorization of U.S. Army Corps of Engineers before any work in, on, over, or under navigable waters of the United States.

Volunteer and Community Partnership Enhancement Act (1998)—Encourages the use of volunteers to help in the management of refuges within the Refuge System; facilitates partnerships between the Refuge System and non-Federal entities to promote public awareness of the resources of the Refuge System and public participation in the conservation of the resources; and encourages donations and other contributions.

Appendix B

List of Preparers and Contributors

This CCP is the result of extensive, collaborative, and enthusiastic effort by the members of the planning team shown below. In addition, many others have contributed time as subject matter experts and reviewers.

B.1 Planning Team

Team member	*Position*	*Work unit*
Patti Bennett-Taylor	Budget analyst, former	National Elk Refuge, Jackson, Wyoming
Eric Cole	Wildlife biologist	National Elk Refuge, Jackson, Wyoming
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Mark Ely	GIS specialist (former)	U.S. Fish and Wildlife Service, Region 6, Lakewood, Colorado
Tim Fuchs	Wildlife supervisor	WGFD, Jackson Regional Office, Jackson, Wyoming
Toni Griffin	Planning team leader	U.S. Fish and Wildlife Service, Region 6, Lakewood, Colorado
Kirk HaYenga	Heavy mobile equipment mechanic (former)	National Elk Refuge, Jackson, Wyoming
Lori Iverson	Outdoor recreation planner	National Elk Refuge, Jackson, Wyoming
Steve Kallin	Refuge manager	National Elk Refuge, Jackson, Wyoming
Amanda Losch	Staff biologist	WGFD, Headquarters, Cheyenne, Wyoming
Marty Meyer	Law enforcement officer (former)	National Elk Refuge, Jackson, Wyoming
Alex Norton	Senior planner	Teton County Planning Department, Jackson, Wyoming
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Mitch Werner	Writer-editor	U.S. Fish and Wildlife Service, Region 6, Lakewood, Colorado

B.2 Contributors

Many organizations, agencies, and individuals helped prepare this CCP. We acknowledge the efforts of the following individuals and groups toward the completion of this plan. The diversity, talent, and knowledge contributed dramatically improved the vision and completeness of this document.

Contributor	*Position*	*Work unit*
Lara Gertsch	Aquatic habitat biologist	WGFD, Jackson Regional Office, Jackson, Wyoming
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Wayne King	National Wildlife Refuge System biologist	U.S. Fish and Wildlife Service, Region 6, Lakewood, Colorado
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Appendix C
Public Involvement

This appendix describes how the Service conducted public involvement and considered the resulting information for developing the CCP for the National Elk Refuge.

C.1 Public Involvement Activities

The Service began public involvement activities by developing a mailing list of more than 200 names during preplanning. The list includes private citizens; local, regional, and State government representatives and legislators; other Federal agencies; and interested organizations.

Public Scoping

A notice of intent to prepare the draft CCP and EA for the National Elk Refuge was published in the Federal Register on October 22, 2010 (65370, Vol. 75, No. 204). The notice provided information concerning the refuge and the CCP process along with information on how the public may provide comments concerning issues to consider in the environmental document and in development of the CCP. Written comments were accepted through November 22, 2010. The notice indicated additional opportunities for providing comments would be announced in local news media throughout the CCP process.

We sent the first planning update to the mailing list addresses in early January 2011. The planning update provided information on the history of the National Elk Refuge and the CCP process, along with an invitation to an upcoming public open house January 11. We invited the public to meet with our staff, learn more about the planning process, and provide input on the planning process. The planning update told people how to submit written comments by letter, fax, or email, which were due February 10, 2011.

At the January 11 open house, the planning team used informational posters, maps, and handouts to display a history of the Refuge System, an orientation to the National Elk Refuge, and an overview of the processes for comprehensive conservation planning and implementing NEPA. Staff answered questions on a variety of topics about refuge management and the CCP process. We encouraged the 40 attendees to ask questions and offer comments; planning team members recorded verbal comments and gave each attendee a comment form to submit additional thoughts or questions, which were due by February 10, 2011.

We sent out a second planning update in March 2011. The update summarized the public scoping efforts and the more than 200 comments that the planning team received during scoping. The update listed the key issues that we identified: landscape-scale conservation, wildlife, habitat, scenic quality, and visitor services. We considered input from the public open house, letters, emails, and comment forms in developing the draft CCP and EA.

Although the public identified bison and elk management as an issue during scoping for the CCP, the issue is outside the scope of this planning process. We and NPS previously addressed this issue in an interagency environmental analysis process that had extensive public involvement. In 2007, we completed the resulting "Bison and Elk Management Plan: National Elk Refuge, Grand Teton National Park, and John D. Rockefeller, Jr. Memorial Parkway" (FWS and NPS 2007a), which has goals, objectives, and strategies for managing bison and elk at the National Elk Refuge and Grand Teton National Park for the next 15 years.

Review of the Draft Plan

The draft CCP and EA were released to the public on September 9, 2014, through a notice of availability published in the Federal Register. Copies of either the draft CCP and EA or a planning update were mailed to individuals on the mailing list. The document was also made available online through the Service's Mountain-Prairie Region refuge planning Web site and the National Elk Refuge's Web site. The public was offered 30 days to review this document and provide comments. At the request of several

organizations and individuals, the comment period was extended to October 24, 2014, for a total of 45 days.

Notification to the public included a press release distributed to Wyoming media contacts and outreach to congressional representatives and WGFD. The refuge also forwarded the news release to approximately 280 contacts, including regional media, nongovernmental organizations, Federal partners, business leaders, and other community members. The press release provided information for obtaining a copy of the draft CCP and EA and methods for submitting comments. A subsequent press release informed the public of the extension to the comment period. Press releases were posted on the National Elk Refuge and Mountain-Prairie Region refuge planning Web sites. Several Wyoming-based newspapers carried the announcements as well as a local radio station. A refuge staff member was interviewed by the Jackson Hole community radio station KHOL.

During the public review period, the Service held a public meeting on September 25, 2014, in Jackson, Wyoming. Turnout was moderate, with the meeting attended by 18 participants. A news release was issued, and planning updates were mailed providing details on where and when the meeting would be held. A short presentation was given on the draft CCP, followed by an opportunity for participants to ask questions and offer comments. In addition to the oral comments recorded at the meetings, 41 emails and letters were received. All comments were to be received or postmarked by October 24, 2014.

Public Mailing List

The Service sent planning updates to all agencies, individuals, and organizations on the mailing list. In addition, by written request many hard copies of the draft CCP and EA were distributed to the mailing list, and to honor additional requests received during the review period for copies.

Federal Officials

U.S. Congressman Cynthia Lummis, Washington, DC
U.S. Senator John Barrasso, Washington, DC
U.S. Senator Michael Enzi, Washington, DC

Federal Agencies

Bureau of Reclamation, Pacific Northwest Regional Office, Boise, Idaho
National Park Service, Grand Teton National Park, Moose, Wyoming
National Park Service, Intermountain Regional Office, Denver, Colorado
U.S. Forest Service, Bridger-Teton National Forest, Jackson, Wyoming

Tribal Officials

Assiniboine and Sioux Tribes of Fort Peck, Popular, Montana
Cheyenne and Arapaho Tribes, Concho, Oklahoma
Cheyenne River Sioux Tribe, Eagle Butte, South Dakota
Crow Creek Sioux Tribal Council, Fort Thompson, South Dakota
Eastern Shoshone Tribal Council, Fort Washakie, Wyoming
Lower Brule Sioux Tribe, Lower Brule, South Dakota
Northern Arapaho Business Council, Fort Washakie, Wyoming
Northern Cheyenne Tribal Council, Lame Deer, Montana
Oglala Sioux Tribe, Pine Ridge, South Dakota
Rosebud Sioux Tribal Council, Rosebud, South Dakota
Santee Sioux Tribal Council, Niobrara, Nebraska
Shoshone—Bannock Tribes, Fort Hall, Idaho
Shoshone Business Council, Fort Washakie, Wyoming
Shoshone Cultural Center, Fort Washakie, Wyoming
Standing Rock Sioux Tribal Council, Fort Yates, North Dakota

State Officials

Governor Matt Mead, Cheyenne, Wyoming
Senator Leland G. Christensen, Alta, Wyoming
Senator Dan Dockstader, Afton, Wyoming
Representative Keith Gingery, Jackson, Wyoming
Representative Ruth A. Petroff, Jackson, Wyoming
Representative Jim Roscoe, Wilson, Wyoming

State Agencies

Wyoming Game and Fish Department, Cheyenne, Wyoming
Wyoming Game and Fish Department, Jackson, Wyoming
Wyoming Game and Fish Department, Lander, Wyoming

Local Government

Teton Conservation District, Jackson, Wyoming
Teton County Board of Commissioners, Jackson, Wyoming
Teton County Building Department, Jackson, Wyoming
Teton County Sheriff, Jackson, Wyoming
Town of Jackson, Jackson, Wyoming

Businesses

Alta Planning and Design, Saratoga Springs, New York
Atkins, PBS&J, Missoula, Montana
Bear Creek Incorporated, Jackson, Wyoming
Biota Research and Consulting, Jackson, Wyoming
Brush Buck Guide Services, Jackson, Wyoming
Burton Design Incorporated, Jackson, Wyoming
Four Seasons Resort, Teton Village, Wyoming
Grizzly Country Wildlife Adventures, Jackson, Wyoming
Jackson Hole Eco Tour Adventures, Jackson, Wyoming
Jackson Hole Photo Tours, Jackson, Wyoming
Jackson Hole Wildlife Safaris, Jackson, Wyoming
Nelson Engineering, Jackson, Wyoming
Snake River Brewing Company, Jackson, Wyoming
Snowmobiletours.net, Wyoming
Spring Creek Ranch, Jackson Hole, Wyoming
Steady Jake Mobile DJ, Jackson, Wyoming
The Hole Hiking Experience, Jackson, Wyoming
UpStream Anglers and Outdoor Adventures, Jackson, Wyoming
Wyoming Photo Experience, Jackson, Wyoming

Organizations

Concerned Citizens for the Elk, Jackson, Wyoming
Craighead Beringia South, Kelly, Wyoming
Defenders of Wildlife, National Headquarters, Washington, DC
Ducks Unlimited, Conservation Program, Bismarck, North Dakota
Ducks Unlimited, National Headquarters, Memphis, Tennessee
Friends of Pathways, Jackson, Wyoming
Greater Yellowstone Coalition, Jackson, Wyoming
Teton County Weed and Pest District, Jackson, Wyoming
Jackson Hole and Greater Yellowstone Visitor Center, Jackson, Wyoming
Jackson Hole Art Initiative, Jackson, Wyoming
Jackson Hole Chamber of Commerce, Jackson, Wyoming
Jackson Hole Conservation Alliance, Jackson, Wyoming
Jackson Hole Historical Society and Museum, Jackson, Wyoming
Jackson Hole Land Trust, Jackson, Wyoming
Jackson Hole Wildlife Foundation, Jackson, Wyoming
The Murie Center, Moose, Wyoming
Northern Rockies Conservation Cooperative, Jackson, Wyoming
Rocky Mountain Elk Foundation, Missoula, Montana
Safe Wildlife Crossings for Jackson Hole, Jackson, Wyoming
Sportsmen for Fish and Wildlife, Jackson, Wyoming
Teton Raptor Center, Wilson, Wyoming
Teton Science Schools, Jackson, Wyoming
The Wildlife Society, Bethesda, Maryland
The Wildlife Society Wyoming Chapter, Lander, Wyoming
Wildlife Conservation Society, Bronx, New York
Wyoming Wetlands Society, Jackson, Wyoming
Wyoming Wildlife Federation, Lander, Wyoming

Universities

Northwestern University, Evanston, Illinois
Sinte Gleska University, Sicangu Heritage Center, Mission, South Dakota

Media

Associated Press, Cheyenne, Wyoming
Casper Star Tribune, Casper, Wyoming
Dubois Frontier, Dubois, Wyoming
Herald Journal, Logan, Utah
Idaho State Journal, Pocatello, Wyoming
Jackson Hole Magazine, Jackson, Wyoming
Jackson Hole News & Guide, Jackson, Wyoming
Jackson Hole Underground, Jackson Hole, Wyoming
K2TV, Casper, Wyoming
KCWY13, Mills, Wyoming
KHOL, 89.1, Jackson Hole Community Radio, Jackson, Wyoming
KID FM, Idaho Falls, Idaho
KIFI TV, Idaho Falls, Idaho
KPIN, Pinedale Radio, Pinedale, Wyoming
KPVI TV, Pocatello, Idaho
KTWO, Casper, Wyoming
KZ95, Jackson Hole Radio.com, Jackson, Wyoming
New York Times, New York, New York
Pinedale Online, Pinedale, Wyoming

Pinedale Roundup, Pinedale, Wyoming
Planet Jackson Hole, Jackson, Wyoming
Post Register, Idaho Falls, Idaho
Star Valley Independent, Afton, Wyoming
Sublette Examiner, Pinedale, Wyoming
Teton Valley News, Driggs, Idaho
The Mountain Pulse, Jackson, Wyoming
The Valley Citizen, Driggs, Idaho
Valley Citizen, Driggs, Idaho
Wyoming Lifestyle Magazine, Laramie, Wyoming
Wyoming Public Radio, Laramie, Wyoming

Individuals

121 individuals

C.2 Public Comments on the Draft Plan

The public provided many comments during the public review period for the draft CCP and EA. The Service reviewed all comments and found the following to be substantive. As defined by NEPA compliance guidelines, comments are considered substantive if they:

- Question, with reasonable basis, the accuracy of the information in the document;
- Question, with reasonable basis, the adequacy of the environmental analysis;
- Present reasonable alternatives other than those presented in the environmental assessment;
- Cause changes or revisions in the proposal.

In compliance with the spirit of the Privacy Act of 1974, it is the policy of the U.S. Fish and Wildlife Service, Mountain-Prairie Region, to not publish the names, addresses, or other personal information of individuals. Agencies, businesses, and organizations are excluded. Rather than print every letter from individuals and redact (black out) all personal information, the Service has summarized the general nature of the comments received and responded to each substantive comment. Some of the comments do not meet the definition of "substantive" (as defined previously), and those are shown as "comment noted." In some instances, the Service has opted to respond to specific nonsubstantive comments where the public displayed a strong interest.

A summary of the individual comments is presented below, followed by specific comments and responses. The Service developed responses to each of these comments after grouping them in the following topics:

- Climate change
- Landscape-scale conservation—wildlife crossings, land exchanges, easements, off-refuge conservation measures
- Habitat management—riparian and aspen woodlands, Flat Creek enhancement project, wetlands, marshes and ponds
- Wildlife—threatened and endangered species, migratory birds, amphibians and reptiles, beavers
- Fire management
- Disease management
- Water resources
- Inventory, monitoring, and research
- Education and visitor services—hunting, mandatory carry of bear spray, non-lead ammunition, fishing, wildlife observation and photography, Highway 89 pathway, non-consumptive uses
- Administration and facilities—Elk Refuge Road, access to National Forest
- Partnerships
- NEPA compliance and planning process
- Comments outside the scope of the plan—bison and elk management

The following is a summary of the substantive comments received and the Service's response to those comments.

Climate Change

Comment. *The NER must compensate for the current and anticipated loss of habitat quality and security on nearby lands, including migration*

corridors, and for the harmful effects of global warming. It is clear that elk have been and will be declining as a result of drought and deteriorating forage conditions in the Greater Yellowstone Ecosystem and the trends will show no signs of abating. Thus, elk, bears and other wildlife that uses NER lands will need more habitat and improved security, not less, in years to come.

Response. As climate change information for the greater Yellowstone area becomes available, it will provide an opportunity for the refuge to respond as outlined in the Service's 2010 climate change strategy, "Rising to the Urgent Challenge: Strategic Plan for Responding to Accelerating Climate Change." This plan identifies three categories of response: adaptation, mitigation, and engagement.

Climate change science will continue to advance and eventually provide fine-scale information that will enable the refuge to formulate science-based adjustments to management to help reduce the impacts of climate change on fish, wildlife, and their habitats.

There is no indication that habitat quality is currently deteriorating on the National Elk Refuge. Refuge forage will continue to be stimulated through the expanded irrigation system, which will help compensate for reduced precipitation in the future due to climate change.

Approximately 97 percent of the land in Teton County is under Federal protection, providing habitat that meets the needs of resident wildlife species throughout their life cycles. Large blocks of public land are immediately adjacent to the north and east boundaries of the refuge. The protected status of these Federal lands is not anticipated to change, so the wildlife habitat they provide is considered secure.

All acres on the refuge, except for buildings, roads, and parking lots, are considered habitat for wildlife. Increasing habitat managed by the refuge would require expanding the size of the refuge and the refuge acquisition boundary, actions which are outside the scope of this CCP.

The National Elk Refuge is a signatory to and supporter of "The Path of the Pronghorn" and will continue to manage whenever practicable in a manner that does not impede wildlife migration.

Landscape-Scale Conservation

Wildlife Crossings

Comment. *Support for installing wildlife crossings (overpasses or underpasses) over Highway 89.*

Response. Comment noted.

Comment. *Building wildlife crossings over Highway 89 has the potential for unintended consequences. To direct elk off East Gros Ventre Butte and onto the NER, there would need to be a wildlife-proof fence on the west side of the highway stretching from the Town of Jackson to the top of Fish Hatchery Hill. The crossings would have to have "jumps" on the refuge side so as to allow elk to enter the refuge but not be able to leave via the same route. The other concern is for the mule deer population that winters on East Gros Ventre Butte. These animals would likely cross onto the refuge, abandoning good winter range while likely ending up competing with the bighorn sheep and few deer already wintering the NER's Miller Butte. It would be important to know the summer range of both the elk and deer that would be moving onto the refuge from East Gros Ventre Butte—would their inability to move west off the refuge interfere with their spring migration to their traditional summer range?*

Response. We agree that the effects of any future wildlife crossings will require careful evaluation. Alternatives to wildlife crossings such as reduced speed limits will be explored.

Comment. *Oppose wildlife crossings for highway 89. They don't work in other areas like the one on Route 93 north of Missoula, MT and cost money which our government doesn't have.*

Response. Comment noted.

Comment. *The proposed overhead corridor for game sounds like a good idea. However, there is a wildlife overpass in Canada that reportedly is not being used by animals. Suggest funding several in high traffic areas and monitoring to see if the game animals will use.*

Response. Comment noted.

Land Exchanges, Easements, and Off-Refuge Conservation Measures

Comment. *Support for targeted land exchanges, easements or other off refuge conservation measures that increase/maintain habitat connectivity.*

Response. Comment noted.

Habitat Management

Riparian and Aspen Woodlands

Comment. *The preferred alternative (D) contains inconsistencies in that in one place it says "allow natural revegetation as ungulate populations allow" and use temporary exclosures to support restoration work. On page 59 it says "enclosures might be used", but Table 4 (and Chapter 6) makes it seem more likely? The plan to restore and protect woody vegetation needs to be formulated and summarized clearly. To what extent will elk and bison browsing eliminate the supposed benefits of burning in restoring riparian areas, without effective exclosures?*

Response. Use of exclosures to promote regeneration of woody plant communities will be site-specific and plant community–specific. Strategies to foster regeneration and height recovery in willow, aspen, and cottonwood plant communities will be developed in the forthcoming habitat stepdown management plan, which is scheduled to be completed in 2017.

Comment. *I see no justification for removing the shelterbelt and exclosure in the headquarters management unit. Doing so would lead to the destruction of the enclosed woody plant community by elk and bison. Regardless of its original intent, its long history has undoubtedly established a nesting bird community that will be eliminated thereby impacting species diversity and abundance.*

Response. There is no evidence that the shelterbelt and exclosure has been used by elk as intended (as a wind break to provide shelter and limit energy expenditure in the winter). The shelterbelt is composed of nonnative species and trees and shrubs that would not regenerate naturally at this site. Breeding bird surveys conducted within the shelterbelt and exclosure found ravens, magpies, house sparrows, green-winged teal, vesper sparrows, American robins, and Brewer's blackbirds. None of these species are rare, and some are likely nest predators for long-billed curlews. We favor restoring this area to native grassland vegetation over time.

Flat Creek Enhancement Project

Comment. *Enhancement of Flat Creek is critical for meeting NER's goals.*

Response. Thank you for your comment. We agree enhancement of Flat Creek is important for meeting the refuge's goals.

Comment. *What effects will fish screens have on amphibians? What are the effects of actions to remove non-native fish? What effects with the Flat Creek enhancement project have on amphibians and their streamside habitats? For example, will stream bank restoration actions harm boreal toads by destroying their winter sites in bank cavities; will pools adjacent to Flat Creek be harmed by the project?*

Response. We do not have data to evaluate effects of these activities on amphibians.

Wetlands, Marshes, and Ponds

Comment. *Nowlin Ponds 1 and 4, and Romney Ponds 1 and 2 are source breeding areas for boreal toads and Columbia spotted frogs. Nowlin Pond 1 water levels are crucial to spotted frog breeding, and need to be adjusted each spring to flood the most productive egg-deposition sites. Nowlin Pond 4 is filling up with sediment and will wink out as a breeding site in the future.*

Romney ponds are targeted for structural work and new pond construction with unknown outcomes for amphibians. The effects of wetland actions need to be assessed for amphibians. Modifications of important breeding sites could affect amphibian source populations and have a strong impact on the persistence of amphibians on the NER. How will "improving water control structures" affect the habitat features that favor amphibians? Can a plan be put in place to ensure that amphibian breeding habitat adjacent to Nowlin Pond 1 is protected in the coming years? Can you include a plan to help ensure that Nowlin Pond 1 water levels are adjusted to facilitate frog breeding during the critical April/May breeding season? The Environmental Consequences section inexplicably leaves out the effects on amphibians of projects mentioned in Chapter 6 (p. 203): new water control structures in Romney ponds, construction of two new ponds in the

Romney complex, and the abandonment Pierre's Pond dikes. Please consider amphibians in the design, construction, and maintenance of ponds. For example, include shallow water zones along the edges, exclude fish if possible, retain springs and small streams in a large zone around ponds, maintain complexity and diversity in the surrounding uplands (willow stands, trees and woody debris, uncompacted soils), minimize use and access by heavy machinery, create dikes that eventually mimic natural land forms and host native vegetation, and ensure that inlet and outlet structures are amphibian-friendly.

Response. Management of pond water levels and water control structures will be evaluated in the forthcoming habitat stepdown management plan (scheduled for 2017), and amphibian populations and habitat will be considered as part of this process. It is important to note that constructed ponds require active management if they are to persist, and on occasion short-term loss of habitat is necessary to ensure availability of habitat in the long term.

Comment. *The plan should include direction on how to evaluate and improve the deteriorating condition of the marsh and ponds adjacent to the Visitor Center. Flat Creek by the overlook before it leaves the refuge has become silted in since the bridge was improved some years ago.*

Response. Comment noted. However, the refuge does not consider successional changes in wetlands to be deterioration.

Wildlife

Threatened and Endangered Species

Comment. *Since the release of the Draft CCP, Wyoming's gray wolf population has been placed under the jurisdiction of the U.S. Fish and Wildlife Service and now has the full protection of the Endangered Species Act. As long as this protection remains, the NER is required to manage for the gray wolf's health and safety. Consequently, all sections within this Draft CPP referring to threatened and endangered species should now include the wolf and its management within the NER.*

Response. Comment noted.

Comment. *The Grizzly throughout the Greater Yellowstone Ecosystem has totally lost 2 of the 4 the main food sources required for population growth, the Whitebark Pine Seed and the Cutthroat Trout. The last 2 remaining food sources are in jeopardy, the high altitude army cutworm moth habitat is in question due to climate warming, and pesticides and the elk and bison are drastically on the decline throughout the Greater Yellowstone Ecosystem and in the Southern Region, Grand Teton National Park. Continuing to reduce the elk herd when it is in decline throughout the ecosystem, likely due in part to climate change, and when it is the last predominant food source for the threatened grizzly bear is a violation of Executive Orders, National Environmental Policy Act, and Section 7 of the Endangered Species Act of 1973, (Act; 50CFR sec. 402.12), 16 U.S.C. sec 1536 (a)(2).*

Response. Comment noted.

Comment. *Concern for protection of endangered and threatened species including grizzly bears and wolves. Adopt a plan which includes the best available hunter-grizzly bear education and information program.*

Response. Comment noted.

Comment. *I have concerns with the following comment on page 8 of the Draft CCP: "…in general, the plan moves elk and bison management toward reduces reliance on supplemental feeding, and, at some future time, total reliance on natural forage." I have grave concerns that this open-ended comment does not reflect the intention of the 2007 Bison and Elk plan to end supplemental feeding in a timely manner—as opposed to at "some future time."*

Response. A stepdown management plan is currently being developed to address supplemental feeding.

Migratory Birds

Comment. *A purpose of the NER is to provide a sanctuary and breeding ground for birds. As the plan states, dragging irrigation lines over the ground can have negative effects on the ground-nesting birds such as curlew. How will these impacts be mitigated?*

Response. We agree that one refuge purpose is to be a "refuge and breeding ground for birds." However, the refuge was also established as a "winter elk (game) reserve" and a "winter elk refuge." There is no assumption that all parts of the refuge will concurrently meet all purposes, and therefore it is appropriate that on some portions of the refuge, elk winter habitat is enhanced using irriga-

tion techniques. Mitigation strategies to reduce the effect of the irrigation program on birds includes survey and identification of long-billed curlew nesting territories. Areas around these sites are not irrigated until August, when the bird breeding season has ended. Field observations also suggest that K-Line irrigation hoses ride over passerine bird ground nests because the nests are slightly recessed below surrounding terrain, although this effect has not been quantified.

Comment. *I question why the strategies listed under the migratory bird objective only include monitoring. There are a number of habitat improvements that could be implemented including restoring willow and cottonwood riparian habitats on the refuge, and improving habitat in the Flat Creek main marsh and other wetlands. An objective to maintain high quality habitat for migratory birds needs to be developed.*

Response. Specific habitat treatments for migratory birds will be considered in the forthcoming habitat management plan.

Comment. *The refuge supplies the most important nesting habitat for swans in the Jackson area. There are a number of ways to increase swan nesting habitat through management of wetland vegetation and installing floating islands where nests are often flooded out. Additional ponds could be built along Flat Creek north of the Fish Hatchery.*

Response. Comment noted.

Amphibians and Reptiles

Comment. *Chapter 4 should describe the habitat requirements of amphibians, habitat types on the NER that support amphibians, which areas may be critical for species persistence, and how such habitats and areas may be vulnerable to various management actions, climate change, and ecological changes to wetlands and plant communities.*

All existing amphibian species should be regarded as 'vulnerable to decline' due to climate change, habitat loss and fragmentation, diseases, lack of management attention to critical habitats, fishery management, and water pollution, chemical herbicides, pesticides, and wetland and stream bank disturbances (p. 128 in Chapter 4).

Northern leopard frogs, which are highlighted by the Draft CCP, have not been documented in Jackson Hole for decades (and never on the NER); the species is most likely extirpated in Teton County rather than "vulnerable to population decline in Jackson Hole." Finding any leopard frogs on the NER would be a very significant event, warranting evaluation and species/habitat protective measures if these frogs are found.

Bullfrogs have not been documented on the NER. The only bullfrogs in Teton County inhabit Kelly Warm Springs (Grand Teton National Park), just north of NER. Knowledge of this is important, because non-native bullfrogs could negatively affect native amphibians if they invade NER. The appearance of bullfrogs on the NER would be a significant event warranting rapid management recognition and response.

Boreal toads are widespread in portions of the NER, not across the entire refuge (p. 128). Only 2 main breeding sites and a few minor, intermittently used breeding sites have been identified over the past 15 years. Monitoring of toads has been conducted nearly annually at one of breeding areas (Nowlin pond 4) over the past decade, and this breeding population appears to be robust. However, boreal toads should be considered particularly vulnerable on the NER due to the sparse number of breeding sites. Loss or degradation of the Nowlin Pond 4 breeding site (which hosts the source population) would negatively affect the persistence of this species on the southern portion of the NER (Flat Creek drainage).

Columbia spotted frogs appear to be declining in the region (Hossack et al. 2013) and in Yellowstone/Grand Teton national parks (analysis and paper in progress 2014). Western tiger salamanders suffered a large loss when the Fish Hatchery outflow pond was converted to a fishing pond. Degradation of the wetlands near the Visitor Center may have led to another salamander breeding site loss.

Three amphibian species (Columbia spotted frogs, boreal toads, and western tiger salamanders) are Wyoming Species of Concern. The boreal chorus frog is not on the state list, but should be of special concern and interest to NER because of its particular vulnerability to climate change, more so than the other amphibian species, due to preferred breeding habitat in shallow pools. This species is also vulnerable to chemical herbicides and pesticides and prescribed burning; chorus frogs forage and winter in habitats such as meadows and open woodlands which are

subject to NER's widespread and abundant management actions to increase elk winter habitat.

Response. Your detailed comments and suggested corrections are appreciated. We agree that amphibian species found on the refuge are vulnerable to population decline and noted this in chapter 4 of the draft CCP; however, we do not believe the level of detailed analysis and commentary that you recommend is necessary for each amphibian species because this level of detail was not used for any other species in the document. We agree that northern leopard frogs have likely been extirpated from Jackson Hole, and we have removed the paragraph that implied otherwise. Our reference to bullfrog presence concerned Jackson Hole in its entirety and not the refuge specifically. In general, we agree that all amphibian species are a taxa of special concern that we intend to conserve. However, conservation efforts are limited by available resources and conflicting management priorities.

Comment. *Amphibian species on the NER depend on ponded (stagnant) water for breeding. Pond management actions, fish management, and hydrological changes thus could have a dramatic effect (positive or negative) on amphibian reproduction. In addition to breeding sites (ponds and pools), summer foraging and overwintering habitat are also critical for amphibians. Summer foraging includes wetlands, wet and moist meadows, marshes, riparian zones, pond and stream edges. Winter sites vary among species: spotted frogs winter in springs and spring-fed streams and ponds, while the other species winter terrestrially (e.g., toads overwinter in rodent burrows, and bank cavities). Loss or reduction of breeding, summer foraging, and hibernation habitats will adversely affect amphibians. Establishing buffer zones around breeding sites, probable overwintering sites, and migration zones is recommended.*

Response. Comment noted.

Beaver

Comment. *Support restoring beaver populations as critical to the establishment and maintenance of healthy wetlands. They were an important part of the natural ecosystem prior to trapping and they should be restored to help meet the NER's goals.*

Response. Comment noted.

Comment. *Beavers are important for amphibians. Loss of beavers on the NER has adversely affected amphibians and their habitats. Beaver ponds provide breeding sites for amphibians as well as summer foraging and winter hibernation habitat for some species. Loss of beaver ponds created in tall willows plant communities and the lack of woody vegetation and woody debris are likely limiting factors for amphibians on the NER. Alternative D is said to have the "same effects as alternative A", but the Alternative D section describes the beneficial effects of 'more beaver ponds'. Elsewhere (Chapter 3 and Table 4) Alternative D leaves out beaver restoration (only included in Alternative C). Failure to restore beavers will lead inevitably to the continued diminishment of amphibians, as existing ponds fill with sediment over time and breeding sites are lost, but no new breeding sites are created.*

Response. We agree that restoration of beavers would be beneficial to amphibian habitat. However, restoration of beaver will be contingent upon recovery of riparian woody vegetation. The timeline and specific strategies for recovery of woody vegetation will be developed in the forthcoming habitat stepdown management plan to be completed in 2017.

Comment. *Will beavers be eradicated in some areas to protect the pond facilities? The CCP needs to disclose if beavers will not be tolerated in some areas, and what effects this may have on adjacent wetlands.*

Response. There are no plans to eradicate beavers from pond facilities. Any new ponds will be equipped with structures designed to prevent beavers from clogging water control structures. This strategy has proven effective in other refuge ponds.

Comment. *Why introduce beavers into refuge wetlands? There are no trees for food or dam construction.*

Response. Any reintroduction would be predicated on recovery of appropriate woody habitat in riparian areas. Reintroduction implies natural dispersal and colonization of beavers from surrounding areas, which clearly would only occur if appropriate habitat existed on the refuge. Detailed strategies to promote the recovery of woody plant communities will be developed in the habitat stepdown management plan, which is planned for 2017.

Fire Management

Comment. *Nesting areas for migratory birds (and non-migratory native birds) should not be part of*

a spring-early summer prescribed fire management plan. If it is deemed necessary to conduct prescribed fires in these areas, they should be conducted in the fall.

Response. Historically, spring burns on the refuge have been conducted in April prior to most bird nesting activity. To minimize loss of forage resources for elk and bison, fall burns are generally not used on the refuge. Our professional fire and biological staff, with input from fire personnel from other agencies, will continue to prescribe burns in accordance with the best available science to achieve desired results.

Comment. *A long-term fire management plan should identify habitats and locations that can benefit from fire, and when a natural fire event occurs, management response can be directed by the plan. Prescribed fire should be used sparingly and only in the fall so as not to impact nesting birds. Existing sagebrush communities should be protected from all fires in order to support sage grouse and other sagebrush obligate species.*

Response. We agree that any future fire management plan should promote using natural fire events when possible to meet management objectives. Historically, spring burns on the refuge have been conducted in April prior to most bird nesting activity. To minimize loss of forage resources for elk and bison, fall burns are generally not used on the refuge. We agree that existing sagebrush communities should be protected from all fires, and this is discussed in the plan. Our professional fire and biological staff, with input from fire personnel from other agencies, will continue to prescribe burns in accordance with the best available science to achieve desired results.

Comment. *"Manage fire regimes that mimic pre-European settlement fire-return intervals." How can this be scientifically justified or logical, given the knowledge that the climate now and in the coming decades will be radically different than it was 150+ years ago? Please use the best available information, or at least state that this is a subject that needs much more study.*

Response. We agree that this subject requires much more study. However, it is not clear that today's plant communities are radically different from those 150 years ago, nor is it clear that responses of plant communities to fire would be radically different within the 15-year life of the CCP. All future CCP stepdown management plans (table 14 of the final CCP) will encompass the guiding principles for responding to climate change. These guiding principles will be especially influential in the development of the fire, habitat, integrated pest, and the inventory and monitoring stepdown management plans. Our professional fire and biological staff, with input from fire personnel from other agencies, will continue to prescribe burns in accordance with the best available science to achieve desired results.

Disease Management

Comment. *Feeding elk in concentrated areas is putting elk at greater risk for CWD. What is the "contingency plan for chronic wasting disease?" References should be provided for where this can be found. How will an outbreak of CWD impact the alternatives? The CCP should summarize and evaluate the best available scientific information on ungulate diseases, transmission risk, consequences of outbreaks, and existing action plans if outbreaks occur.*

Response. The disease contingency stepdown management plan, which will be completed in 2016, will contain a detailed discussion of ungulate diseases and management responses.

Comment. *Monitoring for amphibian chytrid disease is stated on pages 40 and 71 of the CCP. Monitoring for this disease on the NER is not practical and no longer of great interest, knowing that the fungal pathogen is so widespread across the region. What is needed is an action plan for reporting and responding to (e.g., collection and submission of specimens for pathology examination) any amphibian die-offs, which could be encountered by staff, visitors (anglers), fish biologists and other researchers. Also needed is a system to prevent the introduction and spread of aquatic diseases. Infectious amphibian diseases may be spread by humans working or fishing in aquatic environments on the NER. Diseases such as ranavirus and whirling disease can be spread by anglers and biologists, if waders and gear are not disinfected. Suggest a program to educate anglers about the need to clean their gear. The CCP needs to disclose and plan for the threat of aquatically-borne diseases, which can threaten fish, amphibians, and birds.*

Response. Your comments are noted. We will consider your suggestions as part of the disease contingency stepdown management plan, which is scheduled for completion in 2016.

Water Resources

Comment. *Protecting the quality of groundwater, which supplies the drinking water for the town of Jackson, needs to be addressed. In particular, how will the groundwater quality be protected from practices such as irrigation and potential use of fertilizers, pesticides, and or herbicides? Has a buffer zone been established around each well to protect the well head? Water quality monitoring by the town of Jackson should be discussed and data provided. What will be done if the water quality begins to show increasing trends in contaminant for pathogen concentrations from NEW irrigation and elk management practices?*

Response. Your concerns are noted. Current sprinkler irrigation practices apply less water to the surface above the aquifer than was applied using the old flood irrigation system. No fertilizers are used on the refuge. Herbicides are used in compliance with labels in a manner to protect groundwater and surface water resources. The Town of Jackson tests drinking water supplies to ensure their safety.

Comment. *The seasonal diversion of Gros Ventre water into Flat Creek creates an unnatural water flow regime and puts at risk any attempt to bring Flat Creek water flows back to natural patterns. Similarly, the off-take of water from Flat Creek for refuge irrigation adds to the improbability of ever mimicking the natural flow systems in Flat Creek (p. 59 and 67). The negative impact to Flat Creek's water quality and subsequent impact to native fisheries from the Gros Ventre–Flat Creek irrigation diversion ditch needs to be addressed. A plan to re-route the section of the ditch responsible for the sediment loading should be completed. This can be done by either encasing the flow in a pipe or routing it over a water-proof ditch/structure. Until this is fixed, sediment will continue to be deposited in Flat Creek, a situation whose impact currently extends through the Town of Jackson.*

Response. Comment noted.

Comment. *Quality Water Resources (p. 23). Note that the first sentence of the second paragraph is contradicted later in the same paragraph.*

Response. Thank you for your comment. The text will be edited to eliminate the contradiction in the final CCP.

Comment. *Water quality, particularly on Flat Creek is likely influenced by run-off of fecal materials brought about by the large concentrations of elk and bison, not cattle as mentioned on page 102. Until these unnaturally high concentrations of elk and bison are eliminated and/or moved away from Flat Creek, its water quality will remain compromised.*

Response. Comment noted.

Inventory, Monitoring and Research

Comment. *Recommend the refuge does not wait five years to implement the post-treatment migratory bird surveys in the K-line irrigation experiment areas. This type of method compared to the former use of ditch/flood irrigation is likely causing large scale nest failure of grassland, ground nesting birds in the treated areas. The refuge should identify if this is occurring and then implement changes to protect nesting species including Long-billed Curlew.*

Response. Comment noted. The monitoring plan for the K-Line irrigation system assumed that breeding bird communities would change with moderate- to long-term plant community changes associated with the irrigation system. Preliminary observations as of 2015 suggested that these plant community changes have not occurred; accordingly, delaying this monitoring is warranted. A study to evaluate breeding bird nest success and productivity in irrigated versus control areas would be much more expensive and is not planned.

Education and Visitor Services

Comment. *I think the private sector can supply the needs of educating the public with the overseeing guidance of the Elk Refuge staff. I agree that boating and swimming on any water that is in the boundaries of the Elk Refuge should be stopped when it interferes with wildlife occupying the refuge. I agree with the idea of not allowing antler hunters on the refuge the night before the Forest Service opening.*

Response. Comment noted.

Comment. *The Service should use a cautious approach to increasing recreation opportunities. Impacts from these uses could pose a risk to resources on which they depend.*

Response. Comment noted.

Comment. *Please honor Bert Rayne's' legacy such as the boardwalk by at least spelling his name correctly.*

Response. Thank you for pointing out this error. We have corrected the spelling in the final CCP.

Hunting

Comment. *Concern regarding hunting of species other than elk and bison to address management concerns. Hunting of predators runs counter to the goals outlined in the Refuge's Bison and Elk Management Plan. Predators play a key role in maintaining balance in an ecosystem, by selecting old, physically impaired, and diseased animals. Additionally, they may reduce transmission and prevalence of diseases such as chronic wasting disease, as well as brucellosis, and assist the Service in meeting herd objectives for elk. Wolves and grizzly bears are protected while in Grand Teton National Park. It is known that there is reciprocal movement of these magnificent animals between GRTE and the NER. They are drawn to the food sources that the NER provides. There are serious ethical considerations about whether animals that are attracted to the NER by gut piles or a manmade concentration of prey should be hunted for doing so.*

Response. We agree that predators provide benefits that support the mission of the refuge, and a hunting season specifically for predators is not envisioned. All references to the hunting of predators have been removed from the final CCP.

Mandatory Carry of Bear Spray

Comment. *The NER grizzly bear management and protection plan must make it mandatory for all hunters to carry current bear spray and have it readily available for use. A growing body of scientific literature shows that bear-caused human injuries are significantly lessened when bear spray is deployed during a hunter/grizzly interaction. This will result in lower incidences of human injury and much lower chance of a hunter shooting a bear in self-defense.*

Neighboring Grand Teton National Park already requires hunters to carry bear spray. Given that the two protected areas share a border, and that many species—including elk, bison, pronghorn, mule deer, wolves, coyotes, and bears—frequently cross this border, it is only logical that the two agencies' policies align.

The precedent to require hunters to carry bear spray is there. The NER worries about alienating hunters as a result of the increased burden associated with such requirements. What about the non-consumptive user? Wouldn't wildlife photographers be alienated by the self-defense shooting of a grizzly bear because a hunter didn't have bears spray on him/her? Fear of alienating a minority user-group by asking them to take on a small inconvenience for the sake of wildlife is not an acceptable reason to forego doing the right thing. If wildlife is truly of the utmost importance to the NER and USFWS, the preferred alternative must require hunters to carry bear spray.

Response. Please see the response to comment 1-8.

Non-lead Ammunition

Comment. *Support for requiring the use of lead-free ammunition for all hunting and fishing activities on the refuge. Both grizzly bears and wolves are protected by the Endangered Species Act and both occur on the NER and both are known to consume hunter-created gut piles. In so doing, they are put at risk of suffering from lead poisoning. In addition, large numbers of bald eagle, golden eagles, coyotes, ravens and crows also utilize hunter-created gut piles and are also potential victims of lead poisoning.*

The current system of encouraging hunters to use lead-free ammunition is inadequate, as more than 60% of hunters use lead ammunition (p. 76). Neighboring Grand Teton National Park has already banned lead ammunition. Given that the two protected areas share a border, and that many species—including elk, bison, pronghorn, mule deer, wolves, coyotes, and bears—frequently cross this border, it is only logical that the two agencies' policies align. The precedent to require hunters to use lead-free ammunition and carry bear spray is there. The NER worries about alienating hunters as a result of the increased burden associated with such requirements. What about the non-consumptive user? Would the sight of lead-poisoned ravens or eagles not alienate birdwatchers? Fear of alienating a minority user-group by asking them to take on a small inconvenience for the sake of wildlife is not an acceptable reason to forego doing the right thing. If wildlife is truly of the utmost importance to the NER and USFWS, the preferred alternative must require hunters to use non-lead ammunition.

Nothing short of 100% compliance will protect the raptors, scavengers and carnivores of both GRTE and the NER from the avoidable risks of lead poisoning from ammunition.

Response. The refuge is concerned about the impacts of spent lead ammunition on scavengers, especially bald eagles and ravens. When this issue was brought to our attention through the research by Craighead Beringia South in 2008, we immediately began work to mitigate these impacts and organized a multiagency partnership program to promote the voluntary use of non-lead ammunition. This effort to engage the hunting community included Craighead Beringia South as a key partner and was implemented in 2009. At its inception, it was emphasized to the hunting community that this was a voluntary program.

Since that time, the voluntary use of non-lead ammunition has steadily increased to approximately 60 percent of successful elk hunters in 2014. This was accomplished through the emphasis of educational materials promoting the use of non-lead ammunition and initially by distributing free non-lead ammunition to refuge hunters. The steady decline in cost and increase in availability of non-lead ammunition, combined with continued educational materials and emphasis by the refuge, is anticipated to continue to increase the voluntary participation in the use of non-lead ammunition.

We also believe the voluntary and educational approach provides an additional benefit over mandating the use of non-lead ammunition. Hunters who are informed and convinced of the benefits of non-lead ammunition through education, and who make the decision to voluntarily use non-lead ammunition, are more likely to voluntarily use that ammunition when they hunt off the refuge where there are no restrictions on ammunition type. There are hundreds of thousands of acres of public and private lands that surround the refuge and are open to hunting. The voluntary use of non-lead ammunition in these areas provides extended benefits to scavenging birds that may use the refuge and the surrounding lands.

Although the voluntary participation in this program has been very positive, we believe its effectiveness needs to be monitored and evaluated. We will continue to promote the voluntary use of non-lead ammunition while monitoring participation and collect data concerning impacts on refuge wildlife populations. Within 5 years, the refuge will determine if the voluntary approach to mitigating the impacts of lead ammunition has been successful or if a refuge regulation requiring the use of non-lead ammunition is needed. Currently, there is no National Wildlife Refuge System policy requiring the use of non-lead ammunition while hunting big game on national wildlife refuges.

Comment. *Trophy hunting (for bull elk and bison) is controversial and unpalatable, especially in such a visible area; and it contradicts your claims that hunting on the NER is primarily to meet 'herd objectives'. Herd reduction is best accomplished through cow hunting; there is no biological reason to hunt bull elk. The bison hunt is already practically a trophy hunt, with low bull bison ratios and a high percent of bull killed each year (see Jackson Hole News & Guide Sept. 10, 2014, Bull bison count falls, p. 34A). Killing bulls does not make sense in terms of the objective to reduce the number of bison. Large bison herd reductions such as occurred in 2013 must have impacts on behavior, calf survival, and other aspects of the lives and well-being of these social mammals. Please evaluate.*

Response. Comment noted. Hunting is a legislatively mandated priority public use on national wildlife refuges. We agree that over time the harvest of females has a greater effect on population reduction than harvest of males; however, harvest of males does in fact reduce the number of animals wintering on the refuge, which is consistent with our management objectives to reduce reliance on supplemental feeding.

Comment. *Migrating waterfowl use the NER as both a year round inhabitation and a stopover for yearly migration. Because waterfowl generate such interest the NER, it is realistic that the inhabitation generates an economic income for management agencies. The NER should adopt a policy of adaptive management concerning waterfowl on the NER which would include hunting seasons for both ducks and geese.*

Response. The CCP suggests that waterfowl hunting could be allowed on the refuge in the future if it is consistent with other management objectives.

Comment. *I question promoting the NER for young hunters, which may increase the risk to non-target wildlife and have other consequences (e.g., young people contacting wildlife disease).*

Response. Youth hunts require participants to be accompanied by an experienced non-hunting adult. This ensures mentoring is provided during the youth hunt. Youth hunters, like all other hunters on the refuge, must abide by all State and refuge regulations.

Fishing

Comment. *Concern for the future of the Snake River Fine-spotted cutthroat trout population in Flat Creek, and support for efforts to reduce competition from non-native species. Allowing the removal of trophy-size fish does not help the refuge meet its management goal of having trophy-size trout alive in the population. When one considers how low population numbers are and the intense competition that exists from non-native fish, allowing harvest does not seem justified. Given the wildlife first mission of the USFWS, a discussion with WGFD to reassess the scientific and social rationale for allowing harvest of trophy-sized cutthroat, as well as the potential need for mandatory catch-and-release regulations should occur. The Draft CCP notes that the vast majority of anglers on Flat Creek have "a catch-and-release conservation ethic." The risk of alienating a small minority of anglers should not take on greater importance that the protection of a critical native fish population. Consider implementing catch-and-release regulations for Snake River Fine-spotted cutthroat trout in Flat Creek.*

Response. We follow the state regulations when it comes to fishing bag limits. Most people fishing Flat Creek on the refuge are practicing catch and release.

Comment. *Cutthroat trout have become idealized in the eyes of many recreationalists similar to the trophy of big game. Limited quota licenses should be considered for fishing privileges on the Flat Creek portion of the NER. General fishing licenses do not suffice for management of a fishery on the level of the NER.*

Response. We follow the state regulations when it comes to fishing bag limits. Most people fishing Flat Creek on the refuge are practicing catch and release.

Wildlife Observation and Interpretation

Comment. *Consider doing tours of Miller Butte.*

Response. The refuge participated in archeological tours of Miller Butte in the past, in cooperation with the Jackson Hole Historical Society and Museum. The tours were specifically related to sensitive archeological sites located on the butte. Refuge staff would consider occasional guided tours that have a specific purpose again in the future. However, regular tours into closed areas for general interpretive programming would need to be assessed for compatibility.

Comment. *Based on my limited observations, the sleigh ride concession represents the greatest single source of disturbance to grazing animals, and resulted in periods of extensive agitation, and movement of the herd distances of upwards of ½ mile or more.*

Response. The three surveys were all listed in the report as being conducted during the same week in April 2012. During that same year, supplemental feeding ended during the week of March 26. This indicates that green-up of spring growth may have started, and elk near the sleigh area may have been less settled than during much of the winter season. If the sleigh contractor had switched to using wagons rather than sleighs because of the spring-like conditions, the additional noise from the alternative vehicles could have been a factor. There may have also been elk in the sleigh area that had not been there during the early part of the season and thus were not acclimated to the sleigh operation. This is often the case if supplemental feeding has stopped earlier in other areas off the refuge.

The sleigh ride contractor is committed to minimizing disturbances to the elk herd. During the eight seasons the same company has held the contract, the refuge staff has not observed repeated, regular disturbances from the sleighs. Decades of observation have shown elk have exhibited a tolerance of sleighs and other refuge vehicles as long as an individual human form is not identifiable. Conversely, animals have routinely demonstrated an intolerance of the presence of humans on foot. Pedestrians illegally using the pathway and approaching the fence have caused noticeable and repeated disturbance to nearby elk, often causing the herd to bolt from the area and not return for up to 24 hours. This was repeatedly the case throughout much of December 2013 and December 2014, observed by the sleigh ride contractor and a number of refuge employees. Because no human violators of the pathway seasonal closure were observed during the three surveys done by Biota, no comparison could be made to the types of reaction each of the disturbances caused.

The refuge is not only concerned about stress to wintering and migrating animals but also the decrease in the amount of refuge areas used by elk, thereby further increasing density.

Highway 89 Pathway

Comment. *Encourage additional data collection and adaptive management of the Highway 89 path-*

way to minimize disturbance to wildlife and maximize seasonal use of pathway for public. Support opening the Highway 89 pathway earlier or closing it later in years when seasonal weather alters the timing of elk migration and bike activity on the pathway would not interfere with elk migration. Simultaneous bike and mule deer use within the pathway corridor can create a dangerous situation for highway users. In making a decision to open the pathway early, managers must take into account deer use in the highway corridor as well as elk activity on the refuge.

Response. A seasonal closure was clearly outlined as a critical condition prior to construction of the pathway. The season has already been expanded by 20 percent and as much as 31 percent in years when the refuge agrees to open the pathway as early as April 15 due to an early migration. Our data show the current pathway season is approximately 2 weeks of when regular migration occurs to and from the refuge. It would be difficult for the refuge or Jackson Hole Community Pathways to open and close the pathway every time there is, or is not, a potential conflict with elk, nor could an unplanned closure be implemented quickly to alleviate a problem. The pathway, open from May 1 through October 31, is open during most of the traditional cycling season.

We will continue to monitor pathway use and collect data to evaluate disturbance to wildlife. We will adaptively manage the pathway to maximize seasonal use of pathway for public in a manner that does not interfere with elk migration or other wildlife needs.

We have edited chapter 4 the final CCP to reflect the pathway will be adaptively managed to minimize disturbance to wildlife and maximize seasonal use for the public based on the results of monitoring and data collection.

Comment. *Agree the bicycle pathway should continue to be restricted during the winter months.*

Response. Comment noted.

Nonconsumptive Uses

Comment. *The needs of non-consumptive users must be balanced with the overarching commitment of the NER to satisfy consumptive demands. The NER is dedicated to wildlife first and consumptive use is regarded as a management tool. When the management goals are reached, what will happen to the consumptive opportunities? The CCP needs to address this question, especially since the emphasis on hunting has reduced the availability of non-consumptive opportunities due to cost and staffing needs.*

Response. Consumptive uses will be adjusted as management goals are met. However, they will continue to be available as a management tool to address natural recruitment and population growth. The refuge has not eliminated nonconsumptive use programs as hunting programs have expanded.

Administration and Facilities

Comment. *It is laudable that the refuge will try to reduce the carbon footprint, but it is laughable that the quantity of carbon consumed in irrigation and feeding practices is not calculated and shown. Efforts to reduce carbon footprints in buildings and travel probably pale in comparison to the carbon used to irrigate and artificially feed elk. This information should be provided.*

Response. Irrigation on the refuge is strictly gravity-fed; carbon emissions associated with irrigation have been substantially reduced because we no longer pump water using electricity. We do use utility task vehicles to haul irrigation lines; however, there is no other way to move lines in an efficient, cost-effective way with minimal impact.

Comment. *The need for employee housing is a challenge for every business in Teton County. New housing should be provided only at existing developed sites and where adequate infrastructure already exists. The prime location for more housing is within the NER headquarters campus. Second would be in the maintenance area north of Miller House. A third location is the National Fish Hatchery site, an already disturbed area and one that appears to be able to accommodate more housing.*

Response. We agree employee housing should be provided at existing developed sites where infrastructure already exists. The draft CCP proposes additional employee housing at the headquarters campus, and we will consider and evaluate the suggested locations of the maintenance area north of Miller House and the National Fish Hatchery site.

Elk Refuge Road

Comment. *Support additional pullouts along the Elk Refuge road. All turnouts should be gravel sur-*

face and delineated with large boulders and/or logs to discourage off-site parking.

Response. Thank you for your comment. The proposed action in the draft CCP includes additional pullouts along the Elk Refuge Road.

Comment. *Reduce speed limits along the Elk Refuge Road and add speed bumps—encourage visitors to slow down and enjoy wildlife. Consider including a few places where people who walk the road can sit down and observe wildlife. The aging population in the community is precluded from enjoying access to the refuge on foot because there is nowhere to sit down. The Senior Center is facilitating a conversation throughout the community about this issue. I hope the NER will consider being a part of that conversation.*

Response. We will discuss seating options as Elk Refuge Road improvements and additional pullouts are added. Seating options would have to be compatible with winter plowing operations.

Comment. *Consider allowing Nordic skiing along the refuge road.*

Response. Elk Refuge Road winter regulations do not restrict any type of nonmotorized pedestrian use. However, the Elk Refuge Road would not be specifically groomed or plowed in such a manner to accommodate Nordic skiing.

Access to National Forest

Comment. *Strongly concur with the recommendation to prohibit overnight parking and camping associated with the antler collection April 30-May 1.*

Response. Comment noted.

Comment. *I understand that the road from the Town of Jackson through the Elk Refuge poses a problem for those wanting to access the forest lands but also keeping in mind that we are talking about two government agencies working out the sharing of the road for access. The building of a separate road for Forest Service access would be prohibitive in cost and would be extremely difficult to go around private land. The shared road is an extremely valuable asset to the community for winter wildlife viewing and should be continued with restrictions on how the road is accessed.*

Response. Comment noted.

Comment. *Propose three new national forest access trails be included in the Plan at the following locations. This proposal would not require new parking lots as existing refuge hunting parking lots can be used. There would be minimal impact to refuge resources and trails could be open only for the hunting season.*

1. *Miller barn parking NE along Elk Refuge road to north edge of section 26. Trail head due east along north edge of section to national forest boundary. Large existing parking at Miller barn.*
2. *Flat Creek parking lot northeast along Flat Creek road to southeast corner of section 33.*
3. *Nowlin parking lot from NE corner of section 24. Walk due south along eastern edge of section 24.*

Response. The CCP leaves the idea of new access open for future consideration. Additional access would have to be weighed against the Service's mandate to put wildlife first. Any new access would be subject to a compatibility determination, which would address how new access would relate to our mission and purposes.

Partnerships

Comment. *Work with Town of Jackson to request the street lights be dimmed at night (i.e., North Cache Street) for the wildlife sake.*

Response. Comment noted.

NEPA Compliance and Planning Process

Comment. *The initial comment period of 30 days for the review of the detailed 600 page document was unrealistic. The public information meeting on September 29th was the first time that the public was introduced to the plan. Why was the meeting not held shortly after the Plan was released for comment? I do not feel that the time allotted for public comment was sufficient, even with the week extension for so complicated an EA.*

Response. A notice of availability was published in the Federal Register September 9, 2014, announcing that the draft CCP was available for public review and comment. At the request of several organizations and individuals, the comment period was extended to October 24, allowing 45 days total for reviewing and commenting on the draft CCP and EA. The public meeting was scheduled September 25, 2014, to provide time for the public to review the draft CCP prior to attending the

public meeting. We believe the 45-day review period provided adequate time to review the document and provide meaningful comments. The review period was conducted in accordance with NEPA guidelines, and similar review periods have been provided for the majority of CCPs in the Mountain-Prairie Region.

Comment. *The CCP alleges that a biological evaluation of the actions pursuant to section 7 of the Endangered Species Act has been completed. None is published for review in the Draft CCP.*

Response. An Intra-Service Section 7 Biological Evaluation has been prepared for the preferred alternative and included as an appendix in the final CCP.

Comment. *An Environmental Impact Statement is needed under NEPA. Management of the NER has significant potential environmental impacts and a comprehensive look at how to mitigate these issues over the next 15 years is needed. EAs are intended to be a concise document, which this clearly is not due to the complexity of the issues.*

Response. The preferred alternative (CCP) was not a major Federal action that would significantly affect the quality of the human environment within the meaning of Section 102(2)C of the National Environmental Policy Act of 1969. Accordingly, the preparation of an EIS was not required.

Comment. *A true comprehensive conservation plan to address management of the refuge that includes elk and bison management, irrigation practices, and elements included in this plan. Elk and bison management should not be an issue outside the scope of the CCP as it is an integral and critical component. The EIS should include a detailed analysis of the effect of supplemental feeding and the resulting concentration of a large ungulate population on an already severely degraded habitat.*

Response. The management of bison and elk is addressed in the Bison and Elk Management Plan that was completed in 2007 and remains in effect until 2022 (FWS and NPS 2007a). The effects of supplemental feeding were addressed in the EIS that was completed as part of the NEPA process for the Bison and Elk Management Plan.

Comment. *There has been a plethora of NER NEPA documents over the past decade, leading to confusion about what the NER is doing, will do and when. The BEMP, Irrigation Expansion Project Environmental Assessment 2009, and Pathway89 EA contained mitigation measures relating to habitat conservation and restoration for 'other wildlife' and with regards to the ecological concerns stemming from management decisions. The CCP needs to clearly formulate its relationship to other decisions and commitments. Where the CCP overrides, contradicts, or improves previous plans or mitigation measures, this needs to be clearly disclosed, and not in a piece-meal fashion.*

Response. The CCP is written to complement other refuge NEPA documents and does not override or supersede the other completed plans that remain in effect. The planning team worked diligently to ensure contradictions between existing NEPA documents (that is, the Bison and Elk Management Plan and Irrigation Expansion EA) and the CCP do not occur. We have provided additional text in the final CCP to clarify the relationship of the CCP to other planning documents for the refuge.

Comment. *Prefer alternative C to the others. The refuge is for wildlife. It should be much more than a feedlot for the game we like to hunt. Very little land remains that is protected in such a way and it would be lovely for tourism and personal gratification to see the management focus on improving the wilderness component of the refuge. I especially support the idea of beaver dams and overpasses for migrating ungulates.*

Response. Comment noted.

Comment. *All of the Alternatives increase elk reduction programs and hunt areas and leave less refuge, free of human disturbance, with no study of impact on the elk, the populations are on the decline throughout the GYE, and your provide no study of the impact on other species, including the food needs for reproduction, the distribution and the mortality/human caused of the threatened Grizzly Bear. Or the environmental impact on the visitors, business owners and residents in the town of Jackson and Teton County from the killing of elk adjacent to the road, alternatives, B, C, & D, promote additional hunts from the west end and Fish Hatchery at Highway 89 as well the Southern end of the Refuge, outside of the Hospital, not a conducive visual for health and rehabilitation. Highway 89 is the gateway into the town of Jackson. Shooting elk as folks enter town requires an EIS pursuant to National Environmental Policy Act, NEPA, 42 U.S.C. sec 4321. The impact on human life and the qualities pertaining to the refuge as a tourist icon for the valley shall be jeopardized and dramatically impacted. Alternatives B, C & D also call for expanding the*

Bison Hunt by directing hunters onto the Northern Portion of the Refuge through the town of Kelly and the Teton Highlands subdivision. This significant impact on the quality of human life in these neighborhoods requires a DEIS with scoping and public comment pursuant to the NEPA requirements.

Response. Based on the purposes of the refuge, the requirements of the Improvement Act, and other applicable laws, regulations, and policies, a full range of reasonable alternatives was considered. The planning team conducted several workshops involving staff and other professionals, mailed planning updates, posted information on our Web site, held a public meeting, listened to public comments, and analyzed the biological, visitor use, and socioeconomic data before determining the options for future management.

Comment. *I have concerns with the following comment on page 8 of the Draft CCP: "…in general, the plan moves elk and bison management toward reduces reliance on supplemental feeding, and, at some future time, total reliance on natural forage." I have grave concerns that this open-ended comment does not reflect the intention of the 2007 Bison and Elk plan to end supplemental feeding in a timely manner—as opposed to at "some future time." It doesn't appear much progress has been made over the last 7 years on this and in fact, the elk numbers are increasing. Is there a timeline for "some future time"?*

Response. A stepdown management plan is currently being developed to address supplemental feeding.

Comments Outside the Scope of The CCP

Bison and Elk Management

Comment. *The NER cannot increase elk reduction to only 5,000 wintering on the refuge if this number reduces the Jackson herd below 11,000. The BEMP is implemented collaboratively to maintain herd objectives while diminishing the use of supplemental feed as conditions allow, while still maintaining the herd population objective. I demand compliance with the population requirements of the 2007 Bison and Elk Management Plan and all Executive Orders that pertain to land management and wildlife. Specifically, the promised comprehensive public review process before any further reduction of the Jackson herd. No CCP alternative can contradict BEMP in terms of the population objective of 11,000 elk in the Jackson Herd.*

Response. Comment noted. The management direction in the final CCP does not conflict with management approved in the Bison and Elk Management Plan (FWS and NPS 2007a).

Comment. *I am really concerned about our overall elk population that the goal of 5000 elk on the refuge will reduce the overall herd size by around 2000 head. I would like to suggest that the idea of removing young elk from the refuge and placing them on other feed grounds in the heart of the winter so they would then follow the resident herds to their summer grounds. This would supplement these herds that are low in herd count. I am also concerned about the rising number of Buffalo on the refuge and what it will do to the overall management of our elk herd. In the past hunting just don't seem to produce the herd reduction that is necessary to reduce the impact they have on the refuge. This would also bring to discussion of removing some of the healthy animals to other areas that are trying to increase their herds.*

Response. Elk herd size and supplemental feeding of elk is addressed in the Bison and Elk Management Plan (FWS and NPS 2007a). The Bison and Elk Stepdown Management Plan is being developed as a stepdown plan to the Bison and Elk Management Plan. We are working with WGFD to prepare the adaptive management plan, and we will consider this suggestion during our planning discussions with WGFD.

Comment. *I learned on October 15, 2014, of a 2013 FWS Biological Opinion Addendum, or re-assessment of the original Biological Opinion with the Bison and Elk Management Plan of 2007, pursuant to the Endangered Species Act. This re-assessment is not attached.*

Response. The biological opinion and subsequent addendum concerns the Grand Teton National Park's Elk Reduction Program within the Grand Teton National Park. Management of the Jackson elk herd by the Service and NPS is addressed in the Bison and Elk Management Plan (FWS and NPS 2007a) that was completed in 2007. Because the management of bison and elk is outside the scope of the CCP and EA, the biological opinion and subsequent addendum are not included in the CCP.

C.3 Comments from Agencies and Organizations

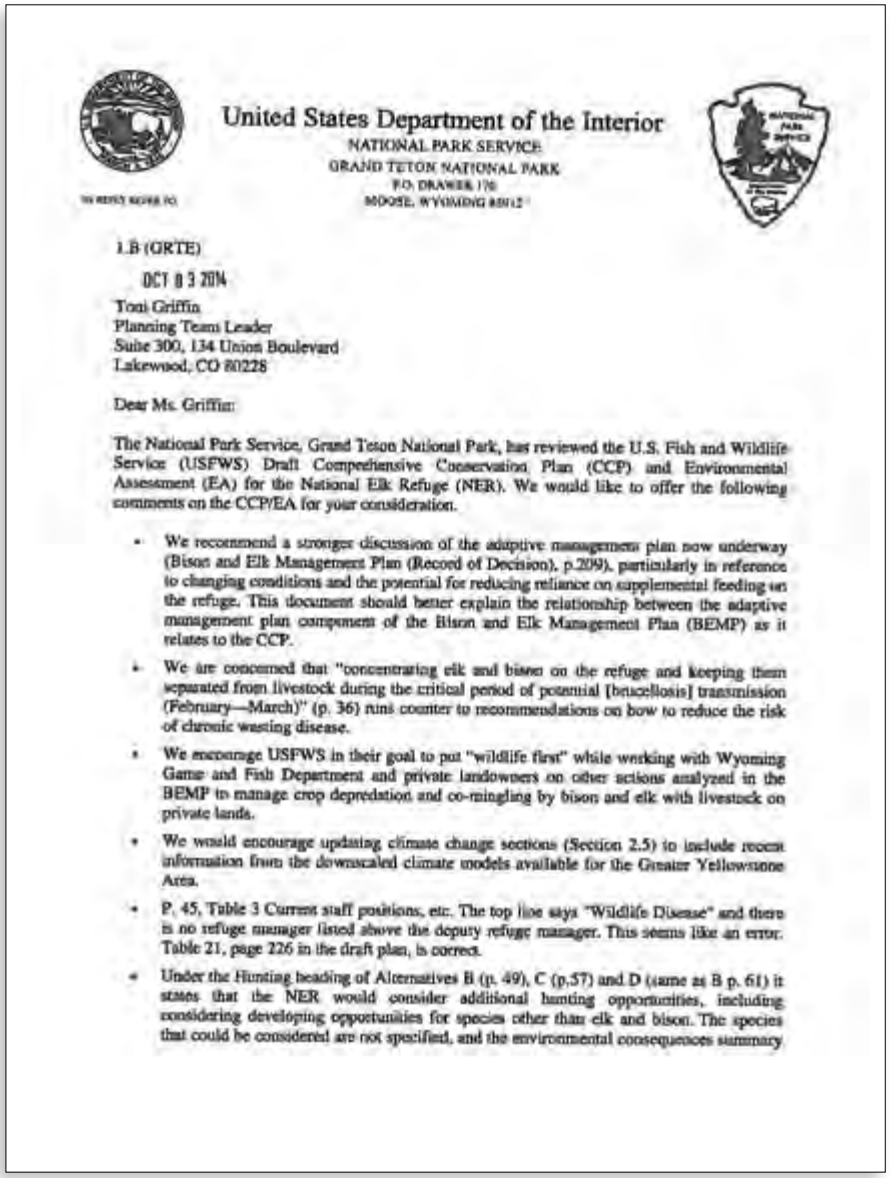
The Service received formal comments from the following Federal, State, and local government agencies.

1. National Park Service, Grand Teton National Park, Moose, Wyoming
2. Office of the Governor, State of Wyoming, Cheyenne, Wyoming
3. Wyoming Game and Fish Department, Cheyenne, Wyoming
4. Teton County Board of Commissioners, Jackson, Wyoming
5. Teton County Sheriff, Jackson, Wyoming

Formal comments were also received from the following organizations.

6. The Cougar Fund, Jackson, Wyoming
7. Friends of Animals, Centennial, Colorado
8. Greater Yellowstone Coalition, Bozeman, Montana
9. The Humane Society of the United States, Western Region, Arlington, Washington
10. Jackson Hole Conservation Alliance, Jackson, Wyoming
11. Safari Club International, Washington, DC
12. Sierra Club, Wyoming Chapter, Laramie, Wyoming
13. Western Watersheds Project, Wyoming office, Pinedale, Wyoming
14. The Wildlife Society, Wyoming Chapter, Laramie, Wyoming
15. Wyoming Pathways, Wilson, Wyoming
16. Wyoming Wildlife Advocates, Wilson, Wyoming

Letters 1–16 from agencies and organizations follow after this page. Beside each reproduced letter is the Service's response, numbered to correspond to specific comments in the letter. The Service reviewed all supporting attachments; however, such attachments are not included in this appendix.

Comment number	LETTER #1—National Park Service, page 1 of 4	RESPONSE
1-1 1-2 1-3 1-4 1-5 1-6		**1-1.** Thank you for your suggestion. We have added the text below to help clarify the relationships between the Bison and Elk Management Plan, the Bison and Elk Stepdown Management Plan, and CCP. Reference to specific information within the Bison and Elk Management Plan is outside the scope of the CCP. "The Bison and Elk Management Plan was finalized in April 2007 after a 9-year public process. This comprehensive conservation plan will complement, not replace, the Bison and Elk Management Plan. A stepdown management plan is currently being drafted for the Bison and Elk Management Plan. This plan will outline, consistent with the Bison and Elk Management Plan, guidance to adaptively manage bison and elk herds to meet the goals and objectives outlined in the Bison and Elk Management Plan. Public comments will be solicited before the stepdown management plan is finalized." **1-2.** This is outside the scope of the CCP. **1-3.** This is outside the scope of the CCP. **1-4.** Thank you for your comment. **1-5.** Thank you for calling this to our attention. However, please note that the text appearing in chapter 3 of the draft CCP and EA is not included in the final CCP; accordingly, this change cannot be made in the final CCP. **1-6.** Predators provide benefits that support the mission of the National Elk Refuge, and a hunting season specifically for predators is not envisioned. All references to the hunting of predators have been removed from the final CCP.

United States Department of the Interior
NATIONAL PARK SERVICE
GRAND TETON NATIONAL PARK
P.O. DRAWER 170
MOOSE, WYOMING 83012

1.B (GRTE)

OCT 0 3 2014

Toni Griffin
Planning Team Leader
Suite 300, 134 Union Boulevard
Lakewood, CO 80228

Dear Ms. Griffin:

The National Park Service, Grand Teton National Park, has reviewed the U.S. Fish and Wildlife Service (USFWS) Draft Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) for the National Elk Refuge (NER). We would like to offer the following comments on the CCP/EA for your consideration.

- We recommend a stronger discussion of the adaptive management plan now underway (Bison and Elk Management Plan (Record of Decision), p.209), particularly in reference to changing conditions and the potential for reducing reliance on supplemental feeding on the refuge. This document should better explain the relationship between the adaptive management plan component of the Bison and Elk Management Plan (BEMP) as it relates to the CCP.
- We are concerned that "concentrating elk and bison on the refuge and keeping them separated from livestock during the critical period of potential [brucellosis] transmission (February—March)" (p. 36) runs counter to recommendations on how to reduce the risk of chronic wasting disease.
- We encourage USFWS in their goal to put "wildlife first" while working with Wyoming Game and Fish Department and private landowners on other actions analyzed in the BEMP to manage crop depredation and co-mingling by bison and elk with livestock on private lands.
- We would encourage updating climate change sections (Section 2.5) to include recent information from the downscaled climate models available for the Greater Yellowstone Area.
- P. 45, Table 3 Current staff positions, etc. The top line says "Wildlife Disease" and there is no refuge manager listed above the deputy refuge manager. This seems like an error. Table 21, page 226 in the draft plan, is correct.
- Under the Hunting heading of Alternatives B (p. 49), C (p.57) and D (same as B p. 61) it states that the NER would consider additional hunting opportunities, including considering developing opportunities for species other than elk and bison. The species that could be considered are not specified, and the environmental consequences summary

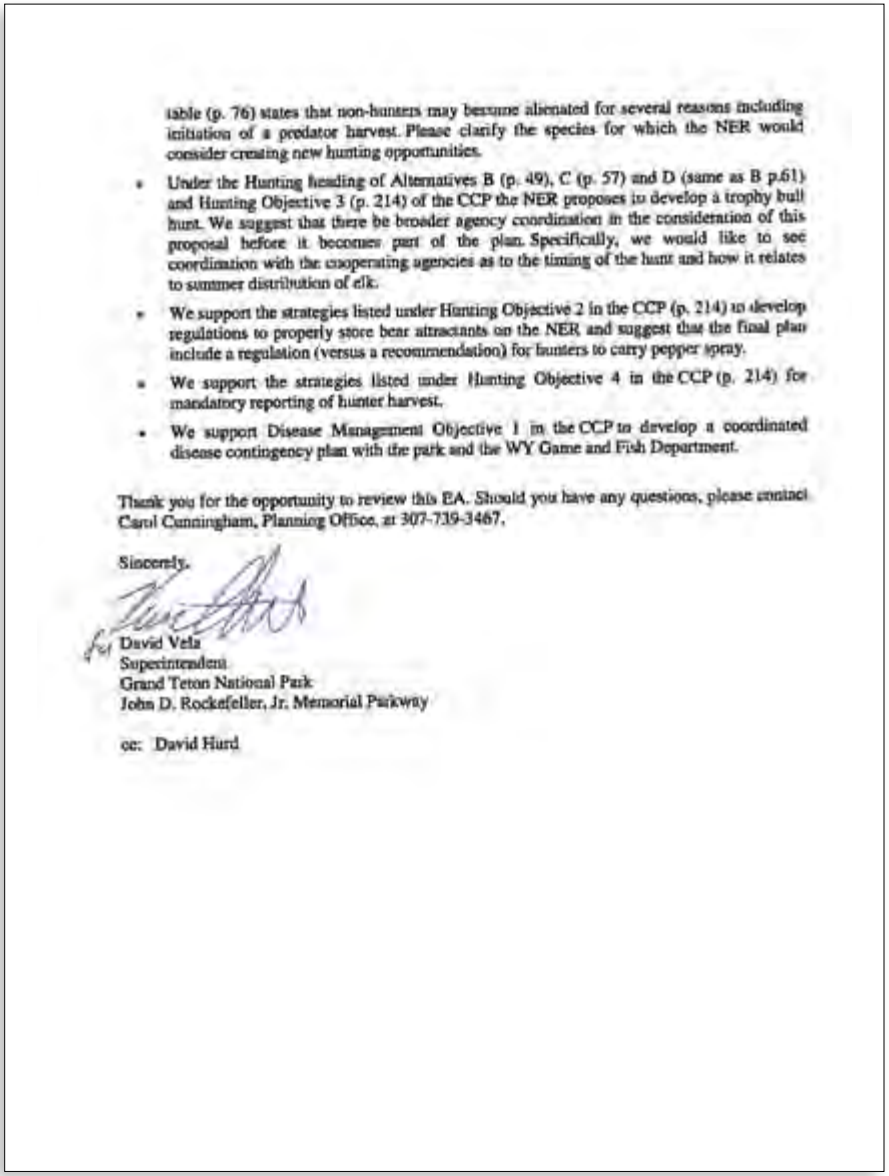
Comment number	LETTER #1—National Park Service, page 2 of 4	RESPONSE
1-7 1-8 1-9 1-10		However, additional hunting seasons could be considered in the future under the CCP. This would require the modification of the refuge's hunting plan and an opportunity for public comment. **1-7.** We agree that coordinating with land management agencies is necessary before developing a framework for new hunting opportunities. This process will occur before the Refuge Hunting Plan is updated. We have also removed all references to "trophy bull hunt" and instead used "bull hunt." **1-8.** Thank you for your support for developing regulations to properly store bear attractants. Grizzly bears (bears) were detected on the refuge during the 2013 hunting season for the first time since 1994. The refuge immediately took the following actions to reduce the potential for conflict between bears and hunters. ■ Bear sighting signs were posted at all refuge parking lots to notify hunters of recent bear activity. All hunters are required to start their hunt at a designated refuge parking lot. ■ Bear sighting news releases were sent to local and regional media. ■ "Bear Aware" information to help hunters avoid bear encounters was provided during programs at the Jackson and Greater Yellowstone Visitor Center, presented verbally to hunters, and posted on the refuge's Web site. ■ A recommendation for refuge hunters to carry bear spray was included in the refuge hunting brochure and posted on the refuge's Web site and on WGFD's Web site, where all hunters must visit to obtain a refuge hunting permit.

table (p. 76) states that non-hunters may become alienated for several reasons including initiation of a predator harvest. Please clarify the species for which the NER would consider creating new hunting opportunities.

- Under the Hunting heading of Alternatives B (p. 49), C (p. 57) and D (same as B p.61) and Hunting Objective 3 (p. 214) of the CCP the NER proposes to develop a trophy bull hunt. We suggest that there be broader agency coordination in the consideration of this proposal before it becomes part of the plan. Specifically, we would like to see coordination with the cooperating agencies as to the timing of the hunt and how it relates to summer distribution of elk.
- We support the strategies listed under Hunting Objective 2 in the CCP (p. 214) to develop regulations to properly store bear attractants on the NER and suggest that the final plan include a regulation (versus a recommendation) for hunters to carry pepper spray.
- We support the strategies listed under Hunting Objective 4 in the CCP (p. 214) for mandatory reporting of hunter harvest.
- We support Disease Management Objective 1 in the CCP to develop a coordinated disease contingency plan with the park and the WY Game and Fish Department.

Thank you for the opportunity to review this EA. Should you have any questions, please contact Carol Cunningham, Planning Office, at 307-739-3467.

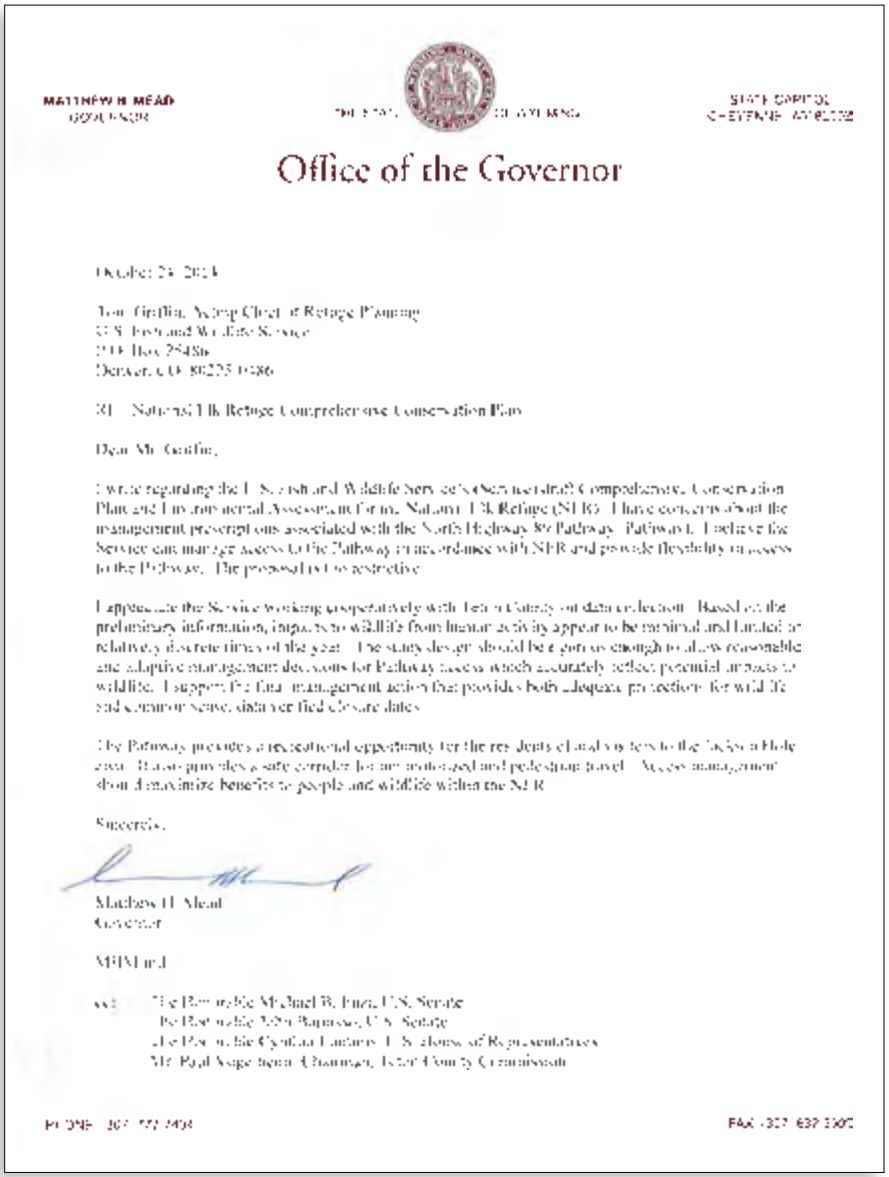
Sincerely,

for David Vela
Superintendent
Grand Teton National Park
John D. Rockefeller, Jr. Memorial Parkway

cc: David Hurd

Comment number	LETTER #1—National Park Service, page 3 of 4	RESPONSE
		The refuge also partnered with a nonprofit conservation organization to provide bear spray—free-of-charge—to all hunters who requested it. Hunters could also obtain free bear spray through a similar program with WGFD. All bear awareness programs from 2013 were continued in 2014 despite no evidence of bear use on the refuge. Bear awareness programs will continue in the future. The presence of bears on the refuge in 2013 is considered a significant development, and bear use of the refuge is anticipated in the future. Many close encounters between bears and people do not occur in open areas, but rather in dense brush or forests (Smith et al. 2008). The conventional advice of avoiding bear encounters by avoiding areas of poor visibility was affirmed by Smith et al. 2012. The refuge's open hunt area has primarily open and gently rolling topography. Approximately 97 percent of the hunt area habitat is open and affords good visibility, with less than 3 percent dense habitat with limited visibility. Because of the refuge's open terrain, the potential for a surprise encounter between grizzly bears and hunters is low. We are unaware of evidence that indicates that requiring hunters to "carry" bear spray increases the "use" of bear spray during bear encounters. There is clearly a difference between a hunter "carrying" bear spray and "using" bear spray during an encounter with an aggressive bear. A regulation requiring hunters to "carry" bear spray does not and cannot require that hunters "use" bear spray. Only information about the effectiveness of bear spray as a deterrent can convince

Comment number	LETTER #1—National Park Service, page 4 of 4	RESPONSE
		a person to "use" bear spray during an aggressive bear encounter. The refuge currently recommends that hunters "carry" bear spray and informs them of its history of effectiveness through informational materials and by providing free bear spray to hunters through a partnership with a nonprofit conservation organization. Requiring the carry of bear spray is not warranted at this time. The refuge will continue to monitor changes in bear use of the refuge and review new research concerning the use of bear spray by hunters and others. It will also attempt to gather information concerning hunter bear spray carry rates and attitudes concerning the use of bear spray. The refuge bear spray policy will be reviewed in 5 years instead of at the expiration of the CCP. If the potential for aggressive bear encounters with hunters increases and evidence of increased use of bear spray by hunters will result from a bear spray carry requirement, the refuge bear spray policy can be modified. **1-9.** Thank you for your support. **1-10.** Thank you for your support and insightful comments. We look forward to a continuation of our close relationship and coordination with the Grand Teton National Park.

Comment number	LETTER #2—Office of the Governor, page 1 of 1	RESPONSE
2-1		**2-1.** In order for compatible activities like wildlife viewing, wildlife photography, interpretation, and education to occur on the pathway, they cannot cause repeated disturbances to wildlife. The pathway season opening on May 1 (or as early as April 15) and closure on November 1 are both within approximately 2 weeks of typical migration and use of the area by elk and other species. The proposal does call for continued adaptive management by allowing for an adjusted season when spring green up and migration occurs earlier than average. Winter use of the pathway is not being considered because pedestrians illegally using the pathway and approaching the fence have caused noticeable and repeated disturbance to nearby elk, often causing the herd to bolt from the area and not return for up to 24 hours. Not only does this stress the wintering animals, but it decreases the amount of refuge areas available for use by elk. Were this to occur regularly during the winter months, the negative effects would be significant. In 2013, the seasonal dates were modified, expanding use by the public for an additional 31 days. The adjustment was based on extensive monitoring done in collaboration with Jackson Hole Community Pathways and Teton County. We have added as a strategy in CCP chapter 4 that seasonal dates may be adjusted prior to the 15-year expiration of the CCP if there are notable, significant effects in the area due to climate change or other factors over an extended number of years. The Service has used GPS collar data to assess when use and movement to and from the refuge occurs rather than relying solely on observations. Thank you for your comments.

MATTHEW H. MEAD
GOVERNOR

STATE CAPITOL
CHEYENNE, WY 82002

Office of the Governor

Comment number	LETTER #3—Wyoming Game and Fish Department, page 1 of 19	RESPONSE
3-1		**3-1.** Thank you for your comments. We have reproduced your comment form below and provided responses as appropriate. The planning team also read and considered the supplemental information you provided on the Jackson Lake Dam Mitigation Project.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 2 of 19	RESPONSE

Toni Griffin
October 9, 2014
Page 2 of 2 WER 12158

Encl: Comments on the Draft CPP
Info re Jackson Lake Dam Mitigation Project

cc: Doug Brimeyer, WGFD, Jackson/Pinedale Regions
Tom Fuchs, WGFD, Jackson Region
Rob Gipson, WGFD, Jackson Region
Susan Patla, WGFD, Jackson Region
Chris Wichmann, Wyoming Department of Agriculture, Cheyenne

Comment number	LETTER #3—Wyoming Game and Fish Department, page 3 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-2	xiii	Suggested edit: The last sentence should read "The Jackson core population area for greater sage-grouse as defined by the State of Wyoming Greater Sage-Grouse Core Area Protection Executive Order 2011-5 overlaps the refuge." Suggested addition: A map or figure within the CCP should depict this overlap so the reader can identify the boundaries. Maps and shapefiles available at http://wgfd.wyo.gov/web2011/wildlife-1000817.aspx.	**3-2.** We have revised the final CCP text as suggested. Regarding the figure, the maps and figures were not available at the URL cited.
3-3	xiii	Suggested addition: Flat Creek on the National Elk Refuge provides a walk in and trophy Snake River Cutthroat trout fishery. No stocking occurs in Flat Creek making natural recruitment the only source of native trout. Suggested edit: "The refuge is the terminus of seasonal migrations for four celebrated large mammal species." Suggested addition: Part of the Jackson bighorn sheep herd spends the winter on the refuge on Miller Butte and around Curtis Canyon and migrates to summer range in the Gros Ventre Mountains. Suggested edit: "Pronghorn summer on the refuge and winter south of Pinedale, Wyoming (more than 70 miles away), making one of the longest mammal migrations in the Western Hemisphere." [Several mule deer migrations have recently been discovered in western WY that are longer]	**3-3.** We have revised the final CCP as suggested.
3-4	xiv	Suggested addition: Flat Creek on the National Elk Refuge provides a walk in and trophy Snake River Cutthroat trout fishery. No stocking occurs in Flat Creek making natural recruitment the only source of native trout. Flat and Nowlin creeks and the Gros Ventre River are managed as wild Snake River cutthroat trout fisheries and are important habitat for other native fish species. Flat and Nowlin creeks are important spawning and recruitment streams for native trout.	**3-4.** We have revised the final CCP as suggested, with some small changes.
3-5	xiv	After mentioning elk, bison, pronghorn and Snake River cutthroat trout, it seems appropriate to add one final sentence: "The Flat Creek wetlands provide habitat for the highest density of nesting Trumpeter Swans in the Greater Yellowstone area."	**3-5.** We have revised the final CCP as suggested.
3-6	5	Pacific Flyway Management Plan for the Rocky Mountain Population of Trumpeter Swans should be listed in this section The NER is an important contributor to conservation efforts of the rocky mountain population of trumpeter swans	**3-6.** We have revised the final CCP as suggested.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 4 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-7	7	Suggested edit: Wyoming Greater Sage-Grouse Conservation Plan "The National Elk Refuge lies within the Jackson core population area of the greater sage-grouse as designated by the State of Wyoming Greater Sage-Grouse Core Area Protection Executive Order 2011-5 signed by Governor Matt Mead in June 2011. Executive Order 2011-5 was issued by Governor Mead to update the process and policy embodied in former Governor Dave Freudenthal's Executive Order 2008-2 and Executive Order 2010-4."	**3-7.** We have revised the final CCP as suggested.
3-8	24	Suggested edit: "The refuge is the terminus of seasonal migrations for four celebrated large mammal species." Suggested addition: Part of the Jackson bighorn sheep herd spends the winter on the refuge on Miller Butte and around Curtis Canyon and migrates to summer range in the Gros Ventre Mountains. Suggested edit: "Pronghorn summer on the refuge and winter south of Pinedale, Wyoming (more than 70 miles away), making one of the longest mammal migrations in the Western Hemisphere." [Several mule deer migrations have recently been discovered in western WY that are longer]	**3-8.** We have revised the final CCP as suggested.
3-9	26	Suggested edit: "Threats to wildlife associated with development include loss of habitat, habitat fragmentation, vehicle collision mortality, loss of wildlife migration routes, poaching…"	**3-9.** We have revised the final CCP as suggested.
3-10	28	Suggested edit: Remove sentence, "Although reduced reliance on supplemental feeding is an objective in the 2007 Bison and Elk Management Plan, feeding is often initiated earlier or terminated later than is biologically necessary to prevent the elk and bison from comingling with livestock on adjacent private lands." [As stated on page 115, the joint decision between the refuge and WGFD to initiate and terminate feeding is based on forage production, elk and bison numbers, timing of migration, winter temperatures, and snow conditions.] Suggested addition: Biologists from the refuge and WGFD evaluate several factors to decide whether feeding is needed, and if so, when it should begin and end. The feeding start date primarily depends on the amount of standing forage that is accessible to elk, which is influenced by (1) forage production the previous growing season, (2) elk and bison numbers, (3) the timing of migration, (4) winter temperatures, and (5) snow conditions. Feeding typically ends within 1 week of the first day that snow has completely melted on the southern end of the refuge. Suggested addition: Suggest noting that brucellosis seroprevalence rates of unfed bison in Yellowstone National Park fluctuate between 40-60% (Cheville 1998). Jackson bison herd seroprevalances is approximately 60%.	**3-10.** We have revised the final CCP as suggested.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 5 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-11	28-29	Suggested addition: Lists as a concern irrigation system expansion effects on hydrology, ground-nesting birds, and amphibians. Later in the document under native grassland habitat description additional information could be included in the document regarding the number of irrigated acres, and map showing location of irrigated acres.	**3-11.** Please see map on page 133 of the draft CCP (figure 11).
3-12	29	Suggested addition: The WGFD has statutory responsibility for damage caused by game birds and big and trophy game to private lands, and in FY12 paid nearly $750,000 in damage claims statewide. Wildlife damage management is a major component of the Department's wildlife management program.	**3-12.** Thank you for your comment.
	33	Paragraph 3 – WGFD is also a partner on the Flat Creek Enhancement Project	We have revised the final CCP to include WGFD in this paragraph.
3-13	37-59	Suggested addition (all alternatives): Streams should be added as a separate habitat type (i.e., water quantity management, channel types, hydrology, etc.) Please clarify in these alternatives whether or not irrigation will be increased/decreased to enhance management or to promote natural process.	**3-13.** Thank you for your comment. Please note that the text appearing in chapter 3 of the draft CCP and EA is not included in the final CCP; accordingly, edits to this text cannot be addressed in the final CCP.
3-14	39	Suggested edit: Remove cheatgrass from the list of invasive plants that are not noxious weeds. Cheatgrass is now recognized as a noxious weed by Teton County.	**3-14.** Please see the response to comment 3-13.
3-15	40	Suggested edit: "The refuge would continue to cooperate with the WGFD to monitor bighorn sheep and facilitate collection of biological samples during disease surveillance monitoring." Suggested edit: "The refuge would attempt to reduce brucellosis transmission from elk and bison to livestock by concentrating elk and bison…" The refuge would attempt to reduce brucellosis transmission from elk and bison to livestock by working with the WGFD to maintain adequate habitat on federal lands and to attract bison and elk away from conflict situations. The refuge would complete a contingency plan for chronic wasting disease…We suggest the Refuge defer to the Wyoming Game and Fish Department's CWD plan.	**3-15.** Regarding your first suggestion, please see the response to comment 3-13. Regarding your suggestion concerning the chronic wasting disease contingency plan, please note that all refuges complete a disease contingency plan that includes chronic wasting disease. The Wyoming State plan from 2007 is being updated at this time. We will continue to cooperate with WGFD on disease contingencies.
3-16	41	Suggested edit: "The refuge provides elk and bison hunting consistent with the Bison and Elk Management Plan, including (1) working with WGFD to adaptively modify elk and bison hunting seasons on the refuge to achieve herd objectives,…"	**3-16.** Please see the response to comment 3-13. We intend to work with WGFD to adaptively manage hunting seasons to achieve herd objectives.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 6 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-17	41	Second bullet: change spelling of "Burt" to "Bert" Raynes Boardwalk	**3-17.** Please see the response to comment 3-13. We have verified the spelling elsewhere in the final CCP.
3-18	46	Suggested edit: "The refuge would continue to support and take part in multi-agency wildlife work groups such as the Jackson Cooperative Elk Studies Group, the Upper Snake River Basin Sage Grouse Working Group,…"	**3-18.** Please see the response to comment 3-13.
3-19	47	"…we would consider partnership opportunities to build wildlife crossings for Highway 89 – such as under-road tunnels, overpasses, or fences…" Wildlife crossings would have to be designed to prevent elk and bison from leaving the refuge to private lands during the winter spring and summer. The Department has concerns regarding the potential to funnel animals off public land and onto private where the potential for conflict is higher. Options to facilitate animal movements off the Refuge should be vetted through the Game and Fish Department, the various land management agencies and private land owners.	**3-19.** We will collaborate with WGFD on wildlife crossings.
3-20	48	Clarification needed: The proposed comprehensive disease contingency plan would only apply to elk and bison on the refuge; the State already has Management Plans for chronic wasting disease and brucellosis. The State would consider input from the Refuge but will likely not follow a federal plan when elk and bison are outside of the refuge or Grand Teton National Park. We are willing to coordinate on this, but recommend it be removed from the CCP and defer decisions regarding disease to the WGFD.	**3-20.** Please refer to Disease Management, chapter 3, page 40, of the draft CCP. There is no intention to commit the State to follow the refuge disease contingency plan.
3-21	49	Clarification needed: "Staff would develop management tools for assessing hunter use – such as hunter checkpoints, hunt success surveys…." Need clarification on whether this would be for bison or elk or both? WGFD already requires that all bison hunters submit a post-hunt survey and the agency conducts a post-hunt survey to estimate elk harvest. If hunter checkpoints are developed and mandatory harvest checks are required, will Refuge staff and the Refuge Office manage the volume of hunter contacts this service would create? We recommend the Refuge defer the hunter contacts and harvest estimates to the WGFD	**3-21.** The refuge will assume the burden of management tools to improve the hunt program.
3-22	50	"require commercial guides to kill non-native trout" – suggest revising to "encourage guides and their clients to harvest non-native trout within creel limits and provide educational materials to guides and their clients on threats to native trout." This would allow increased education on why harvest is being encouraged.	**3-22.** Please see the response to comment 3-13. Elsewhere in the final CCP we have made it clear that we will encourage, not require, removal of nonnative trout. We do, however, retain the right to require removal if warranted by future conditions.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 7 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-23	50,57	Suggested addition: With the increased use of drones in Yellowstone and Grand Teton we suggest the refuge address the use of drones for wildlife photography and hunting.	**3-23.** This issue is being addressed at the national level. We currently do not allow the use of drones due to wildlife disturbance issues.
3-24	55	"The refuge would seek to expand the approved acquisition boundary to include the Twin Creek and Spring Gulch areas, which would provide another tool to resolve off-refuge land use that conflicts with refuge resource protection." The Department supports efforts to consolidate management boundaries along the east side of the Refuge. The WGFD is required to prevent comingling between elk, bison, and livestock and has statutory responsibility for damage caused by big game. The Spring Gulch area includes several traditional agricultural operations and if the refuge acquired lands in Spring Gulch as off-refuge wintering areas for elk and/or bison, damage and comingling incidents would likely be exacerbated in this area.	**3-24.** No easement would be fee title. The primary purpose of the easements would be to reduce the likelihood of comingling between livestock and wildlife.
3-25	56	An evaluation of the level of fish entrainment in ditches, especially South Park supply, should be included. Screening ditches is an expensive project and determining if screening is necessary should be completed prior to any screening.	**3-25.** Please see the response to comment 3-13. If screening is determined to be beneficial and cost-effective, we will work towards installing and use.
3-26	56	Suggested edit: Remove cheatgrass from the list of invasive plants that are not noxious weeds.	**3-26.** Please see the response to comment 3-13.
3-27	56	Suggested addition: The refuge should develop a Habitat Management Plan that prioritizes areas for treatments with prescribed fire and/or wildland fire. The refuge should consider additional habitat treatment tools, including mechanical.	**3-27.** We will complete a fire management plan.
3-28	56	Suggested edit: "Important aspects of wildlife management would be maintaining long-distance ungulate migrations and ~~a full suite of~~ native large carnivores." ["A full suite" implies that the refuge will manage for grizzly bears. There is no other mention in the document of this intent.]	**3-28.** Management actions may occur for any species occurring on the refuge.
3-29	56	An evaluation of the level of fish entrainment in ditches, especially South Park supply, should be included. Screening ditches is an expensive project and determining if screening is necessary should be completed prior to any screening.	**3-29.** Please see the response to comment 3-25.
3-30	57	Majority of this paragraph relates to Aquatic Species Management section – suggest moving. Including angler education on threats to native trout and other native fish species, encouraging harvest of non-native trout would be better to include in this section.	**3-30.** Please see the response to comment 3-13.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 8 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-31	59	Native Grasslands and Sagebrush Shrublands: should include how many acres of grasslands will be irrigated under this alternative Riparian Woodlands: refer to the mitigation measures from the Bison/Elk plan for woodland restoration.	**3-31.** The number of irrigated acres varies annually. The maximum capacity for the system is 4,500 acres at any one time.
3-32	59	Suggested additions: Add following the Bison and Elk Management Plan as an emphasis. Add manage for migratory birds and native aquatic species. Suggested edit: "An adaptive management approach on the Refuge would be used to evaluate hunting seasons on long-distance migratory elk."	**3-32.** The CCP does not address the Bison and Elk Management Plan (FWS and NPS 2007a) or the adaptive management plan process.
3-33	60	An evaluation of the level of fish entrainment in ditches, especially South Park supply, should be included. Screening ditches is an expensive project and determining if screening is necessary should be completed prior to any screening.	**3-33.** Please see the response to comment 3-25.
3-34	60	Migratory Birds: provide more specific details on how monitoring efforts for migratory birds would be increased. Add Heading "Trumpeter Swan and other Waterfowl" which specifies monitoring and management actions.	**3-34.** This will be addressed in the inventory and monitoring plan.
3-35	60	Wildlife Observation and Photography: in addition to creating a more accessible route to the Bert Raynes wildlife viewing platform and a boardwalk/photographic blind at the Visitor Center, water quality issues need to be addressed including the amount and timing of water flow into the ponds and marsh habitat at the center. Habitat quality has decreased in recent years with terrestrial vegetation becoming established where wetland plants existed.	**3-35.** Thank you for your comment on the Bert Raynes platform. We do not have plans to actively manage these areas and will allow for natural succession, which offers opportunity for environmental education and interpretation.
3-36	61	Hunting - Management actions would be the same as Alternative B. – When referring back to Alternative B it states at that management actions will be the same as Alternative A. Alternative A states that (3) prohibit the hunting of any other wildlife species other than elk and bison. We support alternative D and the narrative language referred to in Alternative B expanding hunting opportunities for youth hunters and for other species on the Refuge specifically for waterfowl hunting. We do not support a ceremonial bison hunt above 5 bison.	**3-36.** Thanks for your comment. In accordance with the Bison and Elk Management Plan, there is no intention of increasing ceremonial bison harvest to more than five bison.
3-37	65	Suggested edit (Alternative A): "There would be increased wintering and nesting habitat for greater sage grouse, but a decline in ~~lek sites and~~ brood-rearing habitat." [What evidence is there that current management will lead to loss of leks?]	**3-37.** Alternative A predicts an increase in sagebrush density and cover. Leks typically require some open space.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 9 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-38	70	Alternative A – Also include: Targeting rainbow trout and rainbow-cutthroat trout hybrids for removal in Gros Ventre River. Brook trout removal is conducted in Flat and Nowlin creeks.	**3-38.** Thank you for your comment.
3-39	70	Alternatives C and D – Evaluation of fish entrainment in ditches should be done prior to screening to determine if there is a need.	**3-39.** Please see the response to comment 3-25.
3-40	71	Alternatives C and D – Screening of ditches and increased maintenance costs to WGFD – If screening was determined to be necessary, WGFD would be a partner in the process but not sure how that would effect our costs for maintenance.	**3-40.** Thank you for your comment.
3-41	71	Alternatives C and D – Removal of non-native trout should not noticeably reduce fishing opportunity. Having fewer brook trout present may actually increase numbers of native trout.	**3-41.** Thank you for your comment.
3-42	71	Suggested edit (Alternative A): "Coordinate with WGFD on bighorn sheep disease surveillance and to detect sick bighorn sheep." Recommend that references to a disease contingency plan defer to the WGFD disease plans. Suggested edit (Alternative A): "Concentrate elk and bison on the refuge during February and March by providing adequate habitat to prevent comingling and the potential transmission of brucellosis to livestock."	**3-42.** The refuge disease plan will be developed in collaboration with WGFD. Please note that the text appearing in chapter 3 of the draft CCP and EA is not included in the final CCP; accordingly, this suggestion cannot be addressed in the final CCP.
3-43	72	Last paragraph under Alternative A: "possibly limit management activities in swan and curlew habitat". Recommend this be carried over into preferred alternative also.	**3-43.** It is carried over.
3-44	73	Alt C listed species: environmental consequences: it is not clear why Trumpeter Swan productivity would be substantially lower than alternative B as management actions listed under Wetlands are the same for Alternative D and B. These include improved water control structures and more ponds.	**3-44.** Alternative B has more active management.
3-45	73	Clarification needed (Alternative A): Alternative A states that "This alternative would have the greatest potential to support greater sage-grouse." However, the habitat treatments in alternatives C and D could be equally or more beneficial for sage grouse if they are designed to improve the sagebrush understory for brood-rearing habitat and protect mature sagebrush stands. We suggest removing this statement from Alternative A.	**3-45.** Research suggests that wintering habitat is the limiting factor in the population.
3-46	75	Suggested edit: "Work with WGFD to adaptively revise elk and bison hunting regulations on the refuge to achieve herd size objectives." We support efforts to allow hunting for other species and think hunting of migratory waterfowl could be addressed in Table 4.	**3-46.** Alternative B is the same as alternative A except we will consider other hunting opportunities.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 10 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-47		Clarification needed (Alts. B, C, D): "Conduct hunter check points, surveys, and mandatory reporting of tag use to better manage hunting." [The WGFD created the Hunter Management program in part to reduce the work load of NER staff and to address the USFWS confidentiality concerns the NER had regarding maintaining a file of hunter information. Which agency or agencies would staff hunter checkpoints? WGFD already has mandatory reporting for bison harvest and a post-hunt elk harvest survey.]	**3-47.** Hunter check points, surveys, and reporting would not commit WGFD to any additional work. We will continue to collaborate as needed to improve the hunting program.
3-48	76	Suggested edit (Alt. A): "There would be insufficient elk harvest on the refuge to meet winter distribution objectives of the Bison and Elk Management Plan." [Incorrect as written. We have achieved the 11,000 elk post-hunt population objective, but not the goal of 5,000 elk on the refuge. If we can continue to achieve a reduction in the bison population by 25-50 animals/year, we would achieve the 500 objective within 15 years.] Clarification needed (Alt. C): "Nonhunters might be alienated because of more visible harvest in opened areas near Jackson, a bull elk harvest, and a predator harvest." Why is the document referring to predatory species? The Refuge is not included in the Department's trophy game seasons and the word "predatory" is confusing because predatory animals are defined by W.S. 23-1-101 and include: coyote, red fox, etc. that do not require a license or a hunting season. Suggested edit (Alt. B): "Encouraging use of bear spray could…" [Alternative B does not require use of bear spray by hunters.]	**3-48.** Please note that the text appearing in chapter 3 of the draft CCP and EA is not included in the final CCP; accordingly, this suggestion cannot be addressed in the final CCP. Additionally, the edit shown in the second sentence is outside the scope of the CCP and is already addressed in the Bison and Elk Management Plan. In the final CCP, the phrases "predator hunts" and "predatory hunts" are not used.
3-49	77	Alternative A – Lower Nowlin Creek and Lower Flat Creek are also open to fishing.	**3-49.** This is posted on the ground where fishing is open and closed.
3-50	78	Wildlife Observation and photography actions: Correct name from "Burt" to "Bert" Raynes here and throughout document. Include assessment of hydrology at visitor ponds and wetlands at visitor center and enhancement of water flow to wetlands and ponds where visitor access will be improved.	**3-50.** The spelling of Bert Raynes has been corrected in the final CCP. Regarding the hydrology assessment, thank you for your comment. Natural succession will provide opportunities for environmental education and interpretation.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 11 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-51	83	Suggested addition: Special uses – actions Alt. B, C, D The Proposed Action should include language that ensures SUPs issued in sage-grouse core area are vetted for compliance with E.O. 2011-5 with appropriate stipulations applied. Suggested edit: "Most sagebrush plant communities on the refuge fall within the greater sage-grouse core area as defined by the State of Wyoming Greater Sage-Grouse Core Area Protection Executive Order 2011-5."	**3-51.** The word "vetted" implies permission. We will continue to work with WGFD and the local sage-grouse working group. We have revised the final CCP as suggested.
3-52	110	Suggested edit: "Most sagebrush plant communities on the refuge fall within the greater sage-grouse core area as defined by the State of Wyoming Greater Sage-Grouse Core Area Protection Executive Order 2011-5."	**3-52.** We have revised the final CCP as suggested.
3-53	111	Suggested edit: "Findings by Keigley et al. (2009) suggest that limited-scale regeneration of aspen has occurred on the northernmost parts of the refuge since 2005. Possible but untested explanations of this regeneration include changes in ungulate distributions or migration patterns, changes in ungulate numbers, changes in precipitation and snow accumulation patterns, or some combination of these factors." [The original explanations listed are too narrow and speculative and one is not supported by scientific consensus.]	**3-53.** We have revised the final CCP as suggested but omitted this phrase: "changes in precipitation and snow accumulation patterns."
3-54	112	Clarification needed: "Riparian area restoration would be designed to modify bank and streambed structure and would not address ungulate browsing of willows or facilitate their recovery." [This statement is not in line with the Flat Creek Enhancement Project. The refuge has agreed to use hunter management to discourage browsing and to test tools that will exclude ungulate browsing such as fencing.]	**3-54.** To date, the only strategy shown to be effective in promoting willow regeneration on the south end of the refuge is exclusion of ungulates. Small-scale fencing with corral panels and large-scale fencing with big-game fence are the most effective means. The experimental jackstraw approach is not practical on a large scale. Ungulate exclosures are planned for this area under the Bison and Elk Management Plan, but their exact locations and construction timing will be determined in the habitat stepdown management plan.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 12 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-55	115	Suggested edit: "The 2014 winter population classification count for the Jackson elk herd was 11,423 animals (A. Courtemanch, biologist, WGFD, Jackson, Wyoming, personal communication, 2014). This is within 5% of the State's population objective of 11,000 for the herd size." A herd is considered at objective if the population estimate is within + 20% of the post-season objective. Suggested addition: The winter distribution of elk, including how many are on feed on the refuge is heavily influenced by annual snow conditions.	**3-55.** We have revised the final CCP as suggested.
3-56	115	Suggested edit: Update table with 2014 information as follows: National Elk Refuge on feed = 8,296, Gros Ventre drainage = 2,377, Other winter range = 750, Total = 11,423. Update averages column.	**3-56.** We have revised the final CCP as suggested.
3-57	118	"The State has jurisdiction over bison from the Jackson wild bison herd in "all lands in Lincoln, Sublette and Teton Counties west of the Continental Divide, excluding Grand Teton National Park, Yellowstone National Park and the National Elk Refuge." This statement needs to be clarified in the document. The National Elk Refuge is defined as a portion of Wild Bison Area 2 in the Wyoming Game and Fish Commission regulation Chapter 15, Wild Bison Recreational Hunting Season. In addition, the Wyoming Game and Fish Commission and Wyoming Livestock Board, Chapter 41 Bison Designated as Wildlife further defines the "Jackson wild bison herd area" as all lands in Lincoln and Sublette counties and Teton County west of the Continental Divide, excluding Grand Teton National Park and Yellowstone National Park. Suggested edit: "Bison are counted annually on the refuge in the winter and in the park in the summer. WGFD also conducts annual aerial surveys of bison on native winter range."	**3-57.** The wording in the CCP is consistent with the Bison and Elk Management Plan approved in 2007. WGFD was a cooperating agency in the development of that plan and was provided multiple opportunities to review it during the planning process. We have revised the final CCP as suggested.
3-58	119	Suggested edit: "As of winter 2014, there were approximately 825 bison in the Jackson herd." Suggested edit: "We are offering a 157-day season in 2014-2015, from August 15 through January 18." Suggested edit: "The bison winter population has been reduced from approximately 1,250 in 2007 to approximately 825 in 2014."	**3-58.** We have revised the final CCP as suggested.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 13 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-59	121	Suggested addition: The herd has undergone two pneumonia outbreaks in the last 15 years, the first in 2001/2002 and the second in 2011/2012. The most recent outbreak resulted in an approximately 30% population reduction.	**3-59.** We have revised the final CCP as suggested.
3-60	121	Suggested edit: "The Jackson moose herd was an estimated 500 animals in winter 2014."	**3-60.** We have revised the final CCP as suggested.
3-61	121	Suggested edit: "The gray wolf now falls under the management authority of WGFD…" [Need to remove all language in this section regarding State management of gray wolves due to the recent court decision. Move all wolf sections to Federally and State-Listed Species sections.]	**3-61.** We have revised the final CCP to reflect management of this species.
3-62	124	Suggested addition: Include data from past refuge monitoring efforts for nesting waterfowl and raptors. These data should be referenced and used in this document. Periodic repeats of these monitoring efforts could provide comparisons to baseline data and help evaluate management actions. Partnerships and grants might be used to provide funding and volunteers for such efforts.	**3-62.** We do not have specific population objectives.
3-63	124	References from Craighead Beringia South and GTNP indicate that common raven populations are very high on the refuge.	**3-63.** Thank you for your comment.
3-64	127	1) Should include separate section on Trumpeter Swan and waterfowl and provide datasets available on refuge populations. Technically, the term "waterbirds" does not include waterfowl. Need to highlight the importance of the refuge for nesting swans as the refuge produces over 40% of the production of this rare species in the Snake River drainage (core area) of WY. Could also include some of the history of management of this species. 2) Virginia Rail-missing from list and also from species table end of document	**3-64.** Comment noted.
3-65	129	Change title of section "Federally and State-listed Species" top "Federally listed Species and State Species of Greatest Conservation Need". WY does not have "listed" species. This is confusing the way it is written. Also State Wildlife Action Plan should be in capital letters.	**3-65.** We have revised the final CCP as suggested.
3-66	131	Use the correct name for the swan management plan: Pacific Flyway Management Plan for the Rocky Mountain Population of Trumpeter Swans Correct term: tri-State to "Tri-state"	**3-66.** We have revised the plan name in the final CCP as suggested.
3-67	131	Change "species of concern" to "species of greatest conservation need" Should mitigation measures for curlew be put into Table 4?	**3-67.** We have revised the final CCP as suggested, although table 4 of the draft CCP no longer appears in the final CCP.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 14 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-68	139	Suggested edit: "From 2007 to 2011, WGFD issued an average of 3,724 hunting licenses for the Jackson elk herd, with an average of 1,465 elk harvested each season. In 2013, WGFD issued 3,082 licenses and 1,481 elk were harvested. Of that total, 186 were harvested on the refuge." [The previous information was outdated.]	**3-68.** We have revised the final CCP as suggested.
3-69	140	Suggested edit: "Hunting on the refuge and the elk reduction program in Grand Teton National Park, along with harvest in Bridger-Teton National Forest and on non-Federal lands, takes place from late September to mid-December."	**3-69.** We have revised the final CCP as suggested.
3-70	155	First mention of irrigation system recently established on the refuge: this info should be presented earlier in document under description of refuge.	**3-70.** The irrigation system is mentioned first on page 27 of the draft CCP and on page 27 of the final CCP.
3-71	161	Suggested edit (Alternatives C and D): "The effects on greater sage-grouse habitat and elk and bison distribution could be greater than alternative B. However, the core area policy for greater sage-grouse is to mitigate activities in the core area, and if the proposed management action complies with Executive Order 2011-5 process and stipulations, adverse affects on greater sage-grouse would be avoided."	**3-71.** Please note that the text appearing in chapter 5 of the draft CCP and EA is not included in the final CCP; accordingly, edits to this text cannot be addressed in the final CCP.
3-72	168	Suggested addition: Mention the collaboration between the refuge, WGFD, USFS and GTNP on research and monitoring through the Jackson Cooperative Elk Studies Group.	**3-72.** Thank you for your comment.
3-73	170	Suggested edit: "Both historically and presently, elk harvest on the refuge has been insufficient to meet winter distribution objectives of the Bison and Elk Management Plan." [Incorrect as written. We have achieved the 11,000 Jackson elk herd objective, but not the goal of 5,000 elk on the refuge. If we can continue to achieve a reduction in the bison population by 25-50 animals/year, we would achieve the 500 objective within 15 years.] A herd is considered at objective if the population estimate is within + 20% of the post-season objective.	**3-73.** Please see the response to comment 3-48.
3-74	171	Suggested edit: "We may alienate some nonhunters with the more visible archery harvest in currently closed areas, a bull harvest that includes a trophy value, or the harvest of predatory species such as mountain lion." [Why is the document referring to predatory species? The Refuge is not included in the Departments trophy game seasons and the word "predatory" is confusing because predatory animals are defined by W.S. 23-1-101 and include: coyote, red fox, etc. that do not require a license or a hunting season.	**3-74.** See response to comment 1-6. All references to the hunting of predators have been removed from the final CCP.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 15 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-75	185	Suggested edit: Remove sentence, "Bighorn sheep close to the road could increase the potential for disease transmission to livestock or vice versa or lead to the spread of disease among the bighorn sheep herd itself." [It is questionable how bighorn sheep along the road come into contact with livestock. There is no evidence that densities of bighorn sheep along the road are any higher than on native range, thus this does not support the notion that disease would spread more among the herd.]	**3-75.** Bighorn sheep may experience indirect contact through exposure to equipment used to transport livestock.
3-76	186	Suggested edit: "Reducing dust abatement on Elk Refuge Road would decrease the attractiveness of the road to bighorn sheep, which would reduce potential conflicts with humans and vehicles ~~and reduce the likelihood of disease transmission in the herd and with domestic livestock~~." [See reasoning in above comment]	**3-76.** Thank you for your comment. Please note that the text appearing in chapter 5 of the draft CCP and EA is not included in the final CCP; accordingly, edits to this text cannot be addressed in the final CCP.
3-77	199	Suggested addition: As part of the long-term monitoring, stream temperatures and irrigation returns should be included.	**3-77.** Thank you for your comment.
3-78	199	"Collect long-term monitoring data for key habitats and wildlife populations, focusing on surrogate species when possible." During other interagency meetings the use of surrogate species to monitor ecosystem health has been contested. We suggest working with the WGFD to monitor species with emphasis on species of greatest conservation need.	**3-78.** We already monitor WGFD species of concern. Monitoring surrogate species does not preclude that. The criteria for choosing each is different.
3-79	200	"Wildlife often travel across administrative boundaries to meet their seasonal life cycle needs. Protection of off-refuge resources would help meet these seasonal wildlife needs." The WGFD is required to prevent comingling between elk, bison, and livestock and has statutory responsibility for damage caused by big game. Many off-refuge areas include traditional agricultural operations. If the refuge acquired lands in these areas to serve as off-refuge wintering areas for elk and/or bison, damage and comingling issues would likely be exacerbated.	**3-79.** The refuge will not own anything in fee title. Please see the response to comment 3-24.
3-80	201	"Set up a program with the Jackson Hole Land Trust and others to establish conservation easements with refuge-specific conservation goals." See above comment. WGFD would be especially concerned about holding elk in the Spring Gulch area during the spring summer and winter periods. "Consider partnership opportunities to build wildlife crossings for Highway 89." Same as our previous comments. Wildlife crossings would have to be designed to prevent elk and bison from leaving the refuge to private lands during the winter spring and summer. The Department has concerns regarding the potential to funnel animals off public land and onto private where the potential for conflict is higher. Options to facilitate animal movements off the Refuge should be vetted through the Game and Fish Department, the various land management agencies and private land owners.	**3-80.** The strategy of the draft easement criteria was developed in collaboration with WGFD, and we will continue to work with WGFD.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 16 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-81	201	"Within 10 years, evaluate the effects of the potential sale of Wyoming State trust lands and Wyoming Game and Fish Commission-owned lands near the refuge and consider protection options." It is unclear in the planning document which lands are identified as needing protection. We understand the importance of simplifying boundary lines and recommend the land parcels be identified and the State Land Board and Wyoming Game and Fish Commission are included when proposed protection measures are evaluated.	**3-81.** We have updated Landscape-Scale Conservation Objective 5 to identify lands potentially in need of protection.
3-82	202	Suggested edit: Remove the strategy, "Use wildland fire to help accomplish the objective and reduce hazardous fuel." [This strategy doesn't make sense since the objective is to manage tall, dense sagebrush and assure no net loss of mature sagebrush.] Recommend replacing with, "Use prescribed fire and/or mechanical methods to reduce hazardous fuels in targeted areas to protect mature sagebrush stands from wildfire." Suggested edit: "The Upper Snake River Basin Sage-Grouse Conservation Plan (WGFD 2014) recommended…" [Need to update citation here and in bibliography with newest version of the plan]	**3-82.** Thank you for your comment. Regarding the sage-grouse conservation plan, we have revised the final CCP as suggested.
3-83	203	Reducing water level in spring would impact swan nesting habitat. Replace with drawn-downs in fall through winter and then refill in time for spring nesting season. This has been extremely successful at Seedskadee NWR.	**3-83.** Water levels are manipulated with consideration toward nesting swans.
3-84	203	Need to review mitigation project documents for Jackson Lake Dam that included improvements and construction of wetlands at Pierre Ponds. (See attached documents). If replacement of ponds is necessary these ponds need to be constructed in a site that would provide additional nesting habitat. Given the territorial behavior of nesting swans, additional ponds in the Romney area would likely not support an additional nesting pair. More summer habitat is needed for nesting and subadult summering swans at another location. Other areas such as the Flat Creek wetlands north of the Fish Hatchery should be evaluated and considered for wetland projects. The CCP should specify the acreage for the two new ponds proposed also.	**3-84.** A review of mitigation project documents for Jackson Lake Dam shows the USFWS has fulfilled its commitment and no further mitigation is required. Because mitigation wetlands are continually damaged by natural river channel changes, the refuge may consider constructing wetlands in other areas less susceptible to damage. Offsite mitigation is no longer allowed on refuge system lands by policy. The hatchery area contains conflicts with other resources and would likely not be suitable for wetland projects.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 17 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-85	204	Suggested addition: Add strategy to consider planting willows within fenced exclosures to speed restoration.	**3-85.** We have revised the final CCP as suggested.
3-86	204	Suggested edit: "For the life of the plan, maintain or increase the acreage of class 1 and 2 condition willows, cottonwood, and aspen." Suggested edit: "…maintaining high hunting pressure on the northern end of the refuge, hazing elk and bison off the refuge during the summer, and using exclosure fences ~~and encouraging wolf activity on the northern end of the refuge~~." "encouraging" wolf activity is a meaningless management action.	**3-86.** Regarding this first edit, we have revised the final CCP as suggested. Regarding this second edit, we have revised the final CCP as suggested but with minor changes.
3-87	206	Suggested addition: Aside from consideration for removal of invasive plants, the strategy should at least commit to treating to control the spread of invasive plant species to additional areas. Suggested edit: Remove cheatgrass from the list of invasive plants that are not considered noxious weeds. It is now listed as a noxious weed by Teton County.	**3-87.** We have revised the final CCP as suggested by both of these edits.
3-88	207	Include language that acknowledges coordination with WGFD to monitor swans and long-billed curlews since this has been ongoing for many years and will likely help the Refuge meet monitoring goals in the future. Also recommend including a strategy to repeat raptor nesting survey at specified intervals.	**3-88.** We have revised the final CCP as suggested, with the exception of the raptor nesting survey. That survey will be considered in the inventory and monitoring plan.
3-89	208	"Within 5 years, develop a comprehensive disease contingency plan in coordination with WGFD and Grand Teton National Park." The proposed comprehensive disease contingency plan would only apply to elk and bison on the refuge; the State already has Management Plans for chronic wasting disease and brucellosis. The State could not be held to following a federal plan when elk and bison are outside of the refuge or Grand Teton National Park. We are willing to coordinate on this, but recommend it be removed from the CCP and that the refuge refer to the WGFD disease plans.	**3-89.** Please see the response to comment 3-20.
3-90	210	Suggested edit: "Cooperate with WGFD to develop hunting season proposals for the refuge."	**3-90.** Please see the response to comment 3-16.
3-91	213	Suggested edit: We would like to see more flexibility identified for bison and elk hunting areas. Adaptively managing areas open to hunting bison and elk will help the agencies respond to distribution shifts in the future.	**3-91.** This issue will be addressed in the stepdown hunting plan.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 18 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-92	214	Suggested edit: Remove the bullet, "Develop an antler point restriction to make sure only mature bulls are harvested." We prefer that the document not identify management options for hunting seasons. The formulation of specific hunt recommendations can occur annually as the agencies adaptively manage populations through hunting season recommendations. Recommendation spelled out in the CCP may limit the agencies in the future.	**3-92.** We have revised the final CCP as suggested.
3-93	214	Clarification needed: "Work cooperatively with WGFD to develop hunter checkpoints and hunter success surveys." Need clarification on whether this would be for bison or elk or both? If hunter checkpoints are developed, which agency or agencies would staff these? WGFD already conducts a mandatory survey for bison harvest and a post-hunt survey for elk harvest. See previous comments. "Consider requiring mandatory reporting of elk tag use and harvest." Already have this in place for bison. If implemented for elk, which agency(ies) would be responsible for contacting hunters? Suggested edit: "Our current tools provide only minimum estimates of elk harvest ~~and do not provide any data about elk hunter success or tag use on the refuge~~." [Bison harvest reports are mandatory from every hunter and WGFD follows up on cards that aren't turned in. The WGFD post-hunt elk hunter survey provides a statistically valid estimate of hunter participation and harvest on the refuge.]	**3-93.** Regarding checkpoints and surveys, please see the response to comments 3-21 and 3-47. Regarding mandatory reporting, we understand that WGFD results are valuable, but the refuge may want to supplement information with refuge-specific and real-time data.
3-94	215	Suggested edit: "Coordinate with WGFD and Wyoming State Board of Outfitters and Guides. " Develop guidelines for outfitters to follow in an effort to minimize conflicts with unguided permit holders.	**3-94.** We have revised the final CCP as suggested.
3-95	215	Rationale – "By encouraging anglers to harvest all nonnative trout they catch…" Suggest rewording "By encouraging anglers to harvest nonnative trout within creel limits…"	**3-95.** We have revised the final CCP as suggested.
3-96	216	Rationale – "By encouraging anglers to harvest all nonnative trout they catch…" Suggest rewording "By encouraging anglers to harvest nonnative trout within creel limits…"	**3-96.** We have revised the final CCP as suggested.
3-97	219	Suggested edit (2nd bullet, 5th sub-bullet): "ceremonial tribal bison hunt up to 5 bison	**3-97.** We have revised the final CCP as suggested.
3-98	219-220	Clarification needed: Please clarify whether or not habitat improvement projects implemented with project partners will continue to need a special use permit.	**3-98.** Yes, these projects will continue to require a special use permit.

Comment number	LETTER #3—Wyoming Game and Fish Department, page 19 of 19		RESPONSE
	Page	*Comment/Suggested Revision*	
3-99	222	Clarification needed (1st bullet): "Revise hunt area boundaries." We support modifying areas open to hunters within the area designated as Hunt Area 77 the National Elk Refuge. Suggested edit: "Revoke refuge access permits when safety violations occur…" [The way it is currently written suggests the refuge would revoke hunting licenses, which is the WGFD's jurisdiction]	**3-99.** The CCP is specific to the refuge unless otherwise specified, so no further clarification would be needed. We will retain the right to deny access to the refuge. We are not referring to licenses issued by the State.
3-100	222	Suggested addition: Recommend conducting all of these strategies in coordination with WGFD.	**3-100.** The refuge has a long history of communicating and coordinating with WGFD. We will continue to do so when appropriate.
3-101	226	Suggested edit: Recommend removing comprehensive disease contingency plan from the table. If it will not be removed, change planned completion date to 2015 or later.	**3-101.** We have revised the final CCP to indicate a completion date of 2016.
3-102		Aquatic Invasive Species are generally not addressed in the planning document. Flat Creek, Nowlin Creek, and Gros Ventre River have a lot of use by bank anglers, many who are from across the US, or from other countries. Strategies to educate anglers on AIS should be identified in the document. There are tanks for cleaning wading and fishing gear at the Flat Creek access gates, but information is largely unavailable at access points along the Gros Ventre River.	**3-102.** Aquatic invasive species are an important issue to all. We will continue to work with WGFD, NPS, and the USDA Forest Service to improve education and outreach related to aquatic invasive species.

Comment number	LETTER #4—Teton Board of Commissioners, page 1 of 2	RESPONSE

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TETON COUNTY WYOMING

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Barbara Allen
Ben Ellis
Paul Vogelheim

October 27, 2014

Joni Grillin, Acting Chief of Refuge Planning
U.S. Fish and Wildlife Service
PO Box 25486
Denver, Co 80225-0486

Dear Acting Chief Grillin:

The Teton County Board of County Commissioners offers the following comments for the U.S. Fish and Wildlife Service's (Service) draft Comprehensive Conservation Plan and Environmental Assessment (CCP) for the National Elk Refuge (NER).

The Board commends the National Elk Refuge on the process it has followed in the preparation of the draft Comprehensive Conservation Plan and Environmental Assessment.

The Board strongly supports the National Elk Refuge's commitment to coordinated management of federal lands in the Greater Yellowstone Ecosystem on a landscape scale, consistent with the mission of the Refuge System.

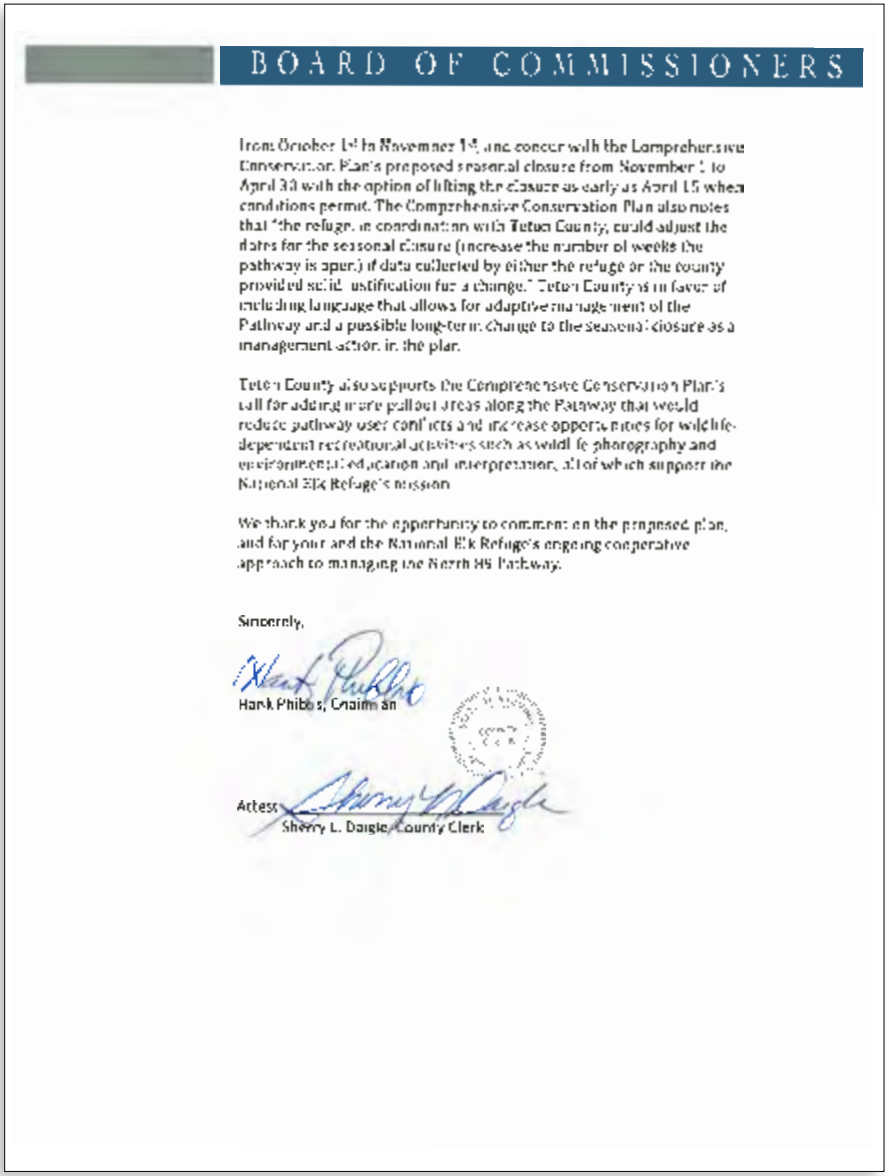
Teton County has worked closely with the Service over the last seven years on all phases of planning, construction, and management of the North 89 Pathway, and has signed a Memorandum of Understanding with the Service that defines management requirements for the Pathway. Throughout the Pathway development and management process, Teton County and the National Elk Refuge have pursued a collaborative, cooperative approach to the partnership that has made the Pathway possible, and we appreciate the National Elk Refuge's efforts in working with Teton County to support the community's transportation systems and recreation goals.

Teton County is generally supportive of the proposed action, Alternative 2, in the draft Comprehensive Conservation Plan, that calls for continuing the adaptive management plan for the Pathway. The County maintains a strong interest in maximizing the availability of the Pathway for use by the public while preserving the ability of the National Elk Refuge to meet its objectives and mission. We supported the National Elk Refuge's action in 2013 to change the Fall closure date

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Comment number	LETTER #4—Teton Board of Commissioners, page 2 of 2	RESPONSE
4-1 4-2		**4-1.** The proposal does call for adaptive management by allowing for an adjusted season when spring green up and migration occurs earlier than average. **4-2.** We look forward to continuing work with Jackson Hole Community Pathways and Teton County to reduce pathway user conflicts and increase opportunities for wildlife dependent recreation activities. Thank you for your comments.

BOARD OF COMMISSIONERS

from October 1st to November 15, and concur with the Comprehensive Conservation Plan's proposed seasonal closure from November 1 to April 30 with the option of lifting the closure as early as April 15 when conditions permit. The Comprehensive Conservation Plan also notes that "the refuge, in coordination with Teton County, could adjust the dates for the seasonal closure (increase the number of weeks the pathway is open) if data collected by either the refuge or the county provided solid justification for a change." Teton County is in favor of including language that allows for adaptive management of the Pathway and a possible long-term change to the seasonal closure as a management action in the plan.

Teton County also supports the Comprehensive Conservation Plan's call for adding more pullout areas along the Pathway that would reduce pathway user conflicts and increase opportunities for wildlife-dependent recreational activities such as wildlife photography and environmental education and interpretation, all of which support the National Elk Refuge's mission.

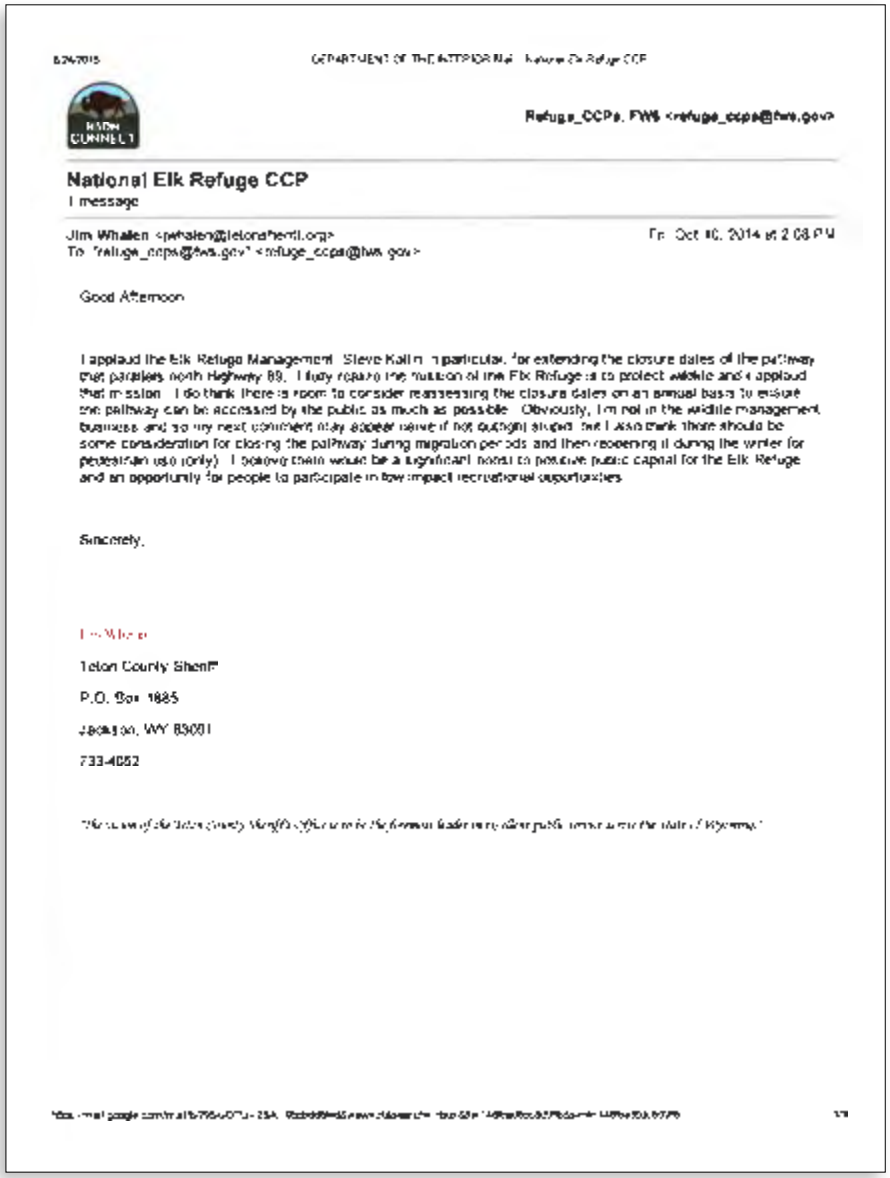
We thank you for the opportunity to comment on the proposed plan, and for your and the National Elk Refuge's ongoing cooperative approach to managing the North 89 Pathway.

Sincerely,

Hank Phibbs, Chairman

Attest:

Sherry L. Daigle, County Clerk

Comment number	LETTER #5—Teton County Sheriff, page 1 of 1	RESPONSE
5-1 5-2		**5-1.** The proposal does call for adaptive management by allowing for an adjusted season when spring green up and migration occurs earlier than average. In 2013, the seasonal dates were modified, expanding use by the public for an additional 31 days. The adjustment was based on extensive monitoring done in collaboration with Jackson Hole Community Pathways and Teton County. **5-2.** Animals are very wary of the presence of humans on foot. Pedestrians illegally using the pathway and approaching the fence have caused noticeable and repeated disturbance to nearby elk, often causing the herd to bolt from the area and not return for up to 24 hours. Not only does this stress the wintering animals, but it decreases the amount of refuge areas used by elk. Were this to occur regularly during the winter months, the negative effects would be significant. Thank you for your comments.

8/4/2015 DEPARTMENT OF THE INTERIOR Mail - National Elk Refuge CCP

Refuge_CCPs, FWS <refuge_ccps@fws.gov>

National Elk Refuge CCP

1 message

Jim Whalen <jwhalen@tetonsheriff.org> Fri, Oct 10, 2014 at 2:08 PM
To: "refuge_ccps@fws.gov" <refuge_ccps@fws.gov>

Good Afternoon

I applaud the Elk Refuge Management Steve Kallin in particular, for extending the closure dates of the pathway that parallels north Highway 89. I fully realize the mission of the Elk Refuge is to protect wildlife and I applaud that mission. I do think there is room to consider reassessing the closure dates on an annual basis to ensure the pathway can be accessed by the public as much as possible. Obviously, I'm not in the wildlife management business and so my next comment may appear naive if not outright stupid, but I also think there should be some consideration for closing the pathway during migration periods and then reopening it during the winter for pedestrian use (only). I believe there would be a significant boost to positive public capital for the Elk Refuge and an opportunity for people to participate in low impact recreational opportunities.

Sincerely,

Jim Whalen

Teton County Sheriff

P.O. Box 1885

Jackson, WY 83001

733-4652

"The mission of the Teton County Sheriff's Office is to fairly enforce federal, state and local public safety laws in the State of Wyoming."

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The Cougar Fund
125 N. Cache St. Upstairs
Box 122
Jackson, WY 83001-0122

Please accept the comments of The Cougar Fund on the Draft CCP/EA for the National Elk Refuge (NER), Jackson, Wyoming.

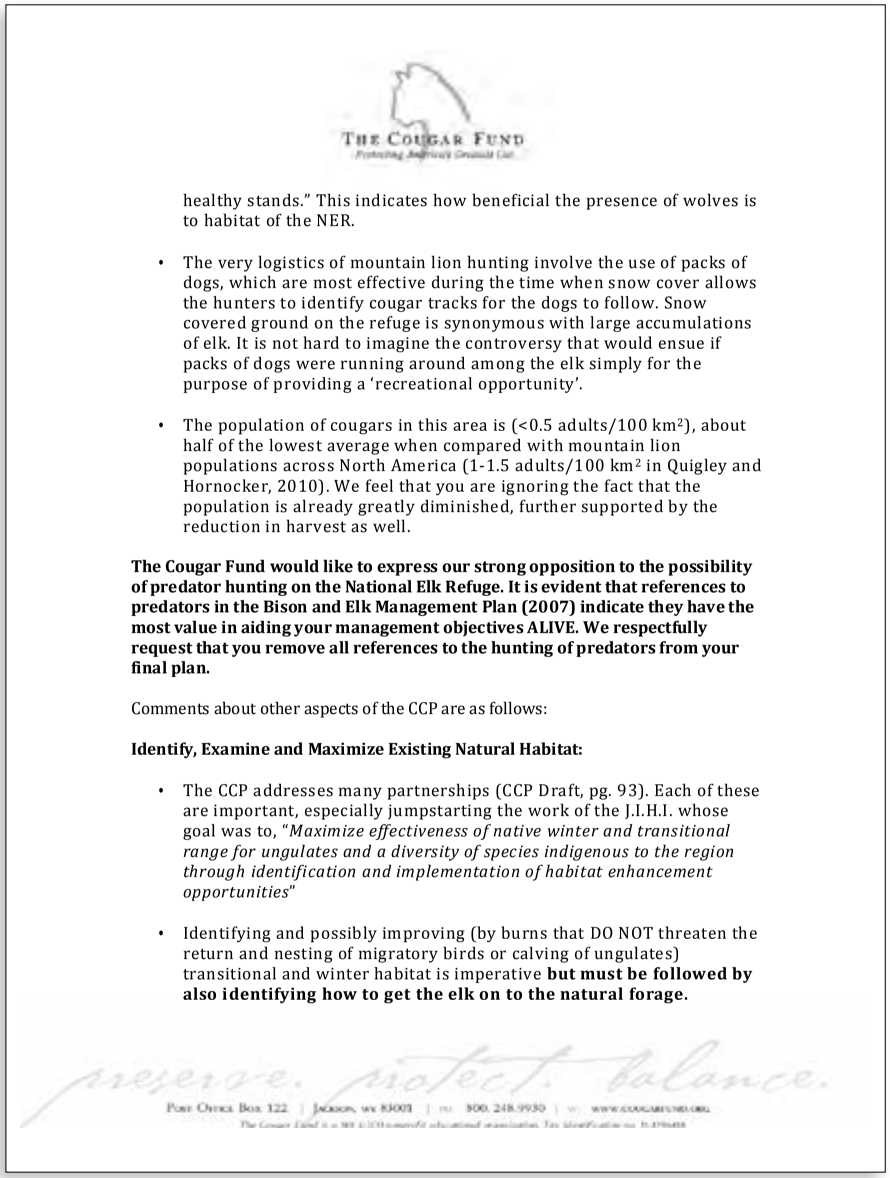
The Cougar Fund is dedicated to the protection of cougars and other large carnivores through education, advocacy and policy monitoring. We have grave reservations concerning United States Fish and Wildlife Service (USFWS) references to the possibility of expanding hunting opportunities on the National Elk Refuge to include sport hunting of predators (CCP Draft hardcopy, pg. 76; *Table 4*). While the initial consideration in the 'actions' proposal is vague, predators are specifically mentioned in the consequences and further identified to include wolves and mountain lions in the expanded analysis on page 171. Since wolves were delisted at the time the CCP was written, we wonder if the grizzly bear might also have been included were it not for the current protection of being a threatened species.

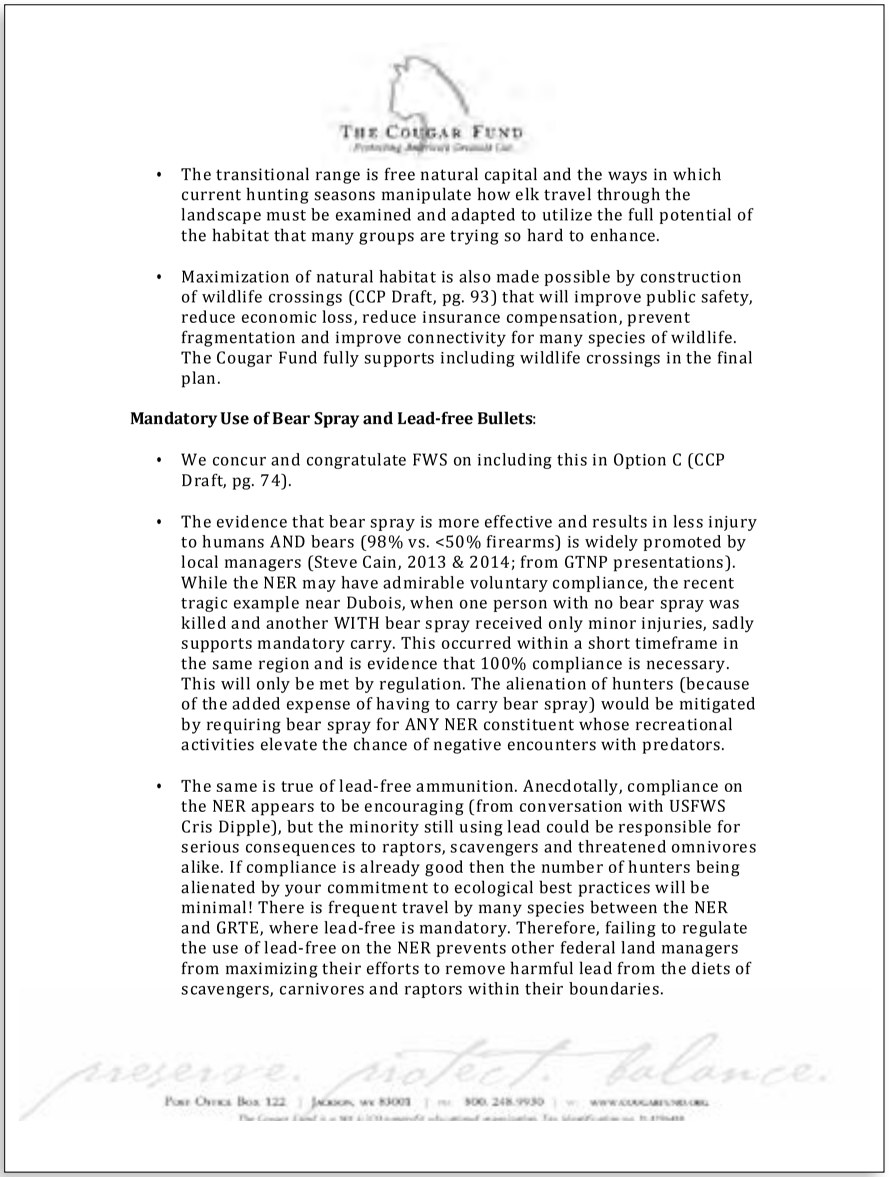
Predator hunting is an inappropriate use of the NER for the following reasons:

- The NER has already identified the risks of large concentrations of ungulates in the Bison and Elk Management Plan (BEMP) of 2007 (pg. 9; *Purpose and Need*) and also identified wolves and cougars as "mainly killing the most vulnerable prey, the young, old and poorly conditioned," (BEMP, pg. 142; *Affected Environment*). This pattern of predation is a tool for you to mitigate, "increased risk of potentially major outbreaks of exotic diseases," (BEMP, pg. 9; *Purpose and Need*).

- Predators are also known to reduce densities by dispersing prey, which also ties in with the statement, "Some precautionary measures such as reducing densities and number of elk and increasing dispersion could reduce the chance of major adverse impacts if the disease (CWD) becomes established," (BEMP, pg. 140; *Affected Environment*).

- FWS also displays the short film "How Wolves Change Rivers" on it's website, http://www.fws.gov/endangered/about/vp-145-2014.html The film showcases improvements not unlike your goal to improve, "damage to and loss of habitat due to browsing of willow, cottonwood, and aspen stands, with resultant reductions in wildlife associated with

Comment number	LETTER #6—The Cougar Fund, page 2 of 6	RESPONSE
6-1		**6-1.** We agree that predators provide benefits that support the mission of the refuge, and a hunting season specifically for predators is not envisioned. All references to the hunting of predators have been removed from the CCP.

Comment number	LETTER #6—The Cougar Fund, page 3 of 6	RESPONSE
		**6-2.** Please see the response to comment 1-8. **6-3.** A program to promote the voluntary use of non-lead ammunition on the refuge was implemented by the refuge, other agencies, and nongovernmental organization partners in 2008. Since that time, the voluntary use of non-lead ammunition has steadily increased to approximately 59 percent of successful elk hunters in 2014. This was accomplished primarily through the emphasis of educational materials promoting the use of non-lead ammunition. The steady decline in cost and the increase in availability of non-lead ammunition, combined with continued educational materials and emphasis by the refuge, is anticipated to continue to increase the voluntary participation in the use of non-lead ammunition. We believe the voluntary and educational approach provides additional benefits over mandating the use of non-lead ammunition. Hunters who are informed and convinced through education of the benefits of non-lead ammunition are more likely to voluntarily use that ammunition on the hundreds of thousands of acres of public and private lands that are open to hunting and surround the refuge, such as Bridger-Teton National Forest and State lands. This provides extended benefits to scavenging birds that may use the refuge and surrounding lands. The refuge will continue to monitor the effectiveness of its voluntary non-lead ammunition program and will re-evaluate this program after 5 years instead of at the expiration of the CCP. A regulation requiring the use of non-lead ammunition can be implemented if the progress of the voluntary non-lead ammunition policy does not meet refuge expectations.

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- The transitional range is free natural capital and the ways in which current hunting seasons manipulate how elk travel through the landscape must be examined and adapted to utilize the full potential of the habitat that many groups are trying so hard to enhance.

- Maximization of natural habitat is also made possible by construction of wildlife crossings (CCP Draft, pg. 93) that will improve public safety, reduce economic loss, reduce insurance compensation, prevent fragmentation and improve connectivity for many species of wildlife. The Cougar Fund fully supports including wildlife crossings in the final plan.

Mandatory Use of Bear Spray and Lead-free Bullets:

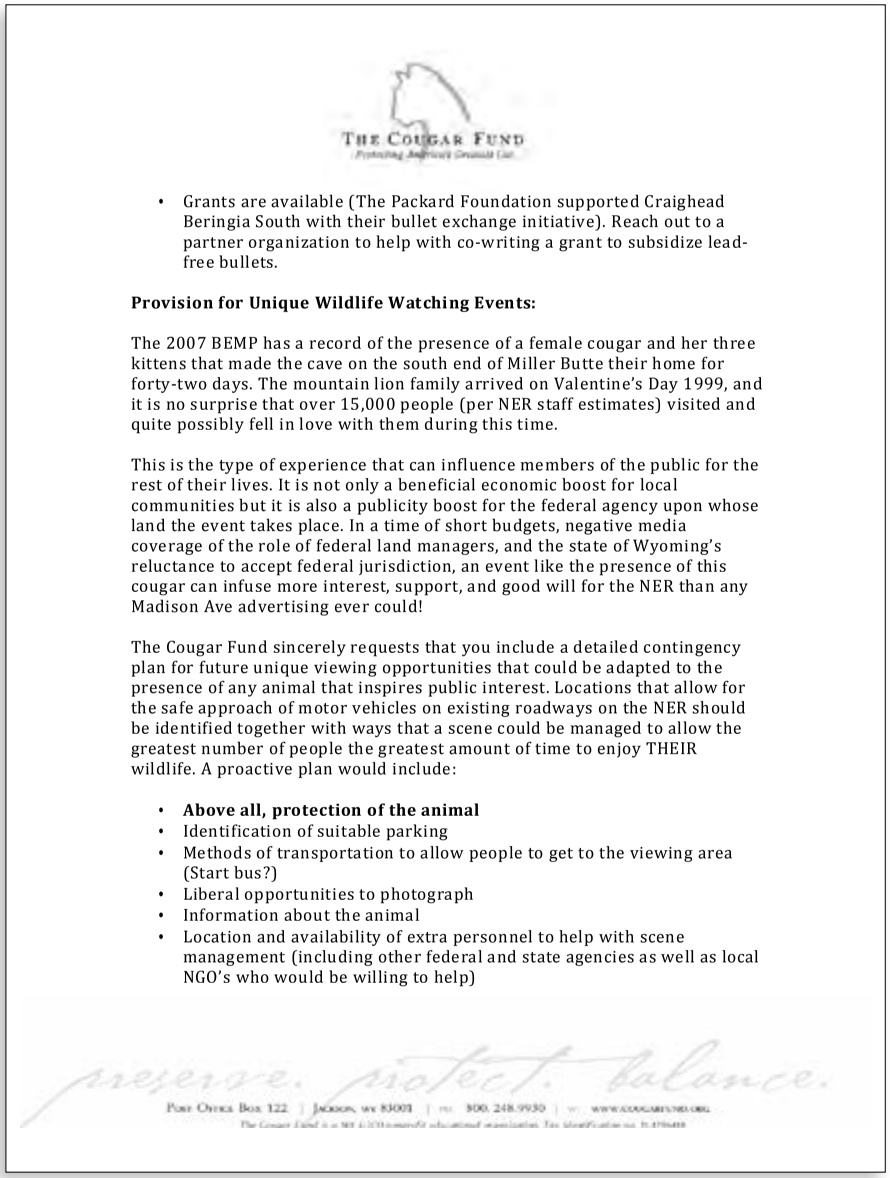
- We concur and congratulate FWS on including this in Option C (CCP Draft, pg. 74).

- The evidence that bear spray is more effective and results in less injury to humans AND bears (98% vs. <50% firearms) is widely promoted by local managers (Steve Cain, 2013 & 2014; from GTNP presentations). While the NER may have admirable voluntary compliance, the recent tragic example near Dubois, when one person with no bear spray was killed and another WITH bear spray received only minor injuries, sadly supports mandatory carry. This occurred within a short timeframe in the same region and is evidence that 100% compliance is necessary. This will only be met by regulation. The alienation of hunters (because of the added expense of having to carry bear spray) would be mitigated by requiring bear spray for ANY NER constituent whose recreational activities elevate the chance of negative encounters with predators.

- The same is true of lead-free ammunition. Anecdotally, compliance on the NER appears to be encouraging (from conversation with USFWS Cris Dipple), but the minority still using lead could be responsible for serious consequences to raptors, scavengers and threatened omnivores alike. If compliance is already good then the number of hunters being alienated by your commitment to ecological best practices will be minimal! There is frequent travel by many species between the NER and GRTE, where lead-free is mandatory. Therefore, failing to regulate the use of lead-free on the NER prevents other federal land managers from maximizing their efforts to remove harmful lead from the diets of scavengers, carnivores and raptors within their boundaries.

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6-4 6-5		**6-4.** This has been done by the refuge in the past and will continue to be considered in the future. **6-5.** Thank you for your comments. We've provided such opportunities in the past and will consider continuing this practice in the future. **6-6.** Responding to accelerating climate change is a Service priority as described in its 50-year strategic plan (see page 8 in the draft CCP). It is an integral part of the U.S. Department of the Interior's strategy for addressing climate change as expressed in Secretarial Order 3289 (September 14, 2009). This strategic plan embeds guiding principles for responding to climate change into Refuge System planning documents. The CCP provides "management direction" for the refuge over the next 15 years, and as mentioned on page 1 of the draft CCP, "detail will be provided in stepdown management plans as part of implementing the final CCP." The refuge will not conduct climate change research. However, it will continue to conduct and collaborate with partners in the collection of long-term baseline data (page 37 of the draft CCP) through targeted wildlife, fisheries, disease, invasive plant, and habitat monitoring surveys. This information, combined with additional surveys to be identified in the inventory and monitoring stepdown plan, will assist the refuge in understanding and planning for the local impacts of climate change in the future. All future CCP stepdown plans (table 22, page 226 of the draft CCP) will encompass the guiding principles for responding to climate change. These guiding prin-

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- Grants are available (The Packard Foundation supported Craighead Beringia South with their bullet exchange initiative). Reach out to a partner organization to help with co-writing a grant to subsidize lead-free bullets.

Provision for Unique Wildlife Watching Events:

The 2007 BEMP has a record of the presence of a female cougar and her three kittens that made the cave on the south end of Miller Butte their home for forty-two days. The mountain lion family arrived on Valentine's Day 1999, and it is no surprise that over 15,000 people (per NER staff estimates) visited and quite possibly fell in love with them during this time.

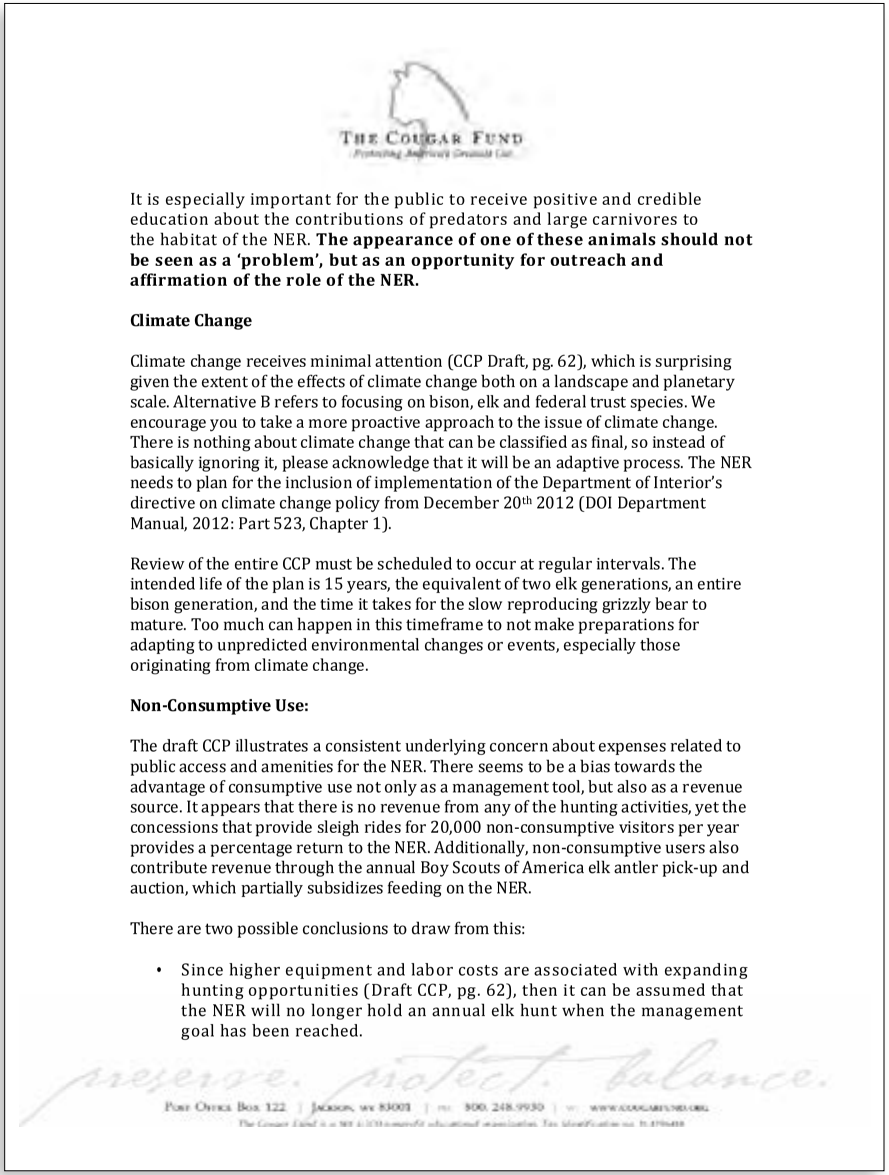
This is the type of experience that can influence members of the public for the rest of their lives. It is not only a beneficial economic boost for local communities but it is also a publicity boost for the federal agency upon whose land the event takes place. In a time of short budgets, negative media coverage of the role of federal land managers, and the state of Wyoming's reluctance to accept federal jurisdiction, an event like the presence of this cougar can infuse more interest, support, and good will for the NER than any Madison Ave advertising ever could!

The Cougar Fund sincerely requests that you include a detailed contingency plan for future unique viewing opportunities that could be adapted to the presence of any animal that inspires public interest. Locations that allow for the safe approach of motor vehicles on existing roadways on the NER should be identified together with ways that a scene could be managed to allow the greatest number of people the greatest amount of time to enjoy THEIR wildlife. A proactive plan would include:

- **Above all, protection of the animal**
- Identification of suitable parking
- Methods of transportation to allow people to get to the viewing area (Start bus?)
- Liberal opportunities to photograph
- Information about the animal
- Location and availability of extra personnel to help with scene management (including other federal and state agencies as well as local NGO's who would be willing to help)

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		ciples will be especially influential in the development of the fire, habitat, integrated pest management, and the inventory and monitoring stepdown plans.
		The refuge, as part of the Greater Yellowstone Coordinating Committee, is supporting the Northern Rockies Adaptation Partnership efforts to complete vulnerability assessments and adaptation strategies for the Greater Yellowstone Ecosystem. This is a step in the process of better understanding potential climate change impacts and adaptation strategies applicable to the refuge.
		It is also anticipated that the refuge will become part of a Landscape Conservation Design (LCD), a future subunit of a Landscape Conservation Cooperative (LCC), which will continue to emphasize the importance of climate change. LCDs must be concerned with climate change, because an LCD "is an assessment of the landscape's current and potential future condition, a description of a desired future condition, and a suite of preliminary, coarse-scale management strategies that are developed by the greater conservation community" (FWS 2013b).
		6-7. To determine the need for revision, the CCP will be reviewed annually. A revision would occur if and when significant information becomes available, such as a change in ecological conditions (page 227 of the draft CCP).
		6-8. In an era of flat or declining Federal operating budgets, the financial cost of implementing programs is always a consideration. The refuge strives to effectively use its limited operational resources such as funding and personnel.

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It is especially important for the public to receive positive and credible education about the contributions of predators and large carnivores to the habitat of the NER. **The appearance of one of these animals should not be seen as a 'problem', but as an opportunity for outreach and affirmation of the role of the NER.**

6-6 **Climate Change**

Climate change receives minimal attention (CCP Draft, pg. 62), which is surprising given the extent of the effects of climate change both on a landscape and planetary scale. Alternative B refers to focusing on bison, elk and federal trust species. We encourage you to take a more proactive approach to the issue of climate change. There is nothing about climate change that can be classified as final, so instead of basically ignoring it, please acknowledge that it will be an adaptive process. The NER needs to plan for the inclusion of implementation of the Department of Interior's directive on climate change policy from December 20th 2012 (DOI Department Manual, 2012: Part 523, Chapter 1).

6-7 Review of the entire CCP must be scheduled to occur at regular intervals. The intended life of the plan is 15 years, the equivalent of two elk generations, an entire bison generation, and the time it takes for the slow reproducing grizzly bear to mature. Too much can happen in this timeframe to not make preparations for adapting to unpredicted environmental changes or events, especially those originating from climate change.

6-8 **Non-Consumptive Use:**

The draft CCP illustrates a consistent underlying concern about expenses related to public access and amenities for the NER. There seems to be a bias towards the advantage of consumptive use not only as a management tool, but also as a revenue source. It appears that there is no revenue from any of the hunting activities, yet the concessions that provide sleigh rides for 20,000 non-consumptive visitors per year provides a percentage return to the NER. Additionally, non-consumptive users also contribute revenue through the annual Boy Scouts of America elk antler pick-up and auction, which partially subsidizes feeding on the NER.

There are two possible conclusions to draw from this:

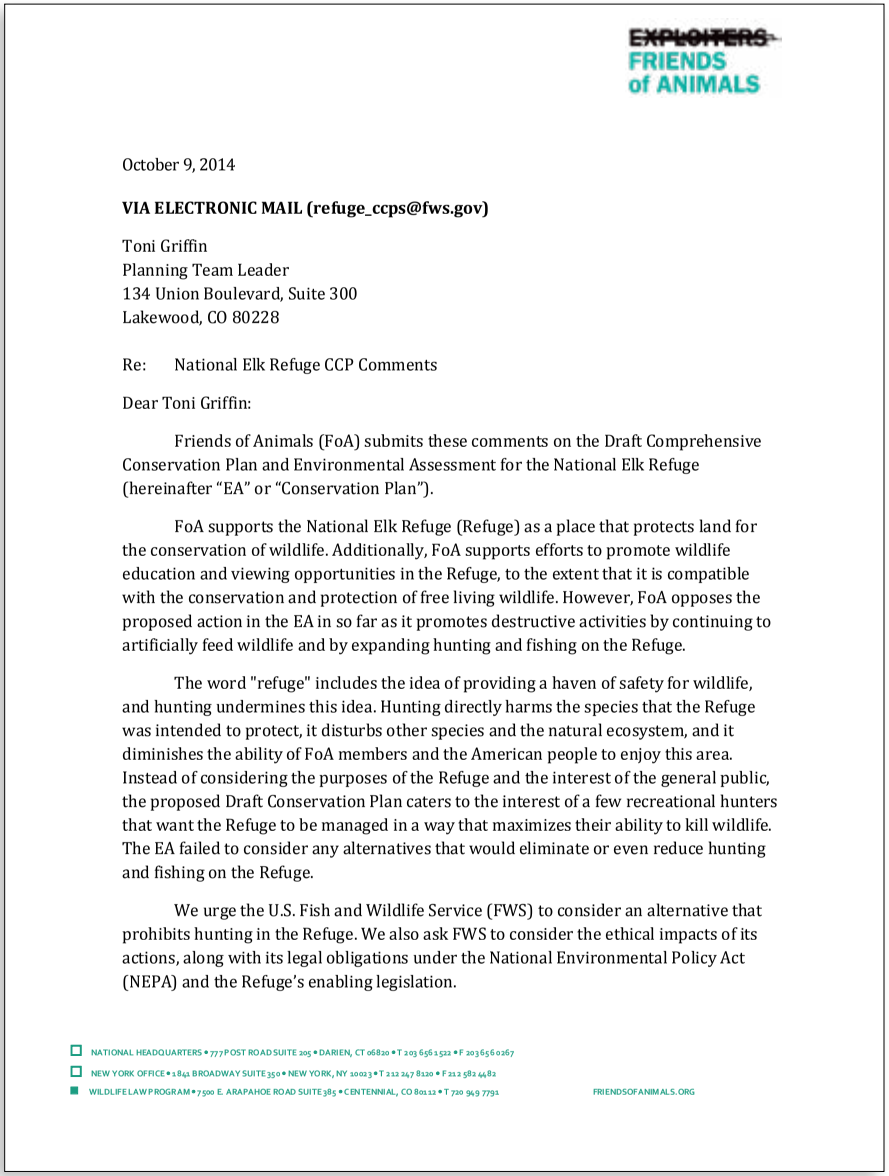
- Since higher equipment and labor costs are associated with expanding hunting opportunities (Draft CCP, pg. 62), then it can be assumed that the NER will no longer hold an annual elk hunt when the management goal has been reached.

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Comment number	LETTER #6—The Cougar Fund, page 6 of 6	RESPONSE
6-9	THE COUGAR FUND Protecting America's Greatest Cat • The second is that non-consumptive users are greater financial contributors, yet there is concern about higher costs to provide programming (Draft CCP, pg. 81). The contributions of non-consumptive users must be addressed when offering wildlife-based recreation on the NER. Programming and access for non-consumptive users must be at least equal to the opportunities available to consumptive users. The NER accepts the presence of WGFD staff to adjudicate the hunt. Cooperation with partners and NGO's could be explored to provide programming and environmental education. **Temporal Scales and Planning of Multiple Management Documents:** There is a notable discrepancy between the longevity of the NER CCP and the BEMP (2007). We observe that the CCP is written to complement the BEMP, yet only half of the CCP's projected lifetime corresponds with the current BEMP. We request that you address this discrepancy and provide an explanation and a plan for your intentions to rectify this inconsistency. In conclusion, The Cougar Fund thanks you for the opportunity to comment. We appreciate your public service and we trust that you will review and consider all comments with the same respect with which they have been submitted. Sincerely, Penelope Maldonado Managing Director preserve. protect. balance. Post Office Box 322 | Jackson, wy 83001 | tel 800.248.9930 | www.cougarfund.org The Cougar Fund is a 501(c)(3) nonprofit educational association. Tax identification no. 51-0376418	Both consumptive and nonconsumptive wildlife-dependent public use activities are considered in the CCP. Those activities that are consistent with the National Wildlife Refuge System Improvement Act and best support the purposes of the refuge receive primary consideration. **6-9.** The Bison and Elk Management Plan (FWS and NPS 2007a) will be updated upon expiration, and consideration will be given to limit the update to match the remaining life of the CCP. Thank you for your comments.

Comment number	LETTER #7—Friends of Animals, page 1 of 13	RESPONSE
7-1		**7-1.** Hunting is a legislatively mandated priority public use under the National Wildlife Refuge System Improvement Act. Current hunting seasons on the refuge and those proposed in the CCP are designed to meet management goals and objectives in the Bison and Elk Management Plan (FWS and NPS 2007a). Broadly, the goal of that plan is to reduce reliance on supplemental feeding, and this is to be achieved through reducing the number of elk wintering on the refuge to 5,000 and reducing the number of bison in the Jackson herd to 500. Hunting on the refuge was the management strategy deemed most effective to meet this management objective.

Comment number	LETTER #7—Friends of Animals, page 2 of 13	RESPONSE
7-2	Page 2 of 13 **FRIENDS OF ANIMALS** FoA is an international animal rights organization incorporated in the state of New York since 1957. FoA has nearly 200,000 members worldwide, including many that live near or visit the National Elk Refuge and surrounding areas. FoA and its members seek to free animals from cruelty and exploitation around the world, and to promote a respectful view of non-human, free-living and domestic animals. FoA activities include educating its members on current threats to many species' abilities to live in ecosystems free from human manipulation, exploitation, and abuse; and monitoring federal agency actions to ensure that laws enacted to protect the environment and wildlife are properly implemented. Hunting on the Refuge seriously disrupts FoA members' experience and ability to enjoy this area. Not only does hunting directly affect the individual animals being hunting, it also disrupts the natural system and balance in these areas. Many members like to recreate on the Refuge and to observe and photograph wildlife there. These members cannot enjoy their time on the Refuge when they are aware that hunting occurs or when they observe hunting and its affects in these areas. **HISTORY AND PURPOSE OF THE NATIONAL ELK REFUGE** At the turn of the 20th century, increased human activities, such as construction and grazing cattle, along with a series of harsh winters, led to the starvation of thousands of elk near Jackson, Wyoming. In response, Congress established a "winter game reserve" in 1912, and in 1913, Congress designated the area "a winter elk refuge." 16 U.S.C. 673, 37 Stat. 847. In 1921, all lands included in the Refuge or that might be added in the future were reserved and set apart as "refuges and breeding grounds for birds" (Executive Order 3596), which was affirmed in 1922 (Executive Order 3741). In 1927, the Refuge was expanded to provide "for the grazing of, and as a refuge for, American elk and other big game animals." 16 U.S.C. 673a. The primary purpose of the Refuge is to conserve elk, big game animals, and birds. As stated in the EA, the Refuge should be a place where "wildlife comes first" and where "ecosystems, biodiversity, and wilderness are vital concepts in refuge management." EA at 4. The National Wildlife Refuge System Improvement Act also states that wildlife conservation is the priority on Refuge System lands and that the Secretary of the Interior should ensure that the biological integrity, diversity, and environmental health of refuge lands are maintained. According to the Refuge Recreation Act, the Secretary of the Interior is authorized to administer areas for public recreation as "incidental or secondary use" only to the extent that they are not inconsistent with the primary objectives of the Refuge. 16 USCS § 460k. NATIONAL HEADQUARTERS • 777 POST ROAD SUITE 205 • DARIEN, CT 06820 • T 203 656 1522 • F 203 656 0267 NEW YORK OFFICE • 1841 BROADWAY SUITE 350 • NEW YORK, NY 10023 • T 212 247 8120 • F 212 582 4482 WILDLIFE LAW PROGRAM • 7500 E. ARAPAHOE ROAD SUITE 385 • CENTENNIAL, CO 80112 • T 720 949 7791 FRIENDSOFANIMALS.ORG	**7-2.** Hunting is a critical management tool to meet Bison and Elk Management Plan goals and objectives, which are primarily to reduce the number of elk and bison to levels more in balance with available habitat and subsequently to reduce our reliance on supplemental feeding. These goals and objectives are consistent with refuge purposes.

Comment number	LETTER #7—Friends of Animals, page 3 of 13	RESPONSE
7-3	Page 3 of 13 **PROPOSED ACTIONS ARE NOT COMPATIBLE WITH THE MISSION OF THE NATIONAL ELK REFUGE** FWS cannot authorize recreational activates that are not compatible with the conservation mission of the Refuge. *See* 16 U.S.C. 668dd. The term "compatible use" means "a wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of the refuge." 16 USCS § 668ee (emphasis added). Additionally, in developing comprehensive conservation plans, FWS must identify and describe "significant problems that may adversely affect the populations and habitats of fish, wildlife, and plants within the planning unit and the actions necessary to correct or mitigate such problems." 16 USCS § 668dd(E). Artificial management of wildlife, including feeding and hunting animals as proposed in the Conservation Plan, are inconsistent with the purposes and goals of the Refuge and adversely affect wildlife on the Refuge.	**7-3.** Your comments are outside of the scope of the CCP. We disagree that hunting animals is inconsistent with the purposes and goals of the refuge. Please see the response to comment 7-2.
7-4	**Hunting** All action alternatives proposed in the EA increase hunting on the refuge, and the proposed Conservation Plan makes significant changes that are not compatible with the Refuge's conservation goals. In particular the proposed Conservation Plan would: deny elk access to "safe zones" in the refuge (EA at 170); expand hunting opportunities for young people, possibly adding a week after the end of the regular elk season; consider creating more hunting opportunities for species other than elk and bison; open currently closed areas to archery hunters; increase overall hunter access; and create designated parking lots for hunters (EA at 266). Although the National Wildlife Refuge System Improvement Act contemplates that hunting could be a compatible use on some national refuge areas, FWS is still required to make an individual compatibility determination for each recreational use and change or modification provided for in the Conservation Plan. 16 U.S.C. 668dd. The EA claims that hunting is not incompatible with the purpose of the Refuge "based on anticipated biological effects described above and in the EA." However, the EA does not disclose the anticipated biological effects of hunting, or increasing hunting, on the Refuge. The only alleged justification for hunting found in the EA is the claim that the habitat produces "surpluses" and that hunting is necessary for wildlife management. There is no evidence to confirm this statement. In fact, the practice of artificially feeding elk creates that this "surplus" is disrupting the natural diversity and health of wildlife populations. In the 2007 Elk and Bison Management Plan, FWS rejected a plan to phase out the supplemental feeding program because it said the total Jackson elk and bison numbers could fall **below** Wyoming Game and Fish Department's established objectives in some years. *See* FWS & National Park Service, Record of Decision for the Final Bison NATIONAL HEADQUARTERS • 777 POST ROAD SUITE 205 • DARIEN, CT 06820 • T 203 656 1522 • F 203 656 0267 NEW YORK OFFICE • 1841 BROADWAY SUITE 350 • NEW YORK, NY 10023 • T 212 247 8120 • F 212 582 4482 WILDLIFE LAW PROGRAM • 7500 E. ARAPAHOE ROAD SUITE 385 • CENTENNIAL, CO 80112 • T 720 949 7791 FRIENDSOFANIMALS.ORG	**7-4.** Regarding hunting, please see the response to comment 7-2. Regarding lead effects, please see response to comment 6-3.

Comment number	LETTER #7—Friends of Animals, page 4 of 13	RESPONSE
7-5	Page 4 of 13 and Elk Management Plan. The practice of feeding wildlife to create larger populations than the area can support, and then shooting them as part of a "management" program perpetuates a destructive cycle that not only disturbs the natural balance of the Refuge, but also places the wildlife at a high risk for disease that could wipe out the very animals that Refuge was created to protect. Moreover, the disturbance of increased hunters in the Refuge, as well as the danger and lasting impact that they leave behind, including lead shots, is incompatible with the mission of the Refuge. The EA admits, and research confirms, the negative effect of lead ammunition (used by 60-80 percent of hunters on the Refuge) on scavenging bird populations such bald eagles and ravens (EA at 139; *see also* Pain, Fisher and Thomas 2009). The fact that hunting practices injure species of concern that the Refuge was intended to protect is further evidence that hunting should not qualify as a compatible use. **Supplemental feeding Program** While winter feeding fuels hunting opportunities on the Refuge by sustaining elk in numbers beyond available habitat and social constraints, this short-sighted management system is fraught with biological and ecological problems. The winter feeding serves neither the long-term health nor conservation of wildlife, and therefore is not consistent with the Refuge's purpose. Nor is it based on a sound scientific principles and sustainable resource management policy, as required by the National Wildlife Refuge System Improvement Act. *See* 16 USCS § 668ee. The supplemental feeding practice interrupts natural migrations, destroys habitats, and feeds the perception that hay can be substituted for habitat (Smith 2001, 2011). The supplemental feeding program also causes the animals to unnaturally congregate in a small area and significantly increases the risk of disease transmission. Abundant hosts packed close together creates an ideal environment for most pathogens to persist, spread, and to develop even more successful forms (McNeil 1989). A recent study comparing physiology of elk on 19 Wyoming feed grounds to 11 unfed, free-ranging populations in Montana and Wyoming found that glucocorticoid concentrations (steroidal hormones that are escalated by inflammation and stress) excreted in feces of feed ground elk were 31-43 percent higher than among unfed elk. Likewise, rates of aggression increased significantly when elk were artificially fed (Forristal et al. 2011). Given the harmful effects that chronically elevated glucocorticoids have on immune function of mammals (Becker 2002), feeding may exacerbate diseases like scabies, hemorrhagic septicemia, foot rot, and bovine brucellosis of elk (Peterson 2003). Animal density also elevates the risk of Chronic Wasting Disease (CWD) transmission and infection rates in wild populations (Williams et al. 2002). A study in NATIONAL HEADQUARTERS • 777 POST ROAD SUITE 205 • DARIEN, CT 06820 • T 203 656 1522 • F 203 656 0167 NEW YORK OFFICE • 1841 BROADWAY SUITE 350 • NEW YORK, NY 10023 • T 212 247 8120 • F 212 582 4482 WILDLIFE LAW PROGRAM • 7500 E. ARAPAHOE ROAD SUITE 385 • CENTENNIAL, CO 80112 • T 720 949 7791 FRIENDSOFANIMALS.ORG	**7-5.** Your comments are outside of the scope of the CCP. The long-term goals and objectives of the Bison and Elk Management Plan are to reduce reliance on supplemental feeding and reduce transmission of density-dependent diseases. The refuge and other agencies are currently engaged in an adaptive management planning process to reduce reliance on supplemental feeding on the refuge. This process is a stepdown plan of the Bison and Elk Management Plan. Strategies to mitigate the comingling of elk and bison with livestock will be part of the adaptive management plan.

Comment number	LETTER #7—Friends of Animals, page 5 of 13	RESPONSE
7-6	 Rocky Mountain National Park led researchers to infer that high density elk populations support relatively high rates of CWD and may substantially affect the dynamics of such populations (Monello et al. 2013). The claim that feeding is implemented to reduce the transmission of disease to livestock is not supported by sound management practices. First, the Refuge should base its policy on the interests of wildlife and not the desires of ranchers outside the Refuge. Second, the supplement feeding program actually increases the risk of disease and many states have actually banned winter feeding or baiting by citizens to reduce the transmission of both CWD and bovine tuberculosis (Dunkley and Cattet 2003). **FWS SHOULD CONSIDER ITS OBLIGATIONS UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT** **FWS Should Prepare in Environmental Impact Statement** The fundamental purpose of NEPA is to improve the decision making of federal agencies by requiring an analysis of the environmental impacts of a proposed action and an exploration of alternatives to that action that would reduce or eliminate such impacts. 42 U.S.C. § 4332. The primary vehicle for this analysis is an Environmental Impact Statement (EIS). The EIS is the cornerstone of NEPA, and is required for all "major Federal actions significantly affecting the quality of the human environment." 42 U.S.C. § 4332(2)(C). The requirement to prepare an EIS is broad and intended to compel agencies to take seriously the potential environmental consequences of a proposed action. The Council on Environmental Quality (CEQ) defines "major federal action" to include "actions with effects that may be major and which are potentially subject to Federal control." 40 C.F.R. § 1508.18 (emphasis added). Whether an agency action is "significant" enough to require preparation of an EIS requires "considerations of both context and intensity." 40 C.F.R. § 1508.27. The context of the action includes factors such as "society as a whole (human, national), the affected region, the affected interests, and the locality." 40 C.F.R. § 1508.27(a). Intensity "refers to the severity of the impact" and requires several factors to be considered, including: beneficial and adverse impacts, how the proposed action affects public health or safety, the unique characteristics of the geographic area affected, the controversial nature of the action, the degree to which the action may establish a precedent for future actions, the effect of the action an endangered or threatened species, and whether the action is related to other actions with individually insignificant but cumulative significant impacts. 40 C.F.R. §1508.27(b). The context and intensity of the proposed action in this case indicate that it is significant enough to require an EIS. First, the effects on the quality of the human environment are significant on a local, regional, and national level. The Refuge attracts NATIONAL HEADQUARTERS • 777 POST ROAD SUITE 205 • DARIEN, CT 06820 • T 203 656 1522 • F 203 656 0267 NEW YORK OFFICE • 1841 BROADWAY SUITE 350 • NEW YORK, NY 10023 • T 212 247 8120 • F 212 582 4482 WILDLIFE LAW PROGRAM • 7500 E. ARAPAHOE ROAD SUITE 385 • CENTENNIAL, CO 80112 • T 720 949 7791 FRIENDSOFANIMALS.ORG	**7-6.** The issues that you discuss were analyzed using an EIS process in the Bison and Elk Management Plan and EIS (FWS and NPS 2007b). Proposed changes to hunting programs outlined in the CCP are relatively minor, and the EA process is sufficient to evaluate their effects.

Comment number	LETTER #7—Friends of Animals, page 6 of 13	RESPONSE
7-7	Page 6 of 13 people from across the world. The primary reason that people come to the Refuge is to view the wildlife and unique habitat that is at issue in this Conservation Plan. Second, the severity of the impacts warrant preparation of an EIS. The Conservation Plan is highly controversial, as an increasing portion of Americans oppose hunting. *See* Smith 2011 at 216. The EA's plan to target young people for hunting is also highly controversial due to potential public health and safety concerns. Moreover, the proposed action occurs on a critical geographic area with unique wildlife viewing opportunities. Because many of the hunters use lead-based ammunition, the continuation of this program could harm threatened and endangered species found on the Refuge. Lastly, the Conservation plan will likely last for 10 to 15 years and have precedential affect for continued management of the Refuge. The significance of the action, the unique environment, the impact on threatened or endangered species, and the controversial nature of the proposed Conservation Plan all indicate that it constitutes a major federal action. Thus, FWS should prepare an EIS to inform decision-makers and the public of all the reasonable alternatives and impacts associated with the Draft Comprehensive Conservation Plan. **EA Failed to Include Adequate Range of Alternatives** Environmental assessments and environmental impact statements should provide a full and fair discussion of the issues, and inform decision makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. *See* 40 C.F.R. § 1502.1. The EA at issue here only contains three action alternatives with little variation, and excludes reasonable alternatives. For example, none of the alternatives eliminate or even reduce hunting in the Refuge, and all three action alternatives consider expanding hunter access on the Refuge and eliminating sanctuaries on the Refuge where hunting is currently prohibited (EA at 85). The EA's limited alternatives inhibit the decision making process and prevent the public from making meaningful comparisons and comments. In order to make an informed decision and fulfill the requirements of NEPA, FWS should consider and compare a broader range of alternative including: eliminating hunting on the Refuge, phasing out the supplemental feeding programs, and ensuring adequate habitat for species on the Refuge. While these are reasonable alternatives that would likely benefit wildlife on the Refuge and the American public, the Draft EA does not include them. The EA's focus on hunting over other non-consumptive wildlife dependent activities does not reflect the best interest of the wildlife in the Refuge, nor does it reflect the interest of the public. Despite the EA's visitor service goal to reach a diverse audience to understand and appreciate the refuge's wildlife conservation role, the NATIONAL HEADQUARTERS • 777 POST ROAD SUITE 205 • DARIEN, CT 06820 • T 203 656 1522 • F 203 656 0267 NEW YORK OFFICE • 1841 BROADWAY SUITE 350 • NEW YORK, NY 10023 • T 212 247 8120 • F 212 582 4482 WILDLIFE LAW PROGRAM • 7500 E. ARAPAHOE ROAD SUITE 385 • CENTENNIAL, CO 80112 • T 720 949 7791 FRIENDSOFANIMALS.ORG	**7-7.** Based on the purpose of the refuge, the requirements in the Improvement Act, and other applicable laws, regulations, and policies, a full range of reasonable alternatives was considered. The planning team conducted several workshops involving staff and other professionals, mailed out planning updates, posted information on our Web site, held a public meeting, listened to public comment, and analyzed the biological, visitor use, and socioeconomic data before determining the options for future management.

alternatives focus on a small interest group – hunters. For example, while the EA provides for hunting opportunities to accommodate disabled people, it does not prioritize updating the visitor center[1] which lacks sufficient accommodations for persons with physical disabilities and does not meet the requirements of the Architectural Barriers Act Accessibility Standard (United States Access Board 2013) (EA 142). Additionally, the preferred action eliminates "safe zones" where people could view animals in areas not subject to hunting. The proposed plan also opens access to hunters, but imposes more limits on commercial wildlife-viewing tours to reduce road congestion and wildlife disturbance (EA at 61). This makes little sense when hunters also contribute to congestion and are far more disruptive to wildlife, as the goal of their activity is to kill and remove wildlife in the Refuge.

The EA also attempts to involve youth in hunting activities. However, a study of children ages 8 to 17 done by the gun industry itself found that, much to their dismay, hunting is actually considered an unfavorable pastime among the majority of America's youth. Nearly 50% of the young participants in the nationwide survey said they had "strongly to moderately" negative opinions about hunting and target shooting.[2] While the hunting and gun industry may find this unacceptable because they consider children to be a portion of the population with huge profit-making potential, the Conservation Plan should not cater to the interests of the gun and hunting industries by furthering their campaign to engage youth in hunting.

The EA should instead focus on non-hunting activities, as less Americans are hunting and a growing number disapprove of the practice. The vast majority of people who visit the park are not there to hunt. In 2001, 780,299 visitors participated in onsite interpretation and nature observation. EA at 141. In comparison, only 2,116 hunting permits were issued on average from 1997 to 2001. EA at 140. While hunting is allowed on the vast majority of public lands, FWS should try to preserve the Refuge as a haven for wildlife and a place that people can go to view wildlife in area safe from hunting.

The EA Failed to Include Adequate Impact Analyses

Under NEPA, FWS has an obligation to identify and disclose to the public all direct, indirect, and cumulative impacts of the proposed action and each reasonable alternative, (42 U.S.C. § 4332(2)(C); 40 C.F.R. §§ 1502.16, 1508.7 – 1508.8). Here, the EA is vague and the alternatives are not adequately described and analyzed. FWS should issue an EIS

[1] The Visitor Center, on the southern end of the refuge, plays a critical role in Jackson's tourism-based economy, serving approximately 300,000 people each year and providing a wide range of visitor services.

[2] Meg McIntire, *Putting Kids in the Crosshairs*, Actionline (Fall 2013). Available from http://friendsofanimals.org/magazine/fall-2013/putting-kids-crosshairs.

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7-8. The impact of hunting was adequately analyzed in the Bison and Elk Management Plan and EIS. The 500 bison objective was not arbitrary. The 500 bison population level was deemed sufficient to maintain genetic diversity, and the Bison and Elk Management Plan does not preclude the introduction of a small number of bison from other populations to ensure continued genetic diversity should it be deemed necessary.

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that adequately describes the impacts of all alternatives, including the impacts of hunting and supplemental feeding.

Impact of Hunting

The EA fails to consider how increased hunting will affect the distribution, migration patterns, and abundance of fish, wildlife, and plant populations in the Refuge. It does not analyze the health or viability of the elk or bison herds or how increased hunting access will disturb individual animals and the entire population. Nor are these issues adequately addressed in the Refuge's Elk and Bison Management Plan.

Bison in the greater Yellowstone area, including the Jackson bison herd, are the last remnants of the extensive wild herd that once roamed much of North America. If FWS continues to allow hunting of bison in the Refuge, it could damage the viability of the bison herds and cause long-lasting, irreparable damage to the herds.

According to Gates et al., "the primary threat to long-term preservation of the herd is a loss of genetic diversity that can be very difficult, if not impossible, to restore. Therefore, thorough genetic evaluation [] is necessary before, during, and after planned large-scale herd reductions." (2010 at 93). The Refuge arbitrarily set a population objective of 500 bison, which could significantly harm the genetic viability of these iconic animals. As protecting a minimum of 2,000 bison in each distinct bison subpopulation is considered a minimum for each population segment to retain genetic diversity over a 200-year time period (Gross and Wang 2005; Gross et al. 2006).

Maintaining sufficiently high levels of genetic diversity within the Refuge's wildlife populations, as might be found within a natural population, is essential to ensuring that sufficient variation exists to allow the species to naturally evolve and adapt to a changing environmeny and retain important survival traits like natural migration and selection. However, the EA completely fails to consider the impact of the hunting program on the wildlife in the Refuge.

The EA also vaguely states it will consider allowing hunters to kill other species in the Refuge, but does not mention what those species would be or how much hunting would be allowed. It is impossible to assess the impacts of this action without more information.

Finally, the EA failed to adequately discuss many of the negative indirect effects of hunting, including: excessive disturbance to wildlife, damage to habitat, and conflicts with other visitor services and experiences.

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7-9	Page 9 of 13 ***Impact to Threatened Species and Species of Conservation Concern*** The EA failed to adequately discuss the impact of the Conservation Plan on threatened or endangered species, and other species of concern. The EA estimates that more than 60% of hunters would not use lead-free ammunition (EA at 76). However, the EA failed to assess the impact that this would have on wildlife, nor did it propose any mitigation measures. Even though there is research to indicate lead ammunition can cause significant harm to waterfowl, raptors, and other animals of conservation concern in the Refuge. *See* Pain, Fisher, & Thomas 2009. It is also possible that the proposed Conservation Plan could disturb listed species under the Endangered Species Act, such as the grizzly bear. The EA mentions that FWS conducted a biological evaluation per section 7 of the Endangered Species Act, but it has not made that document available for public review. FoA requests FWS make that document available along with an EIS, so that we can make a more informed comment regarding the impact of the proposed action on grizzly bears.	**7-9.** Please see response to comment 6-3.
7-10	***Public Health and Safety Impacts*** The proposed action would expand hunting opportunities for young people, possibly adding a week after the end of the regular elk season and adding mentoring programs for young hunters. The EA should consider the public health and safety impacts of expanding hunting and encouraging youth hunting on the Refuge. Federal data from the Centers for Disease Control indicate that between 2007 and 2011, an average of 62 children age 14 and under were accidentally shot and killed each year.[3] According to a study by Everytown for Gun Safety, two children die almost every week in unintentional shootings according to a new study. [4] Despite the raising concerns about hunting and gun safety in America, there is no analysis in the EA of the impacts of new youth targeted hunting programs.	**7-10.** In the interests of public health and safety, the State of Wyoming requires all hunters born on or after Jan 1, 1966, to take a hunting education class that strongly emphasizes firearm safety. The State also requires all hunters under the age of 14 to be accompanied by an adult who has passed this class or who has secured a big game license within the last 5 years.
	Cumulative Impacts If an agency is involved in several actions which, cumulatively, have a significant impact on the environment, then these actions should be considered in the same environmental document. See 40 C.F.R. § 1508.25(a)(2). Additionally, if agency actions	

[3] *See* DeFilippis, E. & Hughes, D. (2014, June 17). Guns Kill Children. *Slate.* Available from: http://www.slate.com/articles/health_and_science/medical_examiner/2014/06/gun_deaths_in_children_statistics_show_firearms_endanger_kids_despite_nra.html

[4] *See* DiBlasio, N. (2014, June 25). Report: More kids die in shootings than statistics show. *USA Today.* Retrieved from: http://www.usatoday.com/story/news/nation/2014/06/25/death-child-unintentional-shooting/11324717/ ; http://everytown.org/article/innocents-lost/

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Comment number	LETTER #7—Friends of Animals, page 10 of 13	RESPONSE
7-11	Page 10 of 13 are similar in that they share common timing or geography, such actions should also be addressed in the same environmental document so as to assess adequately their combined impacts. See 40 C.F.R. § 1508.25(a)(3). Importantly, an agency may not segment actions to unreasonably restrict the scope of the environmental review process. *See Foundation of Economic Trends v. Heckler*, 756 F.2d 143, 159 (D.C. Cir. 1985). The Refuge supports the preservation of large landscapes and migratory animals. With many of these animals imperiled around the globe to due climate change, human development, and habitat destruction, it is important to consider all impacts that could affect the wildlife and habitat at the Refuge. The EA analysis is generally vague and superficial, and it fails to consider the cumulative impacts for all actions. For example, it defers to the objectives set in the Elk and Bison Management plan, but does not analyze the impact of that plan. Additionally, the EA often includes a combination of all alternatives for the proposed action, but fails to provide an independent analysis of the cumulative impact when combining the alternatives. *See e.g.*, EA at 163. ***Ethical Impacts*** It is time for FWS to recognize that individual animals that may be subject to its actions have intrinsic value and this in turn demands that FWS incorporate ethics into its consideration of wildlife management activities. There is a growing recognition among conservationists and biologists that ethics must play a greater role in wildlife policy. See, e.g., Fox & Bekoff, *Integrating Values and Ethics into Wildlife Policy and Management—Lessons from North America*, 1 Animals 126-143 (2011). But as Fox and Bekoff point out: "[w]hile many agree that ethics must play a central role in any project involving [animals], it is often interesting to note that in many books on human-animal interactions . . . there is often no mention of ethics. This needs to change." *Id.* at 129. The same must be said for the regulation of animals. Undoubtedly, discussions in the context of policy development about ethics and animals can make some people uncomfortable. But, of course, just a generation ago it was also unheard of for an agency like FWS to incorporate the humane treatment of animals into its decision-making process. This has changed dramatically. Inclusion of ethical impacts and considerations allows federal, state, and local decision-makers, as well as the public, to better understand the impact of human actions on animal welfare, and allows for better decisions to be made. Our generation needs to adopt the same approach to educating the decision-makers and the public as to the role of ethics in making decisions to "manage" animals. Indeed, it is our jobs as conservationists, animal advocates and scientists "to work toward public education and information dissemination to address real and perceived fears held" by others. *Id.* at 128. What is missing in FWS's EA, is the viewpoint of the animals. Again, from Fox and Bekoff: NATIONAL HEADQUARTERS • 777 POST ROAD SUITE 205 • DARIEN, CT 06820 • T 203 656 1522 • F 203 656 0267 NEW YORK OFFICE • 1841 BROADWAY SUITE 350 • NEW YORK, NY 10023 • T 212 247 8120 • F 212 582 4482 WILDLIFE LAW PROGRAM • 7500 E. ARAPAHOE ROAD SUITE 385 • CENTENNIAL, CO 80112 • T 720 949 7791 FRIENDSOFANIMALS.ORG	**7-11.** Ethics are subjective. The general management philosophy of the Refuge System as determined by current law and policy is to manage for healthy and sustainable wildlife populations and the communities that sustain them. Under the Bison and Elk Management Plan, we are committed to reducing our reliance on supplemental feeding to ensure that in the long term, elk and bison populations are in balance with their habitat. This is our definition of healthy and sustainable. Achieving this goal requires reducing current elk and bison populations. Because hunting is a legislatively mandated priority public use, it is the management tool of choice to achieve our goal to reduce elk and bison numbers and reliance on supplemental feeding. Thank you for your comments.

> The growing body of literature on animal cognition and emotions demonstrates undeniably that animals have interests and points of view. Like us, they avoid pain and suffering and seek pleasure. They form close social relationships, cooperate with other individuals, and likely miss their friends when they are apart. Emotions have evolved, serving as "social glue," and playing major roles in the formation and maintenance of social relationships among individuals. Emotions also serve as "social catalysts," regulating behaviours that guide the course of social encounters when individuals follow different courses of action, depending on their situations. If we carefully study animal behaviour, we can better understand what animals are experiencing and feeling and how this factors into how we treat them.

Id. at 131.

The EA fails to include a serious discussion of the ethical implications of the proposed action, including hunting animals on the Refuge.

FWS should prepare an EIS that includes a legitimate discussion of ethics and the rights of wildlife in order to assist the public and decision makers in fully considering the best alternative to choose. This approach would be consistent with the purposes of NEPA.

Thank you for the opportunity to comment on this Draft EA. FoA hopes that you will reconsider the legal and ethical impacts of the proposed actions and prepare an EIS before approving a Final Comprehensive Conservation Plan for the National Elk Refuge.

Sincerely,

Jenni Barnes

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Comment number	LETTER #8—Greater Yellowstone Coalition, page 1 of 9	RESPONSE

Greater Yellowstone Coalition

America's Voice for a Greater Yellowstone | LANDS • WATERS • WILDLIFE

October 24, 2014

U.S. Fish and Wildlife Service
Attn: Toni Griffin, Planning Team Leader
134 Union Boulevard, Suite 300
Lakewood, CO 80228

Re: National Elk Refuge Comprehensive Comprehensive Plan

Please accept these comments on behalf of the Greater Yellowstone Coalition (GYC). GYC has over 48,000 supporters and constituents who support our mission of protecting the lands, waters and wildlife of the Greater Yellowstone Ecosystem (GYE), now and for future generations. The GYC was founded in 1983 on a simple premise: An ecosystem will remain healthy and wild only if it is kept whole and we advocate for the idea that ecosystem level sustainability and science should guide the management of the region's public and private lands.

This vast ecosystem includes 20 million acres of wild country that includes Yellowstone and Grand Teton National Parks, parts of six national forests, five national wildlife refuges, and state and private lands in Wyoming, Idaho, and Montana.

The Greater Yellowstone Coalition works to ensure that a thoughtful and holistic approach is taken to managing the national and wildlife resources in harmony with people and modern development. We work to shape a future where wildlife populations maintain their full diversity and vitality, where ecological processes function on public lands with minimal intervention, where exceptional recreational opportunities abound for visitors and residents alike, and where communities can enjoy a healthy and diversified economy.

Principals behind GYC's comments
GYC has a history of advocating for better management on the National Elk Refuge (NER) including reducing artificial concentrations of elk and bison and the phaseout of supplemental

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feeding. We also provided comments during the scoping period for the Comprehensive Conservation Plan (CCP) on November 22, 2010.

The National Wildlfe Refuge System Improvement Act requires that the U.S. Fish and Wildlife Service administer refuge lands to "provide for the conservation of fish, wildlife, and plants, and their habitats within the System" and to "ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations of Americans." [1] Conservation is defined as requiring the Service "to sustain and, where appropriate, restore and enhance, healthy populations of fish, wildlife, and plants utilizing, in accordance with applicable Federal and State laws, methods and procedures associated with modern scientific resource programs."

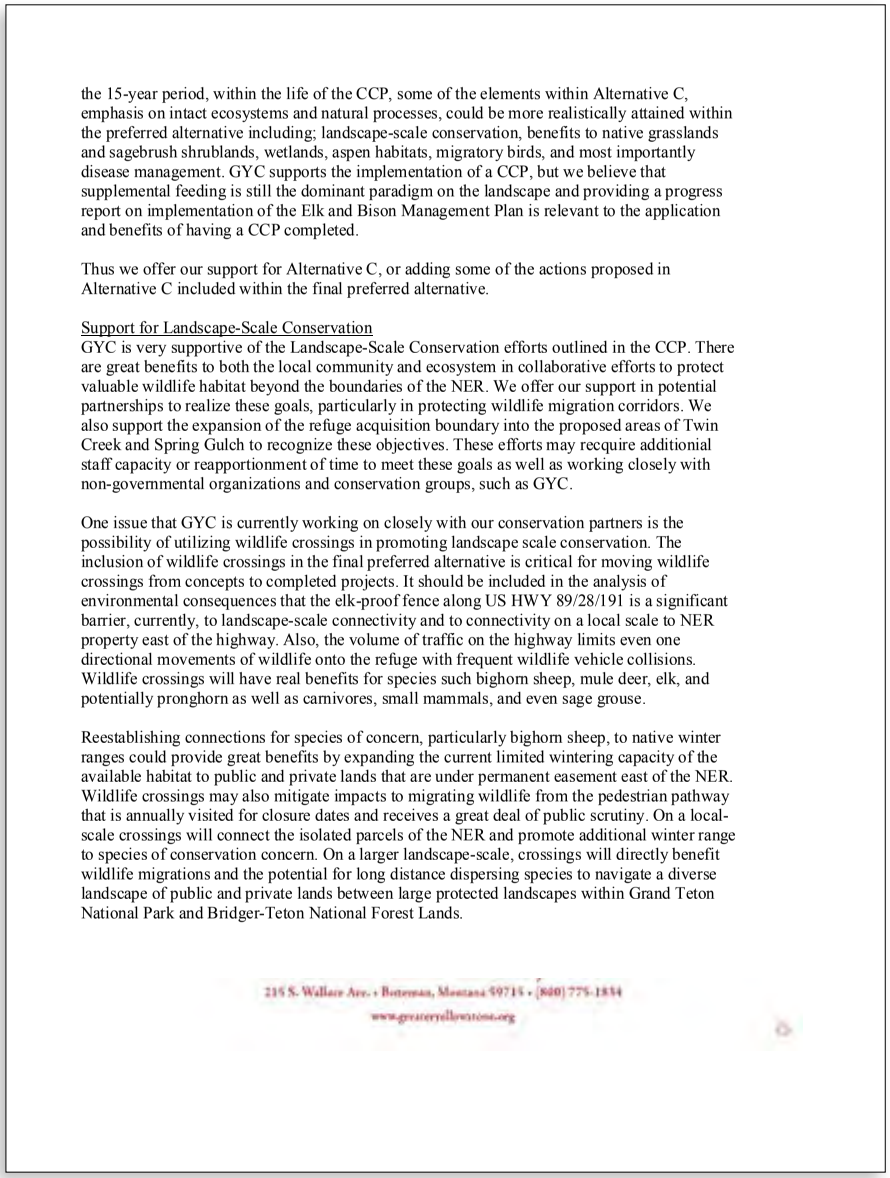
This direction requires management of the NER in a way that is ecologically sustainable into the future. The National Elk Refuge lies geographically in the center of the GYE and is literally in the town of Jackson's backyard. It is integral to the quality of life of Jackson's residents and also to the diversity of the flora and fauna of the ecosystem. One of the remarkable things about the NER is that for most of the year the refuge is completely free of human presence allowing for one of the few locations within the ecosystem where ecological processes are unimpeded by human actions. This value should be highlighted in the final CCP. The available human recreation, whether fly fishing on Flat Creek, elk hunting, or wildlife watching are all significantly enhanced by this management of human access. Many of our members and staff participate and greatly enjoy all of these activities at their current levels and feel that further expansion will degrade my experience.

There is a pervasive management regime that limits the NER's ability to meet the above requirements under the National wildlife Refuge System Improvement Act: Supplemental feeding of elk and bison. While the CCP does not address supplemental feeding or provide any management recommendations, actions, or environmental consequences as a result of supplemental feeding, it does span the life of the 2007 Elk and Bison Management Plan/EIS. Supplemental feeding directly limits the applicability of management actions within the proposed alternatives, such as improving riparian habitats, enhancing sagebrush communities, and aspen regeneration. The August 3, 2011 Federal Appeals Court decision [2] noted that "There is no doubt that unmitigated continuation of supplemental feeding would undermine the conservation purpose of the National Wildlife Refuge System." Further, "over a fifteen-year period, "[a]s habitat and population objectives are achieved, [the agencies will aim to] decrease reliance on intensive the supplemental winter feeding, including complete transition to free-standing forage if and when several established criteria are met, including support from the Wyoming Game and Fish Department and the public."

Therefore we believe it would be timely to provide an analysis of the proposed actions within the CCP in light of progress made within the 15-year Elk and Bison Management Plan. At the end of

[1] 16 U.S.C§668dd(a)(4)(A),(B)
[2] Defenders of Wildlife vs. Salazar. Case No. 10-5144

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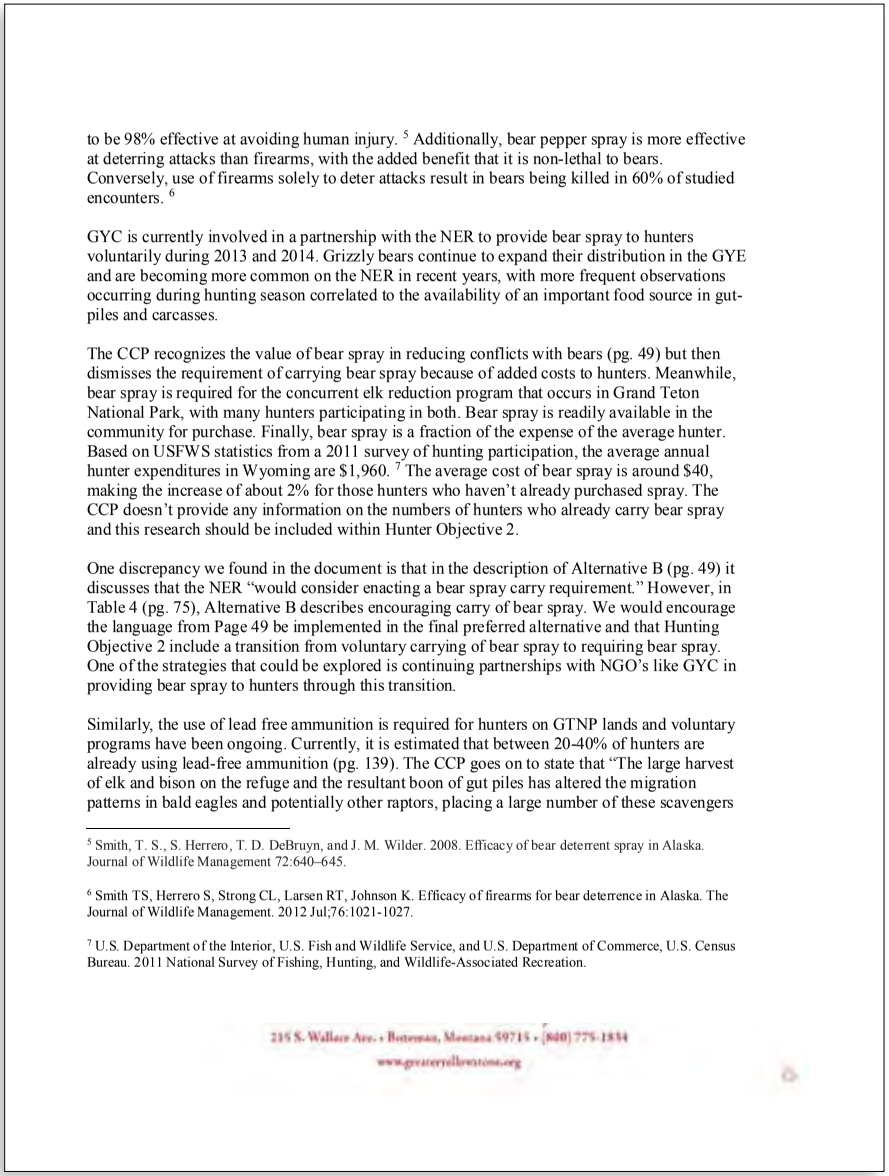
Comment number	LETTER #8—Greater Yellowstone Coalition, page 3 of 9	RESPONSE
8-1 8-2		**8-1.** Thank you for your comments. **8-2.** The CCP often serves—and in this case does serve—as an umbrella document that states in the preferred alternative, "Consider partnerships to build wildlife crossings over Highway 89." The refuge has initiated the process of investigating wildlife crossing options for Highway 89 to improve landscape connectivity. A detailed analysis of this issue, which will include expertise from the Western Transportation Institute–Montana State University, will explore options for consideration.

Comment number	LETTER #8—Greater Yellowstone Coalition, page 4 of 9	RESPONSE
8-3	We are extremely supportive of these actions and are actively working on partnerships to make these visions a reality for Jackson Hole. We ask that steps towards meeting this objective such as completing an analysis of NER roadways and mitigation strategies and strategies for creating partnerships to implement wildlife crossings, be included in Chapter 6. Climate Change Climate change is the most significant long-term threat to the Greater Yellowstone Ecosystem and to the integrity of the NER. It is also one of the most difficult to address in planning efforts because of its scale and limits within agency direction. However, there have been several significant policy directives and strategy documents that would be beneficial to include within the CCP. On December 20, 2012, the Department of Interior issued a directive in climate change policy. [3] That policy states: *"1.4. It is the policy of the Department to effectively and efficiently adapt to the challenges posed by climate change to its mission, programs, operations, and personnel. The Department will use the best available science to increase understanding of climate change impacts, inform decision making, and coordinate an appropriate response to impacts on land, water, wildlife, cultural and tribal resources, and other assets. The Department will integrate climate change adaptation strategies into its policies, planning, programs, and operations, including, but not limited to, park, refuge, and public land management; habitat restoration; conservation of species and ecosystems; services and support for tribes and Alaska Natives; protection and restoration of cultural, archeological and tribal resources; water management; scientific research and data collection; land acquisition; management of employees and volunteers; visitor services; construction; use authorizations; and facilities maintenance."* While the CCP does consider climate change, we feel there is an additional step in the planning process to adequately implement the DOI policy. Specific examples within this policy to consider are: *(7) Use well-defined and established approaches, as appropriate, for managing through uncertainty, including:* *(1) vulnerability assessments, (2) scenario planning, (3) adaptive management, and (4) other risk management or structured decision making approaches. The Department's Adaptive Management Implementation Policy is provided in 522 DM 1.* *(8) Avoid "maladaptive" actions, that is, actions intended to avoid or reduce vulnerability to climate change that negatively impact or increase the vulnerability of other systems, sectors, or social groups.* *(9) Promote landscape-scale, ecosystem-based management approaches to enhance the resilience and sustainability of linked human and natural systems. (10) Advance approaches to managing linked human and natural systems that help mitigate the impacts of climate change, including:* *(a) Protect diversity of habitat, communities and species;* *(b) Protect and restore core, unfragmented habitat areas and the key habitat linkages among them;* *(c) Anticipate and prepare for shifting wildlife movement patterns;* [3] http://www.fws.gov/mountain-prairie/science/documents/Climate%20Change%20Policy_DM_523.pdf 215 S. Wallace Ave. • Bozeman, Montana 59715 • (800) 775-1854 www.greateryellowstone.org	**8-3.** Please see the response to comment 6-6.

Comment number	LETTER #8—Greater Yellowstone Coalition, page 5 of 9	RESPONSE
	(d) Maintain key ecosystem services; *(e) Monitor, prevent, and slow the spread of invasive species (defined in Executive Order 13112 as alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health); and* *(f) Focus development activities in ecologically disturbed areas when possible, and avoid ecologically sensitive landscapes, culturally sensitive areas, and crucial wildlife corridors.*	
8-4	This directive contains some considerations that would benefit the CCP, particularly protecting diversity of habitat, community, and species, avoiding maladaptive actions (such as water diversions), providing vulnerability assessments, and finally protecting and restoring core unfragmented habitat areas and key habitat linkages. We applaud the efforts of the NER to restore and improve aquatic habitats along Flat Creek with agency and non-governmental organizations. We encourage the NER to consider similar future restoration projects for aspen communities, wetland communities beyond Flat Creek, and utilizing wildland fire to restore habitats.	**8-4.** Thank you for your comment.
8-5	We ask the NER to consider the effects of water diversion structures on the Gros Ventre River beyond the refuges boundaries. Connecting the Gros Ventre River drainage with the mainstem Snake River year-round could be considered a climate change adaptation strategy and have real benefits to natural wetlands. We hope additional attention to water diversion and actions to wetlands and natural flow systems of Flat Creek and the Gros Ventre River can be included in the final preferred alternative.	**8-5.** Thank you for your comment.
8-6	An additional example of climate change planning direction that could benefit the final CCP is a recent publication on climate change adaptation: *National Fish, Wildlife and Plants Climate Change Adaptation Strategy*[4] *(NFWPCAS)*, with USFWS and NPS listed as co-contributors. This document has numerous examples of effective measures that should be implemented to offset and adapt to the impacts of climate change. The NFWPCAS has specific recommendations that are described as initial steps towards climate change adaptation that could be useful for incorporation into the CCP. For example Action 1.1.1 (page 58), "identify and map high priority areas for conservation using information such as species distributions (current and projected), habitat classification, land cover, and geophysical settings (including areas of rapid change and slow change)." The NFWPCAS report also lists coordination as a critical step in addressing climate change and species conservation in Strategy 3.2 (page 65): "Facilitate a coordinated response to climate change at landscape, regional, national, and international scales across state, federal, and tribal natural resource agencies and private conservation organizations." We ask that the NER take steps to address this coordination in the final CCP.	**8-6.** As mentioned above, the CCP often serves as an umbrella document that provides general guidance and direction. For complex topics and issues such as climate change, a more detailed planning and implementation document will need to be developed that provides more detail than can be addressed in the CCP.
8-7	Bear spray and Lead-Free Ammunition Alternative C outlines actions that would require carrying bear spray and use of lead free ammunition. We ask that these two actions be included in the preferred alternative. Bear spray is known to be an effective method for avoiding dangerous confrontations (such as charging when encountered at a gutpile or carcass) in 92% of encounters where it's used correctly. It has shown	**8-7.** Although requiring hunters to carry bear spray will increase their expenses, this is not the sole consideration for this topic. See the explanation for the bear spray decision in response to comment 1-8.

[4] http://www.fws.gov/refuges/vision/pdfs/PlanningforClimateChangeontheNWRS.pdf

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Comment number	LETTER #8—Greater Yellowstone Coalition, page 6 of 9	RESPONSE
8-8 8-9		**8-8.** Thank you for pointing out the confusion between pages 49 and 75. The final CCP reflects that we will evaluate our bear spray policy in 5 years. Please see the response to comment 1-8 for additional information concerning bear spray. **8-9.** Thank you for your detailed review of the CCP. The statement that "20 and 40 percent of refuge hunters use lead-free ammunition" is no longer accurate. The 2014 refuge hunting reports indicate that approximately 60 percent of successful elk hunters are voluntarily using non-lead ammunition. For additional information about lead-free ammunition, please see the response to comment 6-3.

to be 98% effective at avoiding human injury. [5] Additionally, bear pepper spray is more effective at deterring attacks than firearms, with the added benefit that it is non-lethal to bears. Conversely, use of firearms solely to deter attacks result in bears being killed in 60% of studied encounters. [6]

GYC is currently involved in a partnership with the NER to provide bear spray to hunters voluntarily during 2013 and 2014. Grizzly bears continue to expand their distribution in the GYE and are becoming more common on the NER in recent years, with more frequent observations occurring during hunting season correlated to the availability of an important food source in gut-piles and carcasses.

The CCP recognizes the value of bear spray in reducing conflicts with bears (pg. 49) but then dismisses the requirement of carrying bear spray because of added costs to hunters. Meanwhile, bear spray is required for the concurrent elk reduction program that occurs in Grand Teton National Park, with many hunters participating in both. Bear spray is readily available in the community for purchase. Finally, bear spray is a fraction of the expense of the average hunter. Based on USFWS statistics from a 2011 survey of hunting participation, the average annual hunter expenditures in Wyoming are $1,960. [7] The average cost of bear spray is around $40, making the increase of about 2% for those hunters who haven't already purchased spray. The CCP doesn't provide any information on the numbers of hunters who already carry bear spray and this research should be included within Hunter Objective 2.

One discrepancy we found in the document is that in the description of Alternative B (pg. 49) it discusses that the NER "would consider enacting a bear spray carry requirement." However, in Table 4 (pg. 75), Alternative B describes encouraging carry of bear spray. We would encourage the language from Page 49 be implemented in the final preferred alternative and that Hunting Objective 2 include a transition from voluntary carrying of bear spray to requiring bear spray. One of the strategies that could be explored is continuing partnerships with NGO's like GYC in providing bear spray to hunters through this transition.

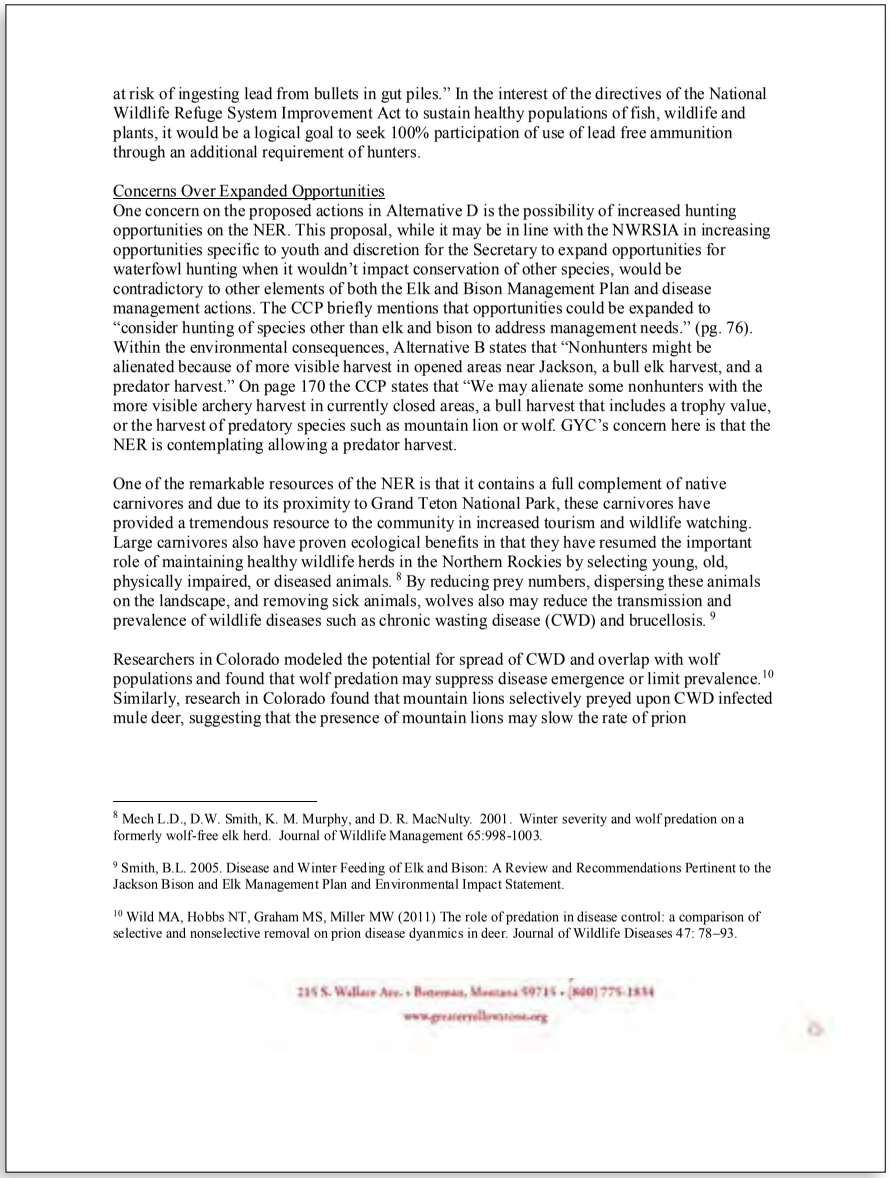
Similarly, the use of lead free ammunition is required for hunters on GTNP lands and voluntary programs have been ongoing. Currently, it is estimated that between 20-40% of hunters are already using lead-free ammunition (pg. 139). The CCP goes on to state that "The large harvest of elk and bison on the refuge and the resultant boon of gut piles has altered the migration patterns in bald eagles and potentially other raptors, placing a large number of these scavengers

[5] Smith, T. S., S. Herrero, T. D. DeBruyn, and J. M. Wilder. 2008. Efficacy of bear deterrent spray in Alaska. Journal of Wildlife Management 72:640–645.

[6] Smith TS, Herrero S, Strong CL, Larsen RT, Johnson K. Efficacy of firearms for bear deterrence in Alaska. The Journal of Wildlife Management. 2012 Jul;76:1021-1027.

[7] U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

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Comment number	LETTER #8—Greater Yellowstone Coalition, page 7 of 9	RESPONSE
8-10		**8-10.** We agree that predators provide benefits that support the mission of the refuge, and a hunting season specifically for predators is not envisioned. All references to the hunting of predators have been removed from the final CCP.

at risk of ingesting lead from bullets in gut piles." In the interest of the directives of the National Wildlife Refuge System Improvement Act to sustain healthy populations of fish, wildlife and plants, it would be a logical goal to seek 100% participation of use of lead free ammunition through an additional requirement of hunters.

Concerns Over Expanded Opportunities

One concern on the proposed actions in Alternative D is the possibility of increased hunting opportunities on the NER. This proposal, while it may be in line with the NWRSIA in increasing opportunities specific to youth and discretion for the Secretary to expand opportunities for waterfowl hunting when it wouldn't impact conservation of other species, would be contradictory to other elements of both the Elk and Bison Management Plan and disease management actions. The CCP briefly mentions that opportunities could be expanded to "consider hunting of species other than elk and bison to address management needs." (pg. 76). Within the environmental consequences, Alternative B states that "Nonhunters might be alienated because of more visible harvest in opened areas near Jackson, a bull elk harvest, and a predator harvest." On page 170 the CCP states that "We may alienate some nonhunters with the more visible archery harvest in currently closed areas, a bull harvest that includes a trophy value, or the harvest of predatory species such as mountain lion or wolf. GYC's concern here is that the NER is contemplating allowing a predator harvest.

One of the remarkable resources of the NER is that it contains a full complement of native carnivores and due to its proximity to Grand Teton National Park, these carnivores have provided a tremendous resource to the community in increased tourism and wildlife watching. Large carnivores also have proven ecological benefits in that they have resumed the important role of maintaining healthy wildlife herds in the Northern Rockies by selecting young, old, physically impaired, or diseased animals. [8] By reducing prey numbers, dispersing these animals on the landscape, and removing sick animals, wolves also may reduce the transmission and prevalence of wildlife diseases such as chronic wasting disease (CWD) and brucellosis. [9]

Researchers in Colorado modeled the potential for spread of CWD and overlap with wolf populations and found that wolf predation may suppress disease emergence or limit prevalence. [10] Similarly, research in Colorado found that mountain lions selectively preyed upon CWD infected mule deer, suggesting that the presence of mountain lions may slow the rate of prion

[8] Mech L.D., D.W. Smith, K. M. Murphy, and D. R. MacNulty. 2001. Winter severity and wolf predation on a formerly wolf-free elk herd. Journal of Wildlife Management 65:998-1003.

[9] Smith, B.L. 2005. Disease and Winter Feeding of Elk and Bison: A Review and Recommendations Pertinent to the Jackson Bison and Elk Management Plan and Environmental Impact Statement.

[10] Wild MA, Hobbs NT, Graham MS, Miller MW (2011) The role of predation in disease control: a comparison of selective and nonselective removal on prion disease dyanmics in deer. Journal of Wildlife Diseases 47: 78–93.

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transmission. [11] We suggest that the research on the topic of predation and limiting disease transmission is robust enough to consider the maintenance of populations of predators on the NER as a Disease Management Objective in Chapter 6. Additionally, allowing for predators to play their ecological role may assist the NER in meeting their bison and elk management objectives through the compensatory role of predation, especially during severe winters.

In the completion of the Jackson Herd (Elk 102) Unit Brucellosis Management Action Plan [12] (BMAP) the Wyoming Game and Fish Department recommended as a best management practice that there is no harrassment or harvest of scavengers on feedgrounds. Research suggests that protection of scavengers on and adjacent to feedgrounds could reduce intraspecific transmission of brucellosis. Wyoming Game and Fish Department held meetings to discuss these options with the NER on January 20th 2011. Scavengers on the National Elk Refuge would include all predatory species.

Finally, with gray wolves currently a listed species under the Endangered Species Act, the Service cannot legally propose expanding hunting opportunities to wolves. Allowing hunting of wolves would not only be illegal, but will certainly alienate non-hunters, conservation-minded hunters, wildlife watchers and the Jackson community. Any expanded hunting opportunities for species beyond elk and bison must undergo a thorough review under the National Environmental Policy Act.

8-11.

Increased Conservation efforts for other NER species
GYC supports the efforts proposed around the conservation of bighorn sheep and trumpeter swans. One concern is how any additional human presence in the form of recreationists along the interior road or increased angling opportunities would effect these two species of conservation concern. We ask that before approving these activities a throrough analysis of risk to these species be completed.

Conclusions
I appreciate the opportunity to submit these comments on behalf of Greater Yellowstone Coalition on the Draft National Elk Refuge Comprehensive Conservation Plan. The NER is integral to the GYE and supports native species, water conservation, and ecosystem function for the vast neighboring lands of Grand Teton National Park and the Bridger Teton National Forest. GYC supports the implementation of the CCP and requests that modifications be made to the final preferred alternative to include some of the elements within Alternative C. We believe that after providing analsysis of the progress and timeline for the Elk and Bison Management Plan that additionial assistance to ecosystem function could be included in the final plan.

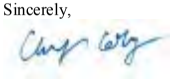
Addmittedly, the NER is a special place for me personally. I successfully harvested my first elk in Wyoming on these lands, spend many enjoyable summer nights fishing on its waters, show

[11] C. E. Krumm, M. M. Conner, N. T. Hobbs, D. O. Hunter, M. W. Miller. (2010) Mountain lions prey selectively on prion-infected mule deer. *Biology Letters* **6**, 209-211.

[12] http://wgfd.wyo.gov/web2011/Departments/Wildlife/pdfs/BMAP_JACKSONELK_UPDATED0001666.pdf

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8-11. Thank you for your comment.

Comment number	LETTER #8—Greater Yellowstone Coalition, page 9 of 9	RESPONSE
8-12.	visitors their first wolf or bighorn sheep in the wild from its overlooks, and commute daily along its roadways envisioning the possibilities for wildlife crossings. Seeing the CCP successfully implemented and managed sustainably into the future is critical to GYC, the local community and to the integrity of the GYE. Thank you for your consideration of these comments, Sincerely,  Chris Colligan Wildlife Program Coordinator, Greater Yellowstone Coalition 215 S. Wallace Ave. • Bozeman, Montana 59715 • (800) 775-1854 www.greateryellowstone.org	**8-12.** Thank you for your detailed review of the draft CCP and your insightful comments.

Comment number	LETTER #9—The Humane Society, page 1 of 3	RESPONSE
9-1		**9-1.** Thank you for your comments. Please see the response to comment 6-3.

THE HUMANE SOCIETY
OF THE UNITED STATES

October 9, 2014

Sent via Email (refuge_ccps@fws.gov)

Toni Griffin, Planning Team Leader
Suite 300
134 Union Boulevard
Lakewood, CO 80228

RE: National Elk Refuge, Wyoming Draft Comprehensive Conservation Plan/Environmental Assessment

Dear Ms. Griffin:

On behalf of The Humane Society of the United States ("The HSUS") and our Wyoming supporters, I thank you for this opportunity to comment on the U.S. Fish and Wildlife Service's ("the Service") comprehensive conservation plan and environmental assessment ("CCP/EA") for the National Elk Refuge, Wyoming ("the Refuge" or "NWR"). 79 Fed. Reg. 51,356 (Aug. 28, 2014). The HSUS offers the following comments in opposition to Alternatives A, B and D and in support of Alternative C.

We commend the Service for addressing the serious threats posed to wildlife by the use of lead ammunition. The CCP for the National Elk Refuge states that:

> [R]esearch confirms the negative effect that lead ammunition has on scavenging bird populations such as bald eagles and ravens. The large harvest of elk and bison on the refuge and the resultant boon of gut piles have altered the migration patterns in bald eagles and potentially other raptors, placing a large number of these scavengers at risk of ingesting lead from bullets in gut piles.[1]

Given this, we oppose alternatives A, B, and D, which only promote the voluntary use of non-lead ammunition rather than solving the problem proactively by requiring the use of non-lead ammunition. We urge the Service to adopt Alternative C and implement a non-lead ammunition requirement for hunting on the Refuge.

Use of Lead Ammunition on NWRs is Dangerous to Human Health and Wildlife.

Every year, lead ammunition is discharged throughout Wyoming by hunters and others shooting wildlife, creating a poisonous environment for many species. More than 130 species of wild animals suffer the effects of lead poisoning from spent lead ammunition globally, either by foraging

[1] USFWS. 2014. Draft Comprehensive Conservation Plan—National Elk Refuge, Wyoming. Pg.139.

Comment number	LETTER #9—The Humane Society, page 2 of 3	RESPONSE

spent lead shot from the ground, feeding on the remains of lead-tainted gut piles, or scavenging the carcasses of animals shot with lead ammunition and left behind.[2] A single ingested shotgun pellet or bullet fragment is sufficient to cause brain damage in birds, resulting in inhibition of critical neuromuscular, auditory, and visual responses. Lead poisoning can induce lethargy, blindness, paralysis of lungs and intestinal tract, various organ failure, seizure and death in wild animals. In fact, more than 500 scientific studies document the poisoning of wildlife from spent lead ammunition.

Additionally, lead is a dangerous toxin to humans when consumed. The Center for Disease Control states there is no safe exposure level for humans.[3] Individuals who consume meat from animals killed with lead ammunition are at risk for lead exposure.[4] Several studies using x-ray imaging have shown lead ammunition is highly fragmentable and nearly impossible to completely remove from meat, even after professional processing.[5] It is clear that use of lead ammunition is not only harmful to wildlife but to human health and safety.

Voluntary Programs Do Not Eliminate the Threat of Lead Poisoning.

The CCP/EA addresses the fact that "scavenging birds would be at risk of lead poisoning because more than 60% of hunters would not use lead-free ammunition."[6] Alternative C would address this issue by requiring the use of non-lead ammunition for hunting on the Refuge.

Switching from lead to non-lead ammunition will provide greater protection for the Refuge's ravens, eagles, and other wild animals from the dangers of lead poisoning. Voluntary programs still allow toxic lead ammunition to be dispersed throughout the environment with no accountability from those who refuse to use non-lead ammunition. In fact, voluntary programs have never proven to be successful at achieving full participation, leaving between 10-15 % of hunters who refuse to use non-lead ammunition. Further, the existing voluntary programs in other states are limited to geographic space and fail to encompass the entire state. Addressing this percentage of noncompliant hunters is crucial, given that even 1 % of carcasses tainted with spent lead ammunition can cause 30-50% chance of exposure to California condors—one of the many scavenging species that feed off of gutpiles and carcasses left in the field.[7]

Since 2008, 15 California condors have been confirmed killed by lead poisoning in Arizona where voluntary programs have been established. Six other recent condor deaths are awaiting necropsy and 20 additional condors have gone missing and are dead of unknown causes in the Arizona/Utah region in the same time period.[8]

Furthermore, regulatory action has proven effective, as millions of animals have been saved through a single mandatory non-lead ammunition requirement implemented by the Service.[9] In 1991, the use of lead

[2] M.A. Tranel & R.O. Kimmel. 2009. Impacts of lead ammunition on wildlife, the environment, and human health – a literature review and implications for Minnesota. In Ingestion of Lead from Spent Ammunition: Implications for Wildlife and Humans. R.G. Watson, et al., eds. Boise, Idaho: The Peregrine Fund.
[3] Centers for Disease Control and Prevention. 2013. Lead Factsheet. National Biomonitoring Program. http://www.cdc.gov/biomonitoring/Lead_FactSheet.html.
[4] D.J. Pain, et al. Potential hazard to human health from exposure to fragments of lead bullets and shot in the tissues of game animals. *PLoS ONE* 2010; 5: e10315.
[5] U.S. National Park Service. 2011. Lead Bullet Risks for Humans & Wildlife. http://www.nps.gov/pinn/naturescience/leadinfo.htm.
[6] USFWS. 2014. Draft Comprehensive Conservation Plan—National Elk Refuge, Wyoming. Pg.76.
[7] M. Finkelstein, et al. 2012. Lead poisoning and the deceptive recovery of the critically endangered California condor. Proceedings of the National Academy of Science Journal. DOI 10.1073/pnas.1203141109
[8] Center for Biological Diversity. 2014. Arizona Game and Fish Department Tries to Spin Continued Condor Lead Poisonings Into "Success" Story. http://www.biologicaldiversity.org/news/press_releases/2014/california-condor-07-02-2014.html
[9] W.L. Anderson, S.P. Havera & B.W. Zercher. 2000. Ingestion of lead and nontoxic shotgun pellets by ducks in the Mississippi flyway. Journal of Wildlife Management 64:848-857.

shot when hunting migratory waterfowl was phased out by the Service after biologists and conservationists estimated that roughly 2 million ducks died each year from ingesting spent lead pellets.[10] And last year, California addressed the serious threats of this toxin by passing legislation (Assembly Bill 711) to phase out lead ammunition used for the take of all wildlife, citing not only harmful effects to the endangered California condor, but to other species as well.[11]

Sportsmen and Women will not stop Hunting due to a Mandatory Non-Lead Requirement

The CCP states that, "hunters would incur higher costs from the more expensive lead-free ammunition, and this requirement might alienate some hunters."[12] The 1991 mandatory non-lead shot requirement for hunting waterfowl did not discourage hunters from hunting waterfowl decades ago, and the 2008 non-lead ammunition requirement for big game hunting in California condor territory actually showed a slight increase in hunter participation after the non-lead requirement took effect.[13] The small cost differential between lead and non-lead ammunition is miniscule when accounting for all the other equipment, clothing, and transportation costs associated with hunting, which is why waterfowl hunters and California big game hunters have continued to hunt after non-lead ammunition requirements took effect.

Many hunters support the use of nontoxic ammunition and millions of hunters already use it not only for waterfowl, but for other game species. The availability, performance, and affordability of non-lead ammunition has never been greater than it is today. Many government entities like the U.S. Army and the National Park Service have already made commitments to eliminate most uses of lead ammunition, citing environmental and animal welfare concerns.[14]

Therefore, we recommend that the Service address this important issue by rejecting Alternatives A, B, and D and adopting Alternative C to require the use of non-lead ammunition on the Refuge. Without a mandatory requirement to use lead-free ammunition for hunting, spent lead pellets and bullet fragments will undoubtedly be ingested causing the suffering or death of wildlife and effects on human health. With alternatives readily available, there is no reason to allow lead ammunition to be used for hunting on the Refuge.

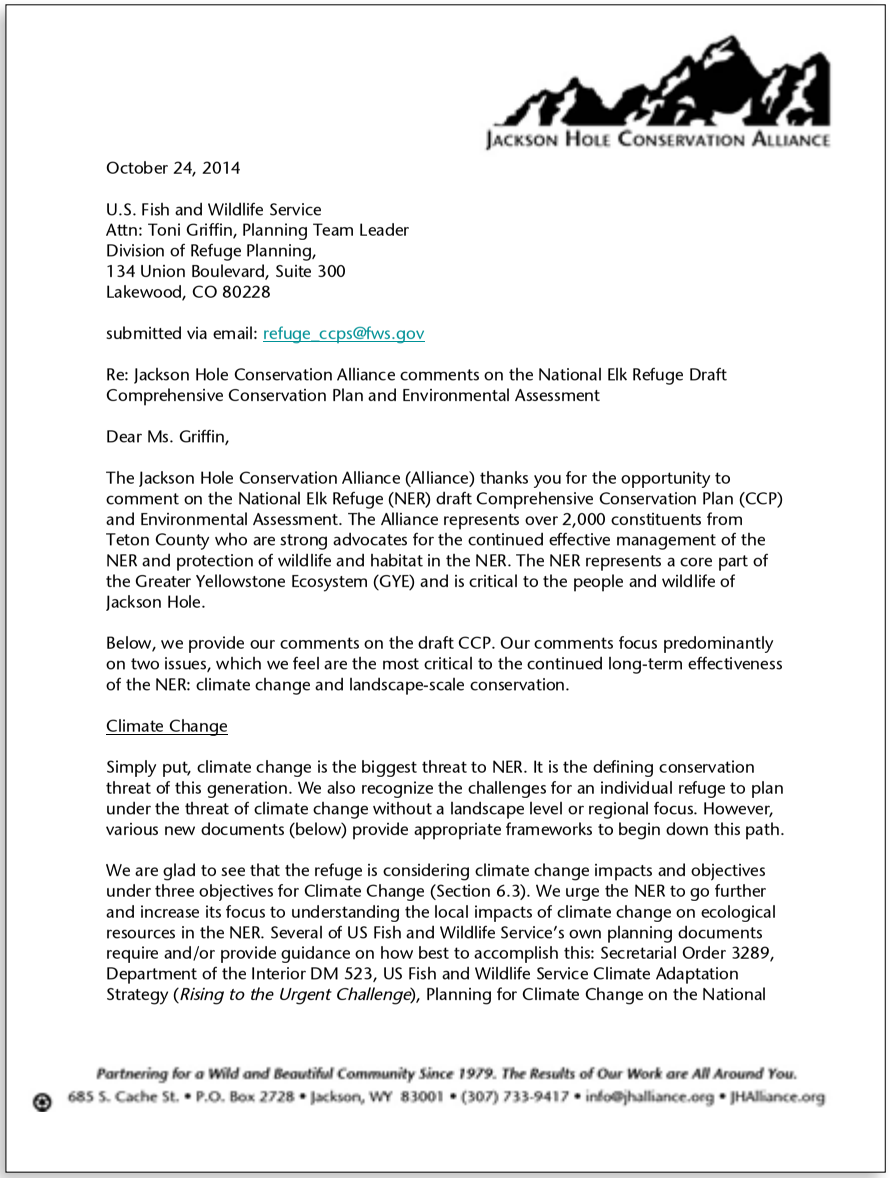
Thank you in advance for considering these comments.

Sincerely,

Jennifer Hillman

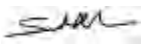
Western Regional Director
The Humane Society of the United States

[10] *Id.*
[11] Brown, Edmund G. "AB 711." Letter to Members of the California State Assembly. 11 Oct. 2013. State of California. N.p., n.d. Web. 18 Sept. 2014.
[12] USFWS. 2014. Draft Comprehensive Conservation Plan—National Elk Refuge, Wyoming. Pg.171.
[13] California Department of Fish & Wildlife. Deer Harvest Data. 2007-2011. http://www.dfg.ca.gov/wildlife/hunting/deer/deerhunt.html
[14] D. Mikko. 1999. "U.S. Military Green Bullet". *Association of Firearm and Tool Mark Examiners Journal* 31.4, Environment News Service. 19 Mar. 2009. http://www.ens-newswire.com/ens/mar2009/2009-03-16-093.html.

Comment number	LETTER #10—Jackson Hole Conservation Alliance, page 1 of 4	RESPONSE
10-1		**10-1.** Strategic habitat conservation (page 9 of the draft CCP) is an adaptive resource management approach that has been adopted by the Refuge System. Strategic habitat conservation in addition to the U.S. Fish and Wildlife Service's "Strategic Plan for Responding to Accelerating Climate Change" contributes to the framework for this CCP and its stepdown plans. For more information about climate change, please see the response to comment 6-6.

Comment number	LETTER #10—Jackson Hole Conservation Alliance, page 2 of 4	RESPONSE
10-2	Wildlife Refuge System (Czech et al 2014), and Considering Multiple Futures: Scenario Planning to Address Uncertainty in Natural Resource Conservation (Rowland et al 2014). General themes for planning outlined in these documents urge managers to use science to best predict future impacts on wildlife and habitat, carry out management in an adaptive framework using sound monitoring, and planning for resilience in ecological and social communities. We suggest taking specific strategic steps to incorporate such planning frameworks into the CCP and the step-down management plans (habitat, inventory and monitoring, fire, disease). Overall, we emphasize Climate Change Objective 2 (Chp 6, pg 199) – conducting vulnerability assessments. We urge that the NER not just participate in climate change assessment but initiate monitoring at the refuge level so that such assessments allow NER to best manage wildlife and habitat. A few specific climate impacts that we believe will be of particular importance to monitor and manage: • Hydrology and stream flow, for instance in the Gros Ventre River and Flat Creek and its impact on fisheries; • Disease and invasive species; • Wildlife habitat connectivity; and • Wildland fire and impacts on sage grouse habitat. We think that the refuge should actively seek ways to evaluate long-term impacts and use long-term monitoring data to best maintain ecological resilience in the face of climate change. Clearly, addressing climate change impacts will take a coordinated, landscape-level effort as identified in part under strategies outlined in Climate Change objectives 1 and 2. We applaud the refuge's participation and work with the Greater Yellowstone Coordinating Committee. Climate impact science and decision support tools are also being developed at Regional Science Centers and the Landscape Conservation Collaborative, of which the refuge is a part. We encourage the refuge to seek out existing science from these institutions as a basis to understand and manage local impacts on refuge resources. <u>Landscape-Scale Conservation</u> A widely accepted strategy to increase the resilience of animal populations to withstand the effects of climate change is addressing landscape-scale connectivity between habitats. Specifically, we appreciate the refuge's strategies to implement landscape-scale conservation objectives 3, 4 and 5. We strongly support the NER's focus on protecting wildlife habitat beyond its boundaries. Several parcels around the NER, both privately or	10-2. Please see the response to comment 6-6.

Comment number	LETTER #10—Jackson Hole Conservation Alliance, page 3 of 4	RESPONSE
10-3	state-owned, currently provide key ecological functions – for instance as migratory or movement corridors. It is necessary to have strategies that will develop proactive solutions with surrounding landowners and managers, be they USFS, private, or state. We believe that targeted land exchanges, easements or other conservation measures (as described in strategies under objectives 3 and 4) for valuable land outside refuge boundaries are critical to the long-term effective functioning of the elk refuge as big game winter range. We offer the refuge our support and would be delighted to work with local refuge staff, other organizations, and citizens to find sustainable solutions to conserve habitat around the refuge. Specifically, we view wildlife crossings (over- or under-passes across roads) as one clearly demonstrated solution for increasing habitat connectivity and reducing wildlife-vehicle collisions. The fence along US Hwy 89 is a significant barrier to wildlife movement (for instance see recent study FHWA-WY-13/08F, Riginos et al Mule Deer Movement and Habitat Use Patterns in Relation to Roadways in Northwest Wyoming). Further, traffic along this road results in a significant number of wildlife collisions for elk and mule deer. Wildlife-vehicle collisions kill wildlife; make our roads less safe, and cost taxpayer money. Past research shows that the cost of just seven deer collisions per mile of road makes investments in crossings cost-effective in the long-term. Wildlife crossings have been unequivocally shown to reduce mortality associated with wildlife-vehicle collisions – saving wildlife and reducing property damage, while simultaneously providing connectivity across habitats fragmented by roads. Wildlife crossings over this highway will tangibly improve habitat connectivity for several species: elk, mule deer, and bighorn sheep, pronghorn, small mammals and potentially even sage grouse, a species under consideration for listing under the Endangered Species Act. Fostering such landscape-level habitat connectivity will have short-term habitat benefits by increasing the availability of winter habitat for several species as well as providing a long-term buffer against climate impacts. Given the new conservation easements along East Gros Ventre Butte, building wildlife crossings to link habitats on both sides of US Hwy 89 is a particularly effective strategy. More locally, this will also connect the two isolated refuge parcels on the west side of the road with more expansive habitat to the east.	**10-3.** Thank you for supporting this approach and offering to provide assistance.
10-4	We urge the refuge to take more concrete steps toward building wildlife crossings, based on studies showing the cost-benefit and the location of collision hot spots. Completing analyses of NER roadways and mitigation will be a first important step toward this goal. We recognize that this is not without challenges associated with detailed planning of wildlife crossings. However, we are committed to working with the refuge, other agencies, partner organizations, and citizens to find durable crossings solutions that protect wildlife, improve habitat connectivity, and keep people safe on our roads.	**10-4.** Thank you for your willingness and commitment to work in partnership with the refuge. Please see the response to comment 8-2.

Comment number	LETTER #10—Jackson Hole Conservation Alliance, page 4 of 4	RESPONSE
	We would be happy to support a final preferred alternative that a) ensures strong action to manage and monitor for the impacts of climate change, and b) recognizes the vital need for landscape-level conservation and takes concrete steps toward improving habitat connectivity.	
10-5	In addition, we recognize that this draft CCP proposes many new actions that would increase access for hunters, anglers and recreationists to the refuge. These are all wildlife-dependent activities generally concordant with refuge purpose. However, without careful management these activities could pose a risk to the very resource on which they depend. We urge the refuge to take a cautious approach and carry out thorough analyses before allowing increased access and impacts. For example, how will new hunting/fishing or wildlife observation actions (new hunts, new boardwalk, etc.) affect wetlands, trumpeter swans, grizzly bears or other species of conservation concern? The Alliance is committed to ensuring that we as a community continue to live in balance with nature. Our actions must recognize and limit our impacts on wildlife. To that end, we are committed to working with the refuge to educate and inform people in Jackson about actions that help or harm wildlife. We are proud of our partnership with the refuge to educate pathway users about winter closures through our "Don't Poach the Pathways" campaign (adapted from "Don't Poach the Powder"). We encourage and support such campaigns and others around sensible actions to live in balance with nature: for example, bear-safe behaviors, lead-free ammunition while hunting, and responsible recreation.	**10-5.** Thank you for your comments.
10-6	Finally, we realize that many objectives and strategies outlined in this CCP will depend on actions and outcomes from the 2007 Elk and Bison Management Plan. Please relate in this CCP how the objectives and strategies presented here will affect, and be affected by, actions in that plan.	**10-6.** The CCP was written to be consistent with the goals, objectives, and strategies of the Bison and Elk Management Plan (FWS and NPS 2007a). These plans should complement, not conflict, with one another.
10-7	Thank you for the opportunity to submit these comments. We are committed to working with the refuge to ensure that this Comprehensive Conservation Plan and the actions that follow best protect our wildlife and wild lands. The National Elk Refuge is critical to the wildlife of Jackson Hole and we look forward to a preferred alternative that addresses climate impacts and contains strong strategies for landscape-scale conservation. Thank you for your consideration.  Siva Sundaresan Conservation Director Jackson Hole Conservation Alliance PO Box 2728 Jackson, WY 83001	**10-7.** Thank you for your informed and insightful comments. We appreciate the Jackson Hole Conservation Alliance's past support and your commitment to work together as partners in the future.

Comment number	LETTER #11—Safari Club International, page 1 of 5	RESPONSE
	October 24, 2014 Via e-mail: refuge_ccps@fws.gov Toni Griffin U.S. Fish and Wildlife Service Division of Refuge Planning 134 Union Blvd, Suite 300 Lakewood, CO 80228 **Re: Safari Club International Comments on the Draft Comprehensive Conservation Plan and Environmental Assessment for the National Elk Refuge** Dear Ms. Griffin:	
11-1	Safari Club International (SCI) appreciates the opportunity to provide comments on the Draft Comprehensive Conservation Plan and Environmental Assessment for the National Elk Refuge (Draft CCP). SCI and its members support the expansion of hunting opportunities on this refuge and on the National Wildlife Refuge System generally for recreational, management and conservation purposes. Allowing increased hunting opportunities on the refuge will aid the U.S. Fish and Wildlife Service (Service) in its management and conservation of refuge wildlife resources and habitat, while providing additional recreational opportunities for the public. SCI	**11-1.** Thank you for the general support of the CCP, and thank you for your comments.
11-2	supports the Service's preferred alternative (Alternative D) because it will expand hunting opportunities and programs on the refuge. However, SCI believes that the Service should implement the additional opportunities more expeditiously than proposed in the Draft Plan. **Safari Club International** Safari Club International, a nonprofit IRC § 501(c)(4) corporation, has approximately 50,000 members worldwide, many of whom hunt on lands throughout the National Wildlife Refuge System. SCI's missions include the conservation of wildlife, protection of the hunter, and education of the public concerning hunting and its use as a conservation tool. SCI has long been an active supporter of hunting opportunities on National Wildlife Refuges. For example, SCI participated as a Defendant-Intervenor in the almost decade-long litigation concerning the Service's compliance with National Environmental Policy Act (NEPA) requirements regarding the opening of hunting opportunities on National Wildlife Refuge System (System) lands. Aided by SCI's input, a federal district court upheld the legality of the Service's NEPA compliance concerning the Environmental Assessments the Service prepared to analyze the impacts of hunting on over 70 refuges throughout the System.	**11-2.** All refuges in the Refuge System are required to develop a hunt management plan as a stepdown plan to an approved CCP; this is required before any expansion of hunting can occur beyond what is already in place on any particular refuge. Any new hunting opportunities at the National Elk Refuge will be developed in coordination with WGFD.

Hunting on National Wildlife Refuges

Hunting has been recognized by the federal government as a priority use of the System. In 1996, the President, by Executive Order (EO), publicly affirmed the Service's obligation to provide hunting opportunities on System lands.

> Section 2. *Guiding Principles*. To help ensure a bright future for its treasured national heritage, I hereby affirm the following four guiding principles for the management and general public use of the Refuge System:
>
> (a) *Public Use*. The Refuge System provides important opportunities for compatible wildlife-dependent recreational activities involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

EO No. 12996, 61 Fed. Reg. 13647 (Mar. 28, 1996). This EO prioritized hunting as a public use of National Wildlife Refuges and provided several "*Directives to the Secretary of the Interior*," to facilitate this priority, including to:

> (a) recognize compatible wildlife-dependent recreational activities including hunting . . . as a priority general public use of the Refuge System "through which the American public can develop an appreciation for fish and wildlife. . . .
> (b) provide expanded opportunities for these priority public uses within the Refuge System when they are compatible and consistent with sound principles of fish and wildlife management, and are otherwise in the public interest. . . .
> (d) provide increased opportunities for families to experience wildlife-dependent recreation, particularly opportunities for parents and their children to safely engage in traditional outdoor activities, such as fishing and hunting. . . .

EO No. 12996, 61 Fed. Reg. 13647 (Mar. 28, 1996).

Congress expressly afforded statutory priority to hunting on refuges via the National Wildlife Refuge System Improvement Act of 1997 (NWRSIA). Like the President's Executive Order, that law directed the Secretary, through the Service, to "provide increased opportunities for families to experience compatible wildlife-dependent recreation, particularly opportunities for parents and their children to safely engage in traditional outdoor activities, such as fishing and hunting." 16 U.S.C. § 668dd(a)(4)(K) (1998).

The legislative history leading to NWRSIA's passage discussed the many positive benefits of the role that hunters and hunting play on the System:

> [T]he National Wildlife Refuge System Improvement Act for the first time establishes a conservation mission for America's 509 refuge units. Equally important, the measure establishes hunting, fishing, and environmental education, as legitimate and appropriate priority general public uses of the 92 million-plus acres of land and water that make up our refuge system. . . . [H]unters and

Comment number	LETTER #11—Safari Club International, page 3 of 5	RESPONSE

> anglers are the unquestioned leaders when it comes to wildlife and fisheries restoration and conservation. America's hunters and anglers have contributed well over $6 billion to wildlife and fisheries restoration over the past 60 years. . . . And with this legislation, hunters and anglers are again leading the conservation movement.

143 Cong. Rec. H7646-02 (daily ed. Sept. 23, 1997)(statement of Rep. Tanner).

In 2006, the Service published a policy that recognized the priorities identified by the President and Congress. The Service's policy stated that the Service "will provide visitors with quality hunting, fishing, wildlife observation and photography, and environmental education and interpretation opportunities on units of the National Wildlife Refuge System." Final Wildlife-Dependent Recreational Uses Policy Pursuant to the National Wildlife Refuge System Improvement Act of 1997, 71 Fed. Reg. 36418 (June 26, 2006).

In the years since adopting that policy, the Service has had many opportunities to acknowledge the cumulative value of hunting beyond its recreational purposes. In the planning documents for many refuges throughout the System, the Service has repeatedly documented the beneficial role that hunting plays in refuge wildlife resource and habitat conservation and management. For example, in planning documents prompted by legal challenges designed to close or limit hunting throughout much of the System, the Service wrote:

> the cumulative effect of closing refuges to hunting may result in decline in social and financial support for wildlife conservation, as hunters have provided, through purchases of hunting licenses and migratory bird conservation stamps, and taxes levied on purchases of hunting equipment, a steady stream of revenue to build the National Wildlife Refuge System, and to restore upland and wetland habitats on millions of acres of public and private lands across the country. (USFWS 2000). These habitat projects also benefit migratory songbirds and other wildlife. Conversely, the cumulative effect of closing refuges to hunting may result in decline in duck stamp and hunting license sales, leading to a decline in funds for conservation. The cumulative effect on closing refuges to hunting may be reduced conservation of wildlife habitats if the above revenues are not replaced by another source.

Draft Environmental Assessment for Moosehorn National Wildlife Refuge 2007.

Hunting on the National Elk Refuge

As stated numerous times in the Draft CCP, hunting programs are important for the management, conservation, and sustainable use of the elk and bison populations in the National Elk Refuge. Hunting is an important management tool for both species. While elk and bison management are controlled mostly by the 2007 Bison and Elk Management Plan, the Service can use this CCP process to craft new and improved ways to manage both species.

Comment number	LETTER #11—Safari Club International, page 4 of 5	RESPONSE
	SCI Comments on National Elk Refuge Draft CCP and EA October 24, 2014 Page 4 of 5 The Draft CCP generally discusses a need to increase harvest rates of elk in the refuge. Elk population numbers are far above the desired herd objective. Draft CCP 115. SCI agrees with increasing hunting opportunities on the refuge and encourages the Service to select proposed Alternative D. However, Alternative D proposes expansions at too slow a pace. SCI recommends that the Service should work to provide those hunting opportunities more quickly than proposed in the Draft Plan.	
11-3	In the Draft Plan, the Service proposes to develop a youth elk hunting program within ten years. Recruiting youth hunters "is critical for continued public support of hunting as an accepted wildlife-dependent recreational activity, continued use as a wildlife management tool, and as the primary funding source for modern wildlife management." Draft CCP 214. SCI could not agree more; however, the Service should set a deadline to provide this program in less than ten years. With assistance from the hunting community, the Service could reasonably plan and implement such a program within two years. For example, the Service could reach out to local hunting organizations, including the Jackson Hole SCI Chapter and the Idaho SCI Chapter in Idaho Falls.	**11-3.** It is the intention of the proposed alternative to expand and improve youth hunting opportunities, which will be addressed in the hunting stepdown management plan scheduled to be completed in 2018.
11-4	Similarly, according to the Draft Plan, the Service proposes to develop a trophy bull elk hunt within the next ten years. Draft CCP 214. Again, ten years is too long to wait for this program. If the Service authorized a bull elk hunt in addition to the existing elk hunts, more hunters would likely hunt in the refuge and more elk would be harvested. If the Service is serious about meeting its herd objective, it should implement a bull elk hunt within two years. The same is true for the Service's proposal to increase the number of guided hunts allowed on the refuge. The Service has already issued two special use permits for guided hunting. Draft CPP 143. Developing and implementing guidelines for more guided hunts should not take as long as five years, as proposed in the Draft Plan. Draft CCP 215.	**11-4.** The CCP does not suggest that we increase the number of guided hunts. It suggests that better management of the current system could increase hunter success. The actual refuge area available for hunting is not big enough to handle a big increase in the number of guided hunts nor does the refuge have the staff resources to manage a significant increase in guided hunts.
	SCI also appreciates that the Service is proposing to open new areas to hunting, including archery hunting, under Alternative D. Draft CCP 49. SCI encourages the Service to take even further steps to expand existing refuge hunting opportunities. For example, we support the Service's consideration of creating hunting opportunities for species other than elk and bison. Draft CCP 49. A Canada goose hunt has already been suggested. Draft CCP 29. The Service should continue to develop other hunts in coordination with the Wyoming Game and Fish Department. Overall, SCI supports the Service's proposed Alternative D. SCI is encouraged by National Elk Refuge's full appreciation and understanding of the value that hunting and hunters bring to the National Wildlife Refuge System. SCI hopes that other refuge managers will read this Draft CCP and take note of the benefits that hunting brings to wildlife conservation. Thank you again for the opportunity to comment on this important planning decision. If you have any questions or need anything further, please contact Anna Seidman, Director of **Safari Club International - Washington DC Office** 501 2nd Street, NE, Washington, DC 20002 • Phone 202 543 8733 • Fax 202 543 1205 • www.safariclub.org	

Comment number	LETTER #11—Safari Club International, page 5 of 5	RESPONSE

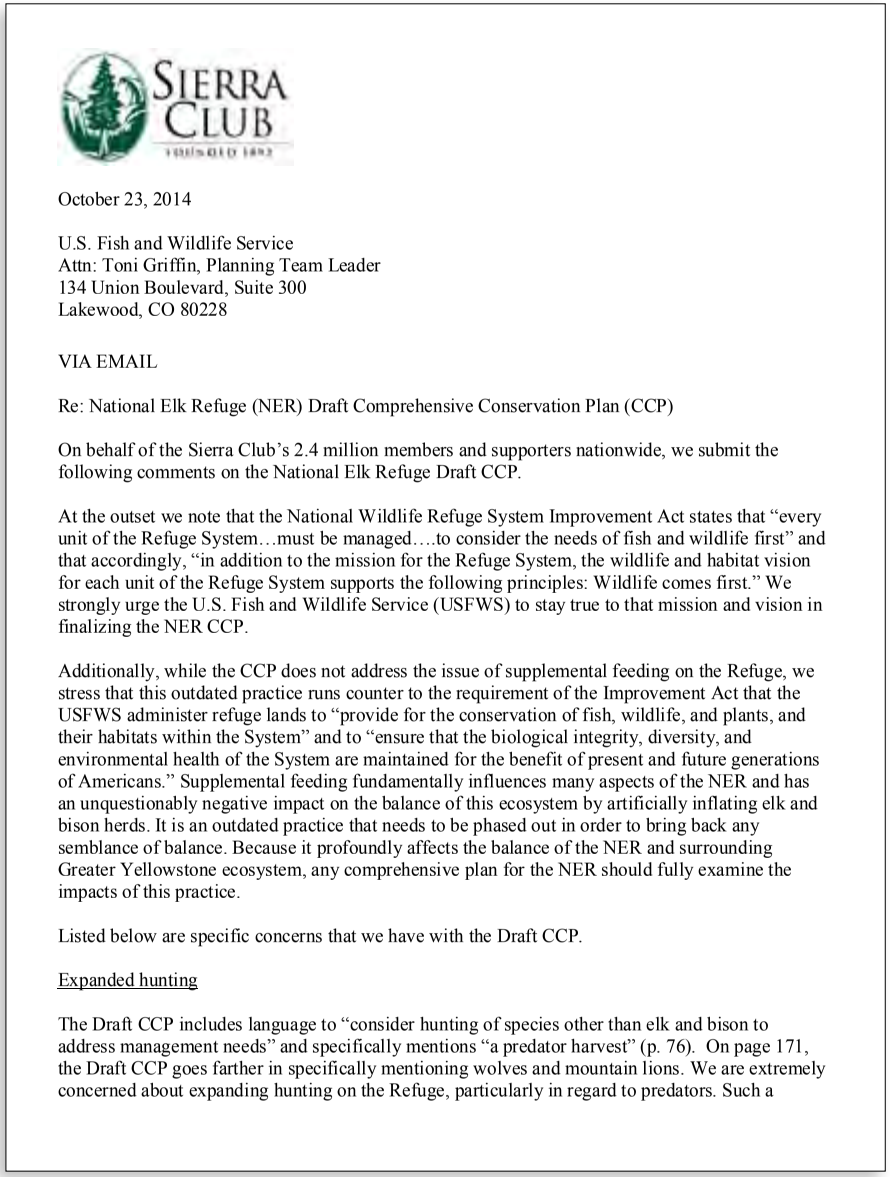
Litigation, at aseidman@safariclub.org and/or Jeremy Clare, Litigation Associate at jclare@safariclub.org.

Sincerely,



Craig Kauffman
President, Safari Club International

Safari Club International - Washington DC Office
501 2nd Street, NE, Washington, DC 20002 • Phone 202 543 8733 • Fax 202 543 1205 • www.safariclub.org

Comment number	LETTER #12—Sierra Club, page 1 of 3	RESPONSE
12-1		**12-1.** We agree that predators provide benefits that support the mission of the refuge, and a hunting season specifically for predators is not envisioned. All references to the hunting of predators have been removed from the final CCP.

SIERRA CLUB

October 23, 2014

U.S. Fish and Wildlife Service
Attn: Toni Griffin, Planning Team Leader
134 Union Boulevard, Suite 300
Lakewood, CO 80228

VIA EMAIL

Re: National Elk Refuge (NER) Draft Comprehensive Conservation Plan (CCP)

On behalf of the Sierra Club's 2.4 million members and supporters nationwide, we submit the following comments on the National Elk Refuge Draft CCP.

At the outset we note that the National Wildlife Refuge System Improvement Act states that "every unit of the Refuge System…must be managed….to consider the needs of fish and wildlife first" and that accordingly, "in addition to the mission for the Refuge System, the wildlife and habitat vision for each unit of the Refuge System supports the following principles: Wildlife comes first." We strongly urge the U.S. Fish and Wildlife Service (USFWS) to stay true to that mission and vision in finalizing the NER CCP.

Additionally, while the CCP does not address the issue of supplemental feeding on the Refuge, we stress that this outdated practice runs counter to the requirement of the Improvement Act that the USFWS administer refuge lands to "provide for the conservation of fish, wildlife, and plants, and their habitats within the System" and to "ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations of Americans." Supplemental feeding fundamentally influences many aspects of the NER and has an unquestionably negative impact on the balance of this ecosystem by artificially inflating elk and bison herds. It is an outdated practice that needs to be phased out in order to bring back any semblance of balance. Because it profoundly affects the balance of the NER and surrounding Greater Yellowstone ecosystem, any comprehensive plan for the NER should fully examine the impacts of this practice.

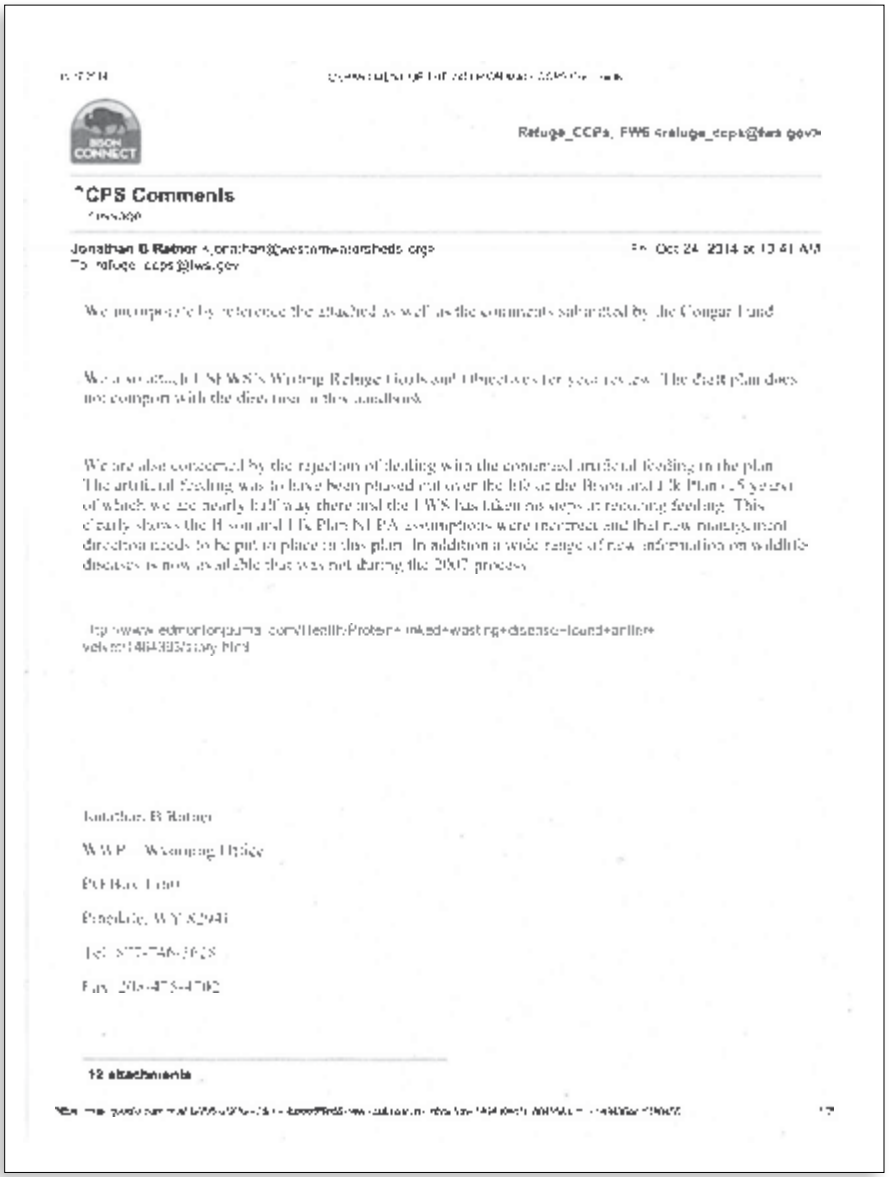
Listed below are specific concerns that we have with the Draft CCP.

Expanded hunting

The Draft CCP includes language to "consider hunting of species other than elk and bison to address management needs" and specifically mentions "a predator harvest" (p. 76). On page 171, the Draft CCP goes farther in specifically mentioning wolves and mountain lions. We are extremely concerned about expanding hunting on the Refuge, particularly in regard to predators. Such a

Comment number	LETTER #12—Sierra Club, page 2 of 3	RESPONSE
12-2	"harvest," if allowed, would directly contradict management objectives of the Bison and Elk Management Plan. Predators play a key role in maintaining balance in an ecosystem, by selecting old, physically impaired, and diseased animals.[1] Additionally, they may reduce transmission and prevalence of diseases such as chronic wasting disease – a severe threat on the Refuge – as well as brucellosis. [2] Federal protections have been restored to wolves in Wyoming; the USFWS cannot legally propose hunting of this species. Even if not illegal, as noted in the Draft CCP, by allowing hunting of wolves and other native carnivores, "We may alienate some nonhunters with the more visible archery harvest in currently closed areas, a bull harvest that includes a trophy value, or the harvest of predatory species such as mountain lion or wolf." Were it not for their status as a threatened species and corresponding Endangered Species Act protections, we can imagine that USFWS would have included grizzly bears as well. Bear Deterrents and Bear Attractants The Draft CCP notes that "Requiring bear spray could provide a safer environment for hunters, communities and bears but would increase costs to hunters." (p. 76). First we remind the USFWS of its mission and vision of 'wildlife comes first.' The relatively small additional cost of bear spray compared to what hunters spend on a hunting experience would not be a hardship. On page 49, the Draft CCP states that the NER 'would consider enacting a bear spray carry requirement." The NER should do so. It has been well documented that bear spray is much more effective than firearms in reducing injuries to both bears and people. [3] [4] A bear spray requirement in neighboring Grand Teton National Park for the Elk Reduction Program has long been in place and the NER should also implement such a requirement. Particularly because, as noted in the Draft CCP, grizzly bear presence on the Refuge has been documented and "we do anticipate that grizzly bear use of the refuge will increase based on the trends in current range expansion of this species." (p.167). Last year, the USFWS increased incidental take of grizzly bears both on the Refuge and in Grand Teton National Park, based on this belief. A requirement to carry and have bear spray readily accessible is a minimal measure in terms of cost and burden to implement, but an important one in preventing injury to bears and people, and it should be implemented immediately. [1] Mech L.D., D.W. Smith, K. M. Murphy, and D. R. MacNulty. 2001. Winter severity and wolf predation on a formerly wolf-free elk herd. Journal of Wildlife Management 65:998-1003. [2] Smith, B.L. 2005. Disease and Winter Feeding of Elk and Bison: A Review and Recommendations Pertinent to the Jackson Bison and Elk Management Plan and Environmental Impact Statement. [3] Smith, T. S., S. Herrero, T. D. DeBruyn, and J. M. Wilder. 2008. Efficacy of bear deterrent spray in Alaska. Journal of Wildlife Management 72:640–645. [4] Smith TS, Herrero S, Strong CL, Larsen RT, Johnson K. Efficacy of firearms for bear deterrence in Alaska. The Journal of Wildlife Management. 2012 Jul;76:1021-1027.	**12-2.** Increased expense to hunters is one factor of many to consider for this topic. Please see the response to comment 1-8.

Comment number	LETTER #12—Sierra Club, page 3 of 3	RESPONSE
	The Draft CCP also notes that requiring proper storage of bear attractants could provide for a safer environment for hunters, communities and bears, yet again appears to dismiss any such requirement, despite its mission to "consider the needs of fish and wildlife first." This, too, would be a very minimal cost to hunters and there is no reason proper storage of food and other attractants should not be required, particularly when the NER expects bear presence on the Refuge to increase.	
12-3	NER should "develop regulations for proper storage of bear attractants and bear deterrent practices when hunting on the refuge" as proposed on page 49.	**12-3.** The proposal on page 49 of the draft CCP is included in the preferred alternative.
12-4	Lead-Free Ammunition The NER should require that all hunters use lead-free ammunition. The Draft CCP notes the negative impacts of lead bullets and that a fairly significant percentage of hunters are already using lead-free bullets. Grand Teton National Park implemented a ban on lead bullets last year. The NER should as well to protect eagles and other wildlife.	**12-4.** Please see the response to comment 6-3.
12-5	Landscape Level Conservation Sierra Club supports efforts on landscape level conservation such as those proposed in the Draft CCP, including enhancing wildlife corridors, and seeking and implementing measures that would reduce uses off the Refuge that impact and conflict with protection of natural resources on the Refuge. Thank you for your consideration of our comments. Sincerely, Bonnie Rice Senior Representative, Our Wild America Campaign Sierra Club John Spahr, Executive Committee Member Wyoming Chapter Sierra Club	**12-5.** Thank you for your comments.

Comment number	LETTER #13—Western Watersheds, page 1 of 1	RESPONSE
13-1 13-2 13-3 13-4		**13-1.** Please see the responses to comments 6-1 through 6-9. **13-2.** In developing the draft CCP the planning team referred to the Writing Refuge Management Goals and Objectives Handbook. We believe the objectives in the draft CCP follow the guidance provided in the handbook. **13-3.** The intention of the CCP is to provide management direction for the refuge into the near future. The CCP does not address management actions that were already addressed and approved in the Bison and Elk Management Plan (FWS and NPS 2007a). That plan was court-approved (twice) and cannot be changed by the CCP. The two documents are meant to work together to guide refuge staff in making management decisions. **13-4.** All refuges in the Refuge System are required to develop a disease management plan as a stepdown plan to an approved CCP. This plan will be developed in coordination with WGFD and will rely on the best available peer-reviewed science as it relates to disease management and prevention. Thank you for your comments.

CPS Comments

Refuge_CCPs, FWS <refuge_ccps@fws.gov>

Jonathan B Ratner <jonathan@westernwatersheds.org> Oct 24, 2014 at 10:41 AM
To: refuge_ccps@fws.gov

We incorporate by reference the attached as well as the comments submitted by the Cougar Fund

We are unable to find FWS's Writing Refuge Goals and Objectives for your review. The draft plan does not comport with the directions in this handbook.

We are also concerned by the rejection of dealing with the contested artificial feeding in the plan. The artificial feeding was to have been phased out over the life of the Bison and Elk Plan – 5 years of which we are nearly half way there and the FWS has taken no steps at reducing feeding. This clearly shows the Bison and Elk Plan NEPA assumptions were incorrect and that new management direction needs to be put in place in this plan. In addition a wide range of new information on wildlife diseases is now available that was not during the 2007 process.

http://www.edmontonjournal.com/health/Probe+linked+wasting+disease+found+antlerless+elk/10464385/story.html

Jonathan B Ratner

WWP - Wyoming Office

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Fax: 208-475-4702

12 attachments

Comment number	LETTER #14—The Wildlife Society, page 1 of 1	RESPONSE



– The –
WILDLIFE SOCIETY
Wyoming Chapter

19 October, 2014

U.S. Fish and Wildlife Service
Attention: Toni Griffin
Division of Refuge Planning
134 Union Blvd. Suite 300
Lakewood, CO 80228

Dear Ms. Griffin:

On behalf of The Science Committee of the Wyoming State Chapter of The Wildlife Society (WYTWS), we appreciate the opportunity to comment on the *Draft Comprehensive Conservation Plan for the National Elk Refuge*. Changes in management directives have the potential to impact wildlife and their habitats on site. Because of the relatively large size and unique location of the National Elk Refuge (NER), it is critical to take into consideration the interrelatedness of actions that occur on the NER with wildlife on a landscape level.

Please find attached to this document several comments provided by three independent reviewers within the Science Committee of WYTWS. The Science Committee is comprised of wildlife professionals with a diverse array of expertise and experience addressing wildlife and wildlife habitat issues in Wyoming and beyond. Please review the attached document for specific comments based on our view of the Draft Plan.

Given the alternatives provided within the Draft Plan, we believe that Alternative D would be most beneficial for wildlife and their habitats on the NER. This Alternative balances the needs of the mission of the NER while taking into consideration the changes that have occurred since its inception, as well as the intricacies and art of proper science-based wildlife management. The comments provided are based on assessment of the potential impacts to wildlife and wildlife habitats within the project area and surrounding areas. We therefore focus on particular merits of the document with this perspective in mind.

Again, we sincerely thank you for the opportunity to comment on the Draft Plan. If you have any questions regarding our comments or review to the draft plan, or would like additional comment or review on potential edits to the document before completion, please feel free to contact us.

Sincerely,

Eric Maichak
WYTWS President

Dan Thompson
WYTWS Science Committee Chair

DT/em/km

Attachment

Comment number	LETTER #14—The Wildlife Society, page 1 of 1	RESPONSE
14-1	NER DRAFT PLAN COMMENTS FROM WYTWS SCIENCE COMMITTEE Reviewer #1: TWS has asked the Science Committee to review and comment on the National Elk Refuge (NER) Comprehensive Conservation Plan (CCP). I have reviewed the document and compared all the details of the 4 alternatives. The mission of the refuge system and the NER focuses primarily on wildlife restoration and conservation, but the reality is that some recreation and I&E is necessary and desirable to promote those missions. As well, the relationship between NER and the community, with it swallowing up the NER physically where possible like an amoeba, necessitates some accommodation of the human element. In this document, the USFWS is attempting to adapt to and deal realistically and reasonably with a complex natural and anthropomorphic environment never imagined when the NER was established. Since its establishment, a variety of additional mandates through executive orders and federal laws have expanded the scope of NER's purpose. It must now work to accommodate the needs of threatened and endangered species, species of special management concern, colonial nesting and marsh birds, fisheries, and landscape and habitat conservation, as well as satisfy the requirements of the Bison and Elk Management Plan. It must not only provide recreational opportunities and interpretation, but manage cooperative and uncooperative behavior of residents and tourists, sportspersons and wildlife viewers, and persons seeking to make a profit or conduct activities not really compatible with the NER's mission. The alternatives for all the various activities contain a dizzying array of choices, and it is difficult for the reader to know the relative merits of each against other (sometimes) conflicting components and to know how to prioritize them (e.g., is a sufficient balance being struck between the original intent of the refuge ("The National Elk Refuge was established in 1912 as a 'winter game (elk) reserve'". pg. 21) and the more recent mandates. The NER must address a multitude of issues ranging from those directly related to its mission and original purpose to many that are not, and from the potential effects of climate change to managing an array of human dimension challenges and opportunities. Given this, the preferred alternative (Alternative D), which strikes a balance between Alternative B (enhanced public use and intensive resource management) and Alternative C (promoting intact ecosystems and natural processes) seems generally logical and well thought out. My primary concern is that the NER be managed first and foremost for wildlife, for that is its purpose, and it is a primary component of the mission of the refuge system (ref. Mission, pg 4). This is further supported by the mission's emphasis on "…support(ing)…biological integrity, diversity and environmental health…." and in authorizing managers to determine compatible human uses. These 3 elements should be the fundamental basis for decisions about NER management.	***14-1.*** Thank you for your comments.

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	All that said, following are some more specific observations and comments. I have no issues with much of the document, so I focus here on the comparison summary of actions and consequences in Chapter 3.	
14-2	Pg 62. I heartily endorse proposed actions related to climate change.	**14-2.** Thank you for your comment.
14-3	Participating in landscape-scale conservation efforts is mentioned here and in at least 2 other proposed actions. However, in those other places those efforts and that concept are not included in proposed outreach efforts in the preferred alternative. Certainly the NER has more things to do than it can tackle, but the merits of and NER involvement in these activities warrants some acknowledgement and interpretation (providing information about it). The discussion of the environmental consequences of climate change provides much justification for some effort to promote public understanding of NER's participation in interagency, interdisciplinary landscape-scale work. I assume justification for not including interpretation is alluded to in the statement, "Emphasis on landscape-level projects would help ecosystem resilience, but would divert money and staff time away from refuge-specific work." (pg 64).	**14-3.** We acknowledge that any emphasis on landscape-level conservation issues will detract from refuge-specific work. Implementation of the CCP will be dependent on available resources, and the refuge will have to remain flexible regarding how we prioritize future actions.
14-4	Pg 64. I agree with the decisions regarding native grasslands and sagebrush shrublands, but this is a case in point regarding trade-offs, especially for sensitive species. Whether fire is used/managed affects the amounts of grasslands and grassland patches and the amounts of older sagebrush versus a range of age classes. Only local managers understand the effects of these trade-offs. Similar choices are presented in the wetland actions.	**14-4.** Thank you for recognizing the complexity of refuge operations.
14-5	Pg 65. Again, are we at a point where focus should be redirected somewhat from Trumpeter Swans to other species in need while monitoring swans to ensure they continue to do well? Should resources now be dedicated to the acknowledged aquatic habitat improvement needs (could the money for more ponds here be better spent on the greater good of aquatic systems since there appear to be opportunities for swans around the outer bounds of their distribution in WY? I don't know the answers to these questions. I understand funding and cooperation for different species come from different sources, but the NER staff and funding should be prioritized based on species' relative need. Is there a NER species prioritization that is based on need and return on investment?	**14-5.** Monitoring priorities will be developed in more detail in the inventory and monitoring stepdown plan. Trumpeter swans are a high priority for monitoring and management because they are categorized by WGFD as a species of priority conservation need and they may act as an umbrella species for wetland communities.
14-6	Pg 66. Some of the choices in the alternatives for riparian and aspen woodlands are confusing. In one place it states (small-scale) enclosures and jackstraw techniques would have only modest benefits, yet elsewhere it states that without exclosures treatment areas would be used excessively by wild ungulates. Knowing nothing about the specific project, I found the statement in Alternative B ("Consider expanded willow regeneration techniques.") contradicting the statement in Alternative C ("Eliminate the jackstraw willow regeneration project"). Based on the discussion on pp. 111-112, it appears anything that restores either of these community types would be desirable.	**14-6.** We do not believe that jackstraw techniques could be implemented at a scale that would meet management objectives. If these techniques are implemented at a large scale, they may be difficult to maintain and also present an entanglement risk to elk and bison.
14-7	Pg 68. I support the proposed actions for Flat Creek and invasive species.	**14-7.** Thank you for your support.

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14-8	Pg 69. No indication of how actions for migratory birds relate to those for Sage-grouse, Trumpeter Swans and other high profile species that might be affected. What are the relative priorities? Difficult for a reviewer unfamiliar with the setting and interagency priorities to provide meaningful comment.	**14-8.** Implementation of the CCP will be dependent on available resources, and the refuge will have to remain flexible regarding how we prioritize future actions. Monitoring priorities will be developed in more detail in the inventory and monitoring step-down plan.
14-9	Pg 71. Under Aquatic species – environmental consequences, the statement is made that, "Increased removal of non-native trout would benefit native fish and invertebrates. More removal would increase WGFD costs and further reduce fishing opportunities." Can fishing regulations help with this? Can they be, somewhat like Yellowstone NP where non native fish caught MUST be killed? This wouldn't be as aggressive or as effective as concerted agency efforts, but could be included as an action in the proposed alternative to help rather than be rejected as a component of another alternative.	**14-9.** Strategies related to nonnative trout were designed to be consistent with existing WGFD fishing regulations. Unlike areas within Yellowstone National Park, fishing regulations on the refuge are set by WGFD.
14-9	Pg 72. Again, given limited resources and a myriad of demands, can the refuge make significant additional contributions to Sage-grouse and Trumpeter Swan conservation, or should it do what it can do best for other species in need? It cannot be all things to all creatures. Just a question.	**14-9.** The National Elk Refuge contains some of the most important wintering habitat in Jackson Hole for sage-grouse, and previous research has suggested that winter habitat is a primary limiting factor on the Jackson Hole sage-grouse population. The refuge is compelled to prioritize management for sage-grouse because it is a candidate species under the Endangered Species Act.
14-10	Pg 73. Federally and State-listed species – environmental consequences. In the discussion of the relative merits of the preferred and other alternatives it states that Sage-grouse would benefit somewhat and benefits to trumpeter swans would be somewhat diminished. I assume someone has compared all the selected actions that will benefit or not benefit these species (and any others of high concern) to determine the net outcome and whether expenditures of resources in one action are not being offset (cancelled out) by different action(s) elsewhere in the plan.	**14-10.** Given uncertainty about species-specific responses and uncertainty about future prioritization of existing actions, such an analysis has not been conducted.
14-11	Pg 73. Research and monitoring. The NER is fortunate to be in a location where everything is high profile. The attention it and the species it provides habitat are important enough that there are many varied opportunities for research and for data collection to assess species status and trend. Given the availability of information on species there, the NER's proposal to emphasize monitoring of public use and other refuge programs on habitat and wildlife (while continuing to partner with others or rely on them to collect status and trend information) is appropriate.	**14-11.** Thanks for your support.
14-12	Pg. 74. I understand the importance of and the desire to stabilize and restore cultural resources – specifically Miller Ranch, but do not know the situation well enough to be able to evaluate the cost/benefit of these actions in relation to other, pressing, natural resource related needs.	**14-12.** In the past, restoration of the Miller Ranch was funded through a grant, and in the future we would likely continue looking for additional grant opportunities for other restoration projects.
14-13	Pg. 76. I am not knowledgeable enough about the NER and its 'environment' to be able to judge whether hunting species other than elk and bison is smart. However, considering the location of the NER and its many other needs and uses, including the most important – wildlife conservation, this appears to be yet another source of complexity and management challenges for an already 'tapped out' refuge. If it was Seedskadee NWR or Arapaho NWR in North Park, CO, this would probably not be such a people management morass and additional activities would not present such additional challenges.	**14-13.** Hunting of elk and bison on the refuge is critical to achieve the 5,000 elk and 500 bison objectives in the Bison and Elk Management Plan (FWS and NPS 2007a).

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14-14	Pg. 76. Hunting – environmental consequences. Requiring bear spray would provide (not could provide) a safer environment for hunters, etc. It might add a little cost, but not as much as a visit to the emergency room or a burial. Anyone now recreating in grizzly bear country should have it as a matter of course as part of their 'survival' gear. Requiring it is not onerous. However, this is somewhat irrelevant because in the proposed actions for the same alternative, it is suggested that carrying bear spray be only encouraged. Not sure why 'requiring' was brought up in the consequences. I also personally think it is time to be assertively encouraging hunters to use non-toxic projectiles no matter their quarry.	**14-14.** Please see the response to comment 1-8.
14-15	Pg. 77. Fishing – actions. Again, maybe out of ignorance, I question why the fishing regulations can't help remove nonnative fishes. It is not clear why this is not a component of each of the alternatives here.	**14-15.** Strategies related to nonnative trout were designed to be consistent with existing WGFD fishing regulations.
14-16	Pg. 78. I support the proposal to assess a fee and regulate permits for guided fishing for the reasons given. Fees might impact outfitters, but there are plenty of other opportunities in the area, and they should be glad to have the opportunity to use the NER.	**14-16.** Thank you for your support.
14-17	Pg 79. Wildlife observation and photography. I support the proposal to limit tour companies for the reasons provided. Yes, there may be some consequences for those tour companies, but their financial well being is not the primary mission of the NER. The goal should be to reduce administrative and other costs for non-essential things so those resources can be dedicated to the NER's primary purposes.	**14-17.** Thank you for your support.
14-18	Pg. 80. Environmental education. My knowledge about the setting is insufficient for me know the limitations this would impose in accommodating outreach needs, but it seems very logical to confine disturbances to areas with nonnative vegetation. Their locations and the outreach needs may not be wholly compatible, but I support that proposal wherever possible.	**14-18.** Thank you for your support.
14-19	Pg 81 through 84. I support the preferred alternatives for the various special purpose areas for the reasons provided in the discussions of environmental consequences. I especially endorse those actions proposed in Alternative D for Special purposes. Again, wildlife comes first on the NER, and as is the case elsewhere, many of the activities some of the public would like to be allowed are not just incompatible with the mission of the NER, they are inappropriate. We are experiencing what I call theme park creep on many of our public lands. It isn't enough to just experience and appreciate natural settings and resources. There has to be something to overtly entertain some people. Land managers are being pressured to allow more, from mountain bikes to pack boats and zip lines to festivities. The public has to be (gently but assertively) reminded that there are higher purposes of many of these lands, and those higher purposes ultimately affect them in ways that they may not be perceptive enough to appreciate without some (interpretive) help.	**14-19.** Thank you for your support.

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14-20	Pg. 86. Public outreach. Here, again, providing outreach about the NER role in landscape-scale management (its role in the greater Yellowstone Ecosystem) is mentioned, but then is not included in the preferred alternative. And, again, I understand there are only so many actions the NER can take given its resources, but including its role in a 'bigger picture' should be a low cost, matter-of-course component of its interpretive efforts. People are too prone to focusing on the small and immediate and need to be encouraged to look out and up.	***14-20.*** We agree that this is an important component of interpretive efforts.
14-21	Pg. 89. Funding and staff. Again, not being knowledgeable about the details, I recommend revising the statement, "Increase refuge base funding by $200,000 to replace private contributions." to "Increase refuge base funding by $200,000 to augment private contributions." Use the additional money to do good things	***14-21.*** Thank you for your comment.

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14-22	Reviewer #2:
	
	(See highlighted portion and text following). I have listed the merits of alternative in bulleted format.
	
	Alternative B
	
	• Includes potential Hwy 89 overpass/underpass
	• Increased habitat management to reduce reliance on artificial feeding/improved woody vegetation component.
	• Prescribed fire use
	• Would develop a disease strategy with alternatives for carcass disposal
	• Increased research to increase confidence in management decisions
	• Hunting
	  o Increased youth opportunity – allow youth only season after the general season (mid to late Dec.)
	  o Require the use of bear spray while hunting on the refuge
	  o Need to make hunter harvest reporting mandatory, require submission of teeth for aging to better monitor age of harvest during hunt
	  o Increased opportunity to harvest other species
	  o Addition of a bull elk hunt
	• Fishing
	  o Reduce fishing pressure by reducing number of allowed guided trips and charge a yearly fee of $100
	  o Requirment to kill non-native fish once caught
	• Special use permits – for commercial filming and photography (increased revinew and ability to regulate activities on Refuge)
	
	Alternative C
	
	• Reduce the promotion of refuge road to view big horn sheep
	• Limit the amount of tours during the winter to reduce congestion
	
	Alternative D – Once I realized that Alternative D covered the majority of high points between Alternatives B and C, I focused on the merits of this Alternative and feel this is a well thought out compromise between public use and preservation and would be the preferred alternative.
	
	• Increased work to improve the function of Flat Creek
		14-22. Thank you for your support of alternative D.

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14-23	Ch. 6 Implementation I agree with the implementation of the disease monitoring in Alternative D. By quantifying elk movement and group size we will be better able to monitor disease transmission risk and model potential outbreaks into the future.	***14-23.*** Thank you for support of this monitoring priority.
14-24	Hunting implementation is also well throughout and will increase the experience and potentially the harvest while increasing youth involvement in the elk reduction program. I also think that the limit on guided hunts will improve to overall experience on the hunting public on the NER. Mandatory harvest reporting should be strongly considered in the near future. This would help wildlife managers track harvest and improve population models and subsequent hunting season's quotas for the NER. Mandatory reporting also gives managers the opportunity to more easily collect biological data from harvested animals (i.e. CWD sampling, harvest age, blood collection).	***14-24.*** Thank you for your support of the CCP's hunting implementation plan. We agree that mandatory harvest reporting would improve data quality.

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	Reviewer #3:	
14-25	- I like that they the preferred alternative would implement food storage and bear spray requirements in the hunting section	**14-25.** Food storage requirements will be implemented, but use of bear spray will be encouraged but not required. Please see the response to comment 1-8.
14-26	- As a group advocating the management based on science, TWS should probably be advocating for the use of non-lead ammo for hunting on national wildlife refuges...the preferred alternative doesn't do that. Nontoxic shot is required for waterfowl everywhere and for upland birds Wyoming Game and Fish Department Habitat Units for example.	**14-26.** The National Elk Refuge initiated a voluntary non-lead ammunition program in 2008. This program will continue to be emphasized to encourage the use of non-lead ammunition.
14-27	- Update the wolf section on page 121, which currently says they are managed by WGFD and the 2012 management plan...recent changes in management authority due to litigation will need to be incorporated into the document.	**14-27.** Gray wolves are currently under the management authority of the U.S. Fish and Wildlife Service due to litigation.
14-28	- The grizzly bear section is very brief and incomplete; even though in Bruce Smith's last elk neonate study on the refuge grizzly bears accounted for a significant portion of elk neonate predation and have been known to frequent the refuge during the late season hunts, hence their recommendation for food storage and mandatory bear spray in the hunting section. It would seem additional information about grizzly bear demographics would improve the merits of the draft plan.	**14-28.** This is largely beyond the scope of the CCP.
14-29	- Since bison and elk management are conducted under a separate management plan, anything about their management is not relevant to this plan.	**14-29.** We believe that some discussion of the Bison and Elk Management Plan was necessary to provide context for CCP decisions.

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October 24, 2014

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Subject: Comment on Draft Comprehensive Conservation Plan for NER

Dear Toni,

Thank you for the opportunity to provide comments on the National Elk Refuge Draft Comprehensive Conservation Plan and Environmental Assessment (Plan). It was also helpful to attend the public open house meeting at Snow King Resort, thank you for providing the opportunity to learn more about the draft Plan.

Wyoming Pathways is the statewide organization representing people who bicycle and walk. Our goal is to encourage bicycling and walking – helping to create thriving communities and enhance public land access across Wyoming. Bicycling and walking provide many benefits, including low impact climate-friendly transportation solutions and enjoyable recreation option to experience the National Elk Refuge. These modes of travel also enhance public health, support sustainable economic development, and align with the vision and goals of the USFWS "Conserving the Future–Wildlife Refuges and the Next Generation."

It is our understanding the Plan will address all aspects of the management, visitor use, natural resources, and cultural resources of the National Elk Refuge, with the exception of Elk and Bison issues, which were decided separately in 2007. The Draft EA is an important step in the planning process to gather public input on the alternatives proposed. With that in mind, Wyoming Pathways requests your consideration of the following comments as you develop the Final Plan and Environmental Assessment decision.

Vision and Goals. Wyoming Pathways supports the vision stated, which includes the public having year round interpretive opportunities, and the Visitor Services Goal, to "Enable a diverse audience to understand and appreciate the refuge's wildlife conservation role in Jackson Hole, while safely enjoying year-round opportunities for wildlife-dependent recreation."

People and the Refuge System. As the Plan notes on page 5, most people visit the Refuge System to observe wildlife in their natural habitats. As documented in public comments made during the Scoping phase of the plan, Refuge visitors currently enjoy using bikes and foot access where allowed to experience the National Elk Refuge. The new Comprehensive Conservation

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15-1	Plan offers the opportunity to improve this public benefit within the purpose and mission of the Refuge. **Conserving the Future, The National Elk Refuge, and the North 89 Pathway.** The North 89 Pathway is a very positive addition to the National Elk Refuge as well as the community pathways system. It has created a new opportunity for Refuge visitors to experience the Refuge without the need of a motor vehicle. The Pathway helps the USFWS accomplish "Conserving the Future" goals, which provides direction how to adapt to a positive new use like the Pathway. To quote from the USFWS plan, with key sections highlighted in bold: "Though our fundamental mission is wildlife conservation, we recognize that to be successful we must inspire the American people to connect with their wildlife heritage and participate as stewards of the System. As an integral part of local communities, refuges are great places to build a broader conservation constituency." **"**Spending time outdoors is good for both our spirit and our health. Recreation and relaxation in nature reduces stress and anxiety, promotes learning and personal growth, nourishes the imagination, and provides mental and physical restoration. Direct experiences in the outdoors often lead to a commitment to, and involvement with, stewardship of our shared natural legacy. The Refuge System's wildlife dependant uses promote getting outside and experiencing nature. Americans must learn anew that national wildlife refuges not only provide essential habitat for wildlife, but they also are beneficial and relevant places for people. **We must actively encourage and provide new opportunities for people of all ages and backgrounds to connect with nature by visiting their national wildlife refuges**, personally or virtually." "**Recommendation 18: Support and enhance appropriate recreation opportunities on national wildlife refuges** by partnering with state fish and wildlife agencies, other governmental bodies, conservation organizations and businesses; and by updating relevant policies and infrastructure." **North 89 Pathway Function.** The North 89 Pathway is located parallel to US Highway 26/89/191 and is compatible with four of the six wildlife dependent National Wildlife Refuge System Priority Public Uses. These are Wildlife Observation, Wildlife Photography, Environmental Interpretation, and Environmental Education. The Final Plan should better acknowledge this compatible use and embrace the pathway as beneficial for the Refuge. Because the pathway is located adjacent to the busy high-speed national highway that carries up to 20,000 motor vehicles per day and is outside the 8' tall continuous Elk Refuge fence, the pathway has negligible impact on the Elk Refuge lands east of the highway ROW. The pathway does offer visitors and residents a wonderful and safe opportunity to enjoy the Refuge by bicycling and walking without impact to wildlife. It also gives employees and visitors Comment Draft CCP National Elk Refuge, Page 2 of 5	**15-1.** We have added the following paragraph to section 2.5 of the final CCP: "We provide a multiuse pathway to the public through a cooperative agreement with Teton County. The pathway is available to a wide variety of people seeking to experience the refuge on foot or via non-motorized vehicles, allowing them to enjoy views of the refuge and providing wildlife viewing and photography opportunities during three seasons of the year. The pathway also allows users to connect to destinations such as the National Wildlife Art Museum, Jackson Fish Hatchery, and Grand Teton National Park."

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	at the motels one-mile north of Jackson and the National Wildlife Art Museum with the opportunity to walk or bike from town to the Motels and Museum while observing the Elk Refuge.	
15-2	Public safety is an important aspect of visitor use along the Elk Refuge. Wyoming Pathways believes the greater threat to public safety is to force pedestrians and cyclists onto US-26 when a safer alternative exists to use the adjacent pathway, which was constructed at significant public expense and should be available for public use when there is no impact to elk on the refuge. The Teton County Sheriff has publicly expressed concern with this safety hazard.	**15-2.** Prior to construction of the pathway, a seasonal closure of the pathway was clearly outlined as a critical condition. The season has already been expanded by 20 percent and as much as 31 percent in years when the refuge agrees to open the pathway as early as April 15 due to an early migration. Our data show the current pathway season is within approximately 2 weeks of when regular migration occurs to and from the refuge. It would be difficult for the refuge or Jackson Hole Community Pathways to open and close the pathway every time there is or is not a potential conflict with elk, nor could an unplanned closure be implemented quickly to alleviate a problem. The pathway, open from May 1 through October 31, is open during most of the typical cycling season.
15-3	The Final Plan should better acknowledge that the North 89 Pathway serves the needs of a wide variety of people seeking to experience the Elk Refuge for wildlife-dependent uses and also to connect to destinations such as the National Wildlife Art Museum, the Fish Hatchery, and to Grand Teton National Park to the north and the Town of Jackson to the south.	**15-3.** All our visitor service programs serve the needs of a wide variety of people seeking to experience the refuge for wildlife-dependent uses. Please see the response to comment 15-1.
	Draft Plan Lacks Information on Pathways Studies. Wyoming Pathways is concerned that the Draft Plan did not include any information from the research study on pathway use that has been underway the past three years in partnership with Teton County. The draft Plan provides no data and no discussion to support the statement that "seasonal closure is essential."	
	The Draft Plan acknowledges on page 30 that the North 89 Pathway provides an opportunity for the public to "enjoy the beauty of the National Elk Refuge", and that "some of the public would like…to extend the use of the pathway by eliminating or modifying the seasonal closure." But then the Plan states, "However, the seasonal closure is part of the agreement with [Teton County]…and is believed to be an essential requirement for this activity to be compatible with the refuge purposes."	
15-4	The Plan states that "The Refuge would explore a variety of data collection methods to assess wildlife movement across the pathway…The Refuge would explore a variety of data collection methods…" The word "would" implies the future. However, Biota Research, a professional environmental firm contracted by Teton County, has already conducted the pathway research during 2011, 2012, and 2013. Research was supported by additional data gathered by the Refuge staff. It is our understanding that the National Elk Refuge has been involved in all phases of this study; initially requiring that the study be done, then reviewing and approving the scope of the study, and finally in regularly reviewing the ongoing results. Public comment during the Scoping phase of the plan also highlighted the study was underway and expressed the need to include the results in the alternatives and analysis.	**15-4.** In draft documents that explore a range of alternatives, we typically use the word "would" to describe potential activities. When the documents are finalized, we change instances of "would" to "will" as appropriate. This change has been made in the final CCP.
	We understand that science is important to the USFWS mission. The USFWS "Conserving the Future" agency plan states: "Science-driven management decisions use better information, improve efficiency, reduce uncertainty, and increase our ability to solve complex problems and adapt to changes in populations, habitats and systems. We must gather and integrate data from our robust inventory and monitoring efforts and directed research on refuges and use these data to inform our management decisions."	
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15-5	Therefore, it is puzzling as to why this well-known, high profile Teton County/Refuge Pathway Study has not been mentioned or included in the Draft Plan. This is an important issue that needs to be addressed in the Final Plan. We support the statement on page 177 that "The Refuge, in coordination with Teton County, could adjust the dates for the seasonal closure if data collected…provided solid justification for a change." In fact the data available shows the pathway to be benign with no impacts to wildlife, and it is proving to be a great improvement for visitor safety and enjoyment of Elk Refuge visits. The Final Plan should acknowledge the pathway has been studied, with positive results that demonstrated the lack of impact of the North 89 Pathway on refuge resources. The research suggests the Pathway does not need the long closure proposed in the alternatives to be compatible with the refuge purposes. Teton County would also prefer that the seasonal closure be reduced or eliminated for public safety and need. Adaptive management of the pathway season would be more successful and should be a joint effort with Teton County and Refuge. A request for the study information completed so far was sent by email to the USFWS Plan contact person, but the request was not answered in time for this comment deadline. A copy of the contract Teton County has with the Biota Research firm is attached to summarize the study, and a letter from 2012 with summary data. **Environmental Education and Interpretation.** The new North 89 Pathway offers a superb opportunity to provide environmental education and interpretation of the Elk Refuge resources and for wildlife dependent public uses like watching wildlife and wildlife photography. So far, this is a missed opportunity. The North 89 Pathway was paved in the fall of 2010, yet four years later there is not a single educational message for pathway users to better understand the Elk Refuge. On the other hand, a huge effort is made every year to close the pathway to human use for 6-7 months, and to try and explain to a skeptical public why the closure is needed. We fully support the new pathway pull offs proposed in the action alternatives under Wildlife observation and photography, and Environmental education and interpretation sections. **Requests for Changes in the Final Plan for North 89 Pathway.** Wyoming Pathways requests the Final Plan and EA Findings include the option for extending the open season for the North 89 Pathway. We are not aware of data that suggests harm would occur with a longer season. We note other activities continue well into the fall, such as elk and bison hunting, winter-long sleigh rides, and year-round use of the Elk Refuge Road. The Final Plan should lengthen the season of use to encourage additional wildlife-dependent public enjoyment of the pathway and Refuge resources within the mission of the Refuge. We request the final plan allow the pathway to be open, and only closed for specific management reasons supported by the research. For example, it may be reasonable to close the pathway during the brief migration season in November and early December, but then it should be open Comment Draft CCP National Elk Refuge, Page 4 of 5	**15-5.** Per the agreement with the National Elk Refuge, Teton County / Jackson Hole Community Pathways is responsible for the development, payment, and maintenance of interpretive signage for the pathway. The refuge's outdoor recreation planner prepared a six-page document titled, "North Highway 89 Pathway Preliminary Interpretive Concepts" in August 2013 and presented the ideas to the Jackson Hole Community Pathways task force that same year. The document included sample photographs, recommended locations for panels, and key interpretive messages. In May 2014, the Pathways coordinator sent out a request for qualifications for designers interested in preparing, fabricating, and installing interpretive signage. A firm was selected that summer. The refuge has continued to express an interest in moving ahead with the project. A preliminary call is scheduled for January 2015.

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	for the balance of the winter and spring. Winter weather in Jackson Hole, when snow and cold descent on the valley, would naturally limit public use on the pathway and maintain protection for wildlife during the most sensitive time, while allowing for wildlife-dependent public use to experience the Refuge resources for more of the year. We maintain the 6-month closure is unnecessary. **Elk Refuge Road**. Wyoming Pathways supports the continued, enhanced and safe public use of the Elk Refuge Road by runners, walkers and cyclists. The gravel road is maintained by Teton County for approximately the southern 3.5-miles. It is used and enjoyed by thousands of people each year that desire to experience the Refuge resources by walking, running, and bicycling.	
15-6	With the improvements planned to the Elk Refuge Road, there are concerns that the traffic speeds may increase. Actions should be included in the Plan to manage the road so as to continue to provide safe shared use by pedestrians and cyclists. The Final Plan should also explore providing an accessible trail directly next to the road (within existing road corridor) between East Broadway and the Miller House. This could provide enhanced opportunities for interpretation, education, and enjoyment of wildlife-dependent public uses and to provide separation from motor vehicle traffic, which during the busy summer season causes safety issues for nonmotorized Refuge visitors, especially children, older people, and people with disabilities trying to share the road with motor vehicles.	**15-6.** The CCP notes that we would continue to promote visitor and employee safety.
	Forest Service Ski Cabin Winter Access. We are pleased the Draft Plan continues to provide managed winter access from the Elk Refuge to the Bridger-Teton National Forest. The existing access near Nowlin Creek is a good location for Ski Cabin users, and the opportunity to cross the Refuge land in the winter is important to provide continued winter access to the National Forest.	
15-7	**North Park.** There is interest by the Town of Jackson to improve the North Cache Street frontage along North Park. This includes a need to improve parking for North Park, sidewalks, and to provide safe passage to access the North 89 Pathway. The Final Plan should acknowledge the Town's interest and support the planning effort.	**15-7.** The refuge was notified of the proposed North Cache Street development in August 2014 by Friends of Pathways, just prior to the item being placed on a municipal ballot in the upcoming election. This occurred after the draft CCP had been written and was being edited and prepared for printing. Two refuge staff members have since attended a Friends of Pathways board meeting and met with Friends of Pathways program director onsite to discuss development opportunities in the North Cache Corridor, which was approved by voters. The memorandum of understanding will expire in 2015, and this project will be discussed during memorandum of understanding renewal. In the area that is already paved and disturbed, the refuge is fine with change but will not give up any additional land to the North Cache project.
	Thank you again for the opportunity to comment on the Comprehensive Conservation Plan for the National Elk Refuge. Please contact me if you have any questions or need clarification on points in this comment letter. Sincerely,  Tim Young, Executive Director Attachments: Teton County Contract and Study on North 89 Pathway Comment Draft CCP National Elk Refuge, Page 5 of 5	Thank you for your comments.

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Comment number	LETTER #16—Wyoming Wildlife Advocates, page 2 of 2	RESPONSE

Wyoming Wildlife Advocates' conclusion is that the proposed plan is fatally flawed. We recommend that an Environmental Impact Statement process be initiated. The much more rigorous process involved in an EIS must include a detailed analysis of the effect of supplemental feeding and the resulting concentration of a large ungulate population on an already severely degraded habitat.

Sincerely

Kent Nelson
Executive Director
Wyoming Wildlife Advocates

Appendix D
Species Lists

What follows are the names of animals and plants found on the National Elk Refuge.

D.1 Lists of Federally Listed and State-Listed Plants and Animals

Plant species of concern listed in Wyoming are shown below.

Scientific name	*Common name*
Aster borealis	Rush aster
Astragalus terminalis	Railhead milkvetch
Carex buxbaumii	Buxbaum's sedge
Carex parryana	Parry sedge
Carex scirpoidea scripiformis	Canadian single-spike sedge
Eriophorum viridicarinatum	Green-keeled cotton-grass
Heterotheca villosa var. depressa	Teton golden aster
Lesquerella carinata	Keeled bladderpod
Muhlenbergia glomerata	Marsh muhly
Salix candida	Hoary willow
Scirpus rollandii	Pygmy bulrush
Utricularia intermedia	Flat-leaf bladderwort

Animal species listed under the Federal Endangered Species Act and by the State of Wyoming (species of greatest conservation need), with documented occurrence on the National Elk Refuge in Wyoming follow: Federally threatened—a plant or animal species listed under the Endangered Species Act of 1973, as amended, that is likely to become endangered within the foreseeable future throughout all or a significant part of its range; Federal candidate—a plant or animal species proposed for addition to the Federal endangered and threatened species list; Wyoming tier 1—highest priority species of greatest conservation need: Wyoming tier 2—moderate priority species of greatest conservation need.

Scientific name	*Common name*	*Documented refuge use*
	Federally threatened	
Ursos arctos	Grizzly bear	Incidental
	Federal candidate	
Centrocercus urophasianus	Greater sage-grouse (also WY tier 1)	Year-round, breeding documented
	Wyoming tier 1	
Anaxyrus boreas boreas	Boreal toad	Year-round, breeding documented
Athene cunicularia	Burrowing owl	Incidental
Buteo regalis	Ferruginous hawk	Seasonal
Gavia immer	Common loon	Incidental
Haliaeetus leucocephalus	Bald eagle	Year-round, breeding documented
Strix nebulosa	Great gray owl	Incidental

Scientific name	*Common name*	*Documented refuge use*
	Wyoming tier 2	
Rana luteiventris	Columbia spotted frog	Year-round, breeding documented
Charina bottae	Northern rubber boa	Incidental
Thamnophis sirtalis fitchi	Valley gartersnake	Incidental
Anas acuta	Northern pintail	Seasonal
Asio flammeus	Short-eared owl	Seasonal
Aythya affinis	Lesser scaup	Seasonal, breeding documented
Aythya americana	Redhead	Seasonal, breeding documented
Botaurus lentiginosus	American bittern	Seasonal
Bucephala islandica	Barrow's goldeneye	Seasonal
Buteo swainsoni	Swainson's hawk	Seasonal
Calamospiza melanocorys	Lark bunting	Incidental
Cygnus buccinator	Trumpeter swan	Year-round, breeding documented
Dolichonyx oryzivorus	Bobolink	Seasonal, breeding documented
Falco peregrinus	Peregrine falcon	Seasonal
Hydroprogne caspia	Caspian tern	Incidental
Larus pipixcan	Franklin's gull	Seasonal
Melanerpes lewis	Lewis's woodpecker	Seasonal
Numenius americanus	Long-billed curlew	Seasonal, breeding documented
Nycticorax nycticorax	Black-crowned night-heron	Incidental
Rallus limicola	Virginia rail	Incidental
Spizella breweri	Brewer's sparrow	Seasonal, breeding documented
Tympanuchus phasianellus columbianus	Columbian sharp-tailed grouse	Incidental
Alces alces	Moose	Year-round, breeding documented
Lontra canadensis	Northern river otter	Year-round, breeding documented
Myotis lucifugus	Little brown myotis	Seasonal
Ovis canadensis	Bighorn sheep	Year-round, breeding documented
	Wyoming tier 3	
Empidonax traillii	Willow flycatcher	Seasonal
Falco columbarius	Merlin	Seasonal
Grus canadensis	Sandhill crane	Seasonal, breeding documented

D.2 Plant Species

The following lists show the scientific and common names of the plant species that have been found on the National Elk Refuge in Wyoming. An asterisk (*) indicates a nonnative species.

Scientific name	*Common name*
Achillea millefolium var. alpicola	Common yarrow
Achnatherum hymenoides	Indian ricegrass
Achnatherum nelsonii ssp. nelsonii	Nelson's needlegrass
Agoseris glauca var. glauca	Short-beaked agoseris

Scientific name	*Common name*
Agoseris glauca var. laciniata	Short-beaked agoseris
Agropyron cristatum	Crested wheatgrass*
Agrostis stolonifera	Redtop*
Allium cernuum	Nodding onion
Allium schoenoprasum var. schoenoprasum	Wild chives*
Alopecurus aequalis	Shortawn foxtail
Alopecurus pratensis	Meadow foxtail*
Alyssum alyssoides	Pale alyssum*
Alyssum desertorum var. desertorum	Desert alyssum*
Amaranthus albus	White pigweed
Amelanchier alnifolia var. alnifolia	Western serviceberry
Anemone multifida	Cliff anemone
Angelica arguta	Sharptooth angelica
Angelica pinnata	Pinnate-leaved angelica
Antennaria dimorpha	Low pussytoes
Antennaria microphylla	Small-leaf pussytoes
Antennaria pulcherrima	Showy pussytoes
Antennaria rosea	Rosy pussytoes
Antennaria umbrinella	Umber pussytoes
Arabis drummondii	Drummond's rockcress
Arabis glabra	Towermustard
Arabis holboellii	Holboell's rockcress
Arenaria congesta	Ballhead sandwort
Argentina anserina	Silverweed
Arnica sororia	Twin arnica
Artemisia biennis var. biennis	Biennial wormwood*
Artemisia frigida	Fringed sagewort
Artemisia ludoviciana ssp. ludoviciana	Louisiana sagebrush
Artemisia tridentata ssp. tridentata	Basin big sagebrush
Artemisia tridentata ssp. vaseyana	Mountain big sagebrush
Artemisia tripartita ssp. tripartita	Threetip sagebrush
Astragalus agrestis	Field milkvetch
Astragalus argophyllus var. argophyllus	Silver-leaved milkvetch
Astragalus canadensis var. brevidens	Canada milkvetch
Astragalus diversifolius var. campestris	Lesser rushy milkvetch
Astragalus eucosmus	Elegant milkvetch
Astragalus miser var. decumbens	Sagebrush weedy milkvetch
Astragalus miser var. tenuifolius	Weedy milkvetch
Astragalus purshii var. purshii	Wooly milkvetch
Astragalus terminalis	Railhead milkvetch
Atriplex rosea	Red orache*
Atriplex truncata	Wedgescale orache
Balsamorhiza sagittata	Arrowleaf balsamroot
Besseya wyomingensis	Wyoming kittentails
Betula glandulosa	Bog birch

Scientific name	*Common name*
Betula occidentalis	Water birch
Bidens cernua	Nodding beggarticks
Bromus carinatus	California brome
Bromus ciliatus	Fringed brome
Bromus inermis ssp. inermis	Smooth brome*
Bromus tectorum	Cheatgrass*
Calamagrostis canadensis	Bluejoint wheatgrass
Calamagrostis rubescens	Pinegrass
Calamagrostis stricta	Slimstem reedgrass
Callitriche palustris	Spring water starwort
Calochortus nuttallii	Sego-lily
Camelina microcarpa	Littlepod falseflax*
Campanula rotundifolia	Harebell
Capsella bursa-pastoris	Shepherd's purse*
Caragana arborescens	Peatree*
Cardaria chalapensis	Chalapa hoarycress, whitetop*
Carduus acanthoides	Plumeless thistle*
Carduus nutans	Musk thistle*
Carex aquatilis	Water sedge
Carex aurea	Golden sedge
Carex buxbaumii	Buxbaum's sedge
Carex capillaris	Hair sedge
Carex duriuscula	Narrow-leaved sedge
Carex filifolia	Thread-leaved sedge
Carex interior	Inland sedge
Carex microptera	Small-wing sedge
Carex nebrascensis	Nebraska sedge
Carex parryana var. parryana	Parry sedge
Carex pellita	Woolly sedge
Carex praegracilis	Clustered field sedge
Carex rossii	Ross sedge
Carex rostrata	Beaked sedge
Carex sartwellii	Sartwell's sedge
Carex scirpoidea ssp. scirpoidea	Canadian single-spike sedge
Carex simulata	Analogue sedge
Carex viridula	Green sedge
Castilleja angustifolia var. angustifolia	Narrowleaf paintbrush
Castilleja angustifolia var. dubia	Desert paintbrush
Castilleja flava	Yellow paintbrush
Castilleja miniata	Scarlet paintbrush
Catabrosa aquatica	Brookgrass
Cerastium beeringianum ssp. earlei	Alpine chickweed
Cercocarpus ledifolius var. ledifolius	Curl-leaf mountain mahogany
Chaenactis douglasii var. douglasii	Hoary dustymaiden
Chamerion angustifolium	Fireweed

Scientific name	*Common name*
Chenopodium berlandieri var. zschackii	Pitseed goosefoot
Chenopodium foliosum	Smallhead goosefoot*
Chenopodium pratericola	Mountain goosefoot
Chrysothamnus viscidiflorus ssp. lanceolatus	Green rabbitbrush
Chrysothamnus viscidiflorus ssp. viscidiflorus	Green rabbitbrush
Cirsium arvense	Canada thistle*
Cirsium scariosum	Elk thistle
Cirsium subniveum	Snowy thistle
Cirsium vulgare	Bull thistle*
Clematis hirsutissima	Leatherflower
Clematis occidentalis var. grosseserrata	Rock virgin's bower
Collomia linearis	Narrowleaf collomia
Comandra umbellata ssp. pallida	Bastard toad-flax
Convolvulus arvensis	Field bindweed*
Cordylanthus ramosus	Bushy birdbeak
Cornus sericea	Redosier dogwood
Corydalis aurea	Golden-smoke
Crataegus douglasii	Black hawthorn
Crepis acuminata	Tapertip hawksbeard
Crepis modocensis	Siskiyou hawksbeard
Crepis runcinata ssp. glauca	Meadow hawksbeard
Crepis runcinata ssp. hispidulosa	Broad-leaved meadow hawksbeard
Dactylis glomerata	Orchardgrass*
Dasiphora fruticosa ssp. floribunda	Shrubby cinquefoil
Delphinium bicolor	Little larkspur
Deschampsia cespitosa	Tufted hairgrass
Descurainia incana ssp. procera	Mountain tansymustard
Descurainia sophia	Flixweed*
Dodecatheon pulchellum	Dark-throat shooting star
Elaeagnus commutata	Silverberry
Eleocharis acicularis	Slender spikerush
Eleocharis palustris	Common spikerush
Elymus albicans	Griffith's wheatgrass
Elymus elymoides	Bottlebrush squirreltail
Elymus lanceolatus	Thickspike wheatgrass
Elymus lanceolatus ssp. lanceolatus	Riparian thickspike wheatgrass
Elymus repens	Common quackgrass*
Elymus trachycaulus ssp. trachycaulus	Slender wheatgrass
Epilobium brachycarpum	Panicled willow-herb
Epilobium ciliatum ssp. ciliatum	American willow-herb
Epilobium hornemannii	Hornemann's willow-herb
Epilobium leptophyllum	Swamp willow-herb
Equisetum hyemale var. affine	Common scouring-rush
Equisetum laevigatum	Smooth scouring-rush
Equisetum variegatum	Northern scouring-rush

Scientific name	*Common name*
Ericameria nauseosa ssp. nauseosa var. nauseosa	Rubber rabbitbrush
Erigeron compositus	Cut-leaved fleabane
Erigeron corymbosus	Foothill daisy
Erigeron glabellus var. glabellus	Smooth daisy
Erigeron lonchophyllus	Spear-leaf fleabane
Erigeron pumilus	Shaggy fleabane
Eriogonum brevicaule var. laxifolium	Shortstem buckwheat
Eriogonum caespitosum	Mat buckwheat
Eriogonum ovalifolium var. purpureum	Cushion buckwheat
Eriogonum umbellatum var. majus	Sulfur buckwheat
Eriophorum angustifolium ssp. subarcticum	Many-spiked cottongrass
Eriophorum viridicarinatum	Green-keeled cottongrass
Erysimum capitatum var. capitatum	Sanddune wallflower
Erysimum cheiranthoides	Treacle wallflower*
Eucephalus elegans	Elegant aster
Festuca idahoensis	Idaho fescue
Festuca ovina	Sheep fescue
Fragaria virginiana	Virginia strawberry
Frasera speciosa	Monument plant
Frasera speciosa	Green gentian
Fritillaria atropurpurea	Checker lily
Galium boreale	Northern bedstraw
Galium trifidum	Small bedstraw
Gentiana affinis	Prairie gentian
Gentiana fremontii	Water gentian
Geranium viscosissimum var. incisum	Sticky geranium
Geranium viscosissimum var. viscosissimum	Sticky geranium
Geum macrophyllum var. perincisum	Large-leaved avens
Geum triflorum	Prairie-smoke
Glaux maritima	Sea-milkwort
Glyceria grandis	American mannagrass
Glyceria striata	Fowl mannagrass
Glycyrrhiza lepidota	Licorice-root
Gnaphalium palustre	Lowland cudweed
Grindelia squarrosa	Curly-cup gumweed
Gutierrezia sarothrae	Broom snakeweed
Hackelia floribunda	Many-flowered stickseed
Hedysarum boreale	Northern sweet-vetch
Helianthella uniflora	Rocky Mountain helianthella
Heracleum maximum	Cow parsnip
Hesperostipa comata ssp. intermedia	Needle and thread
Heterotheca villosa var. depressa	Teton golden aster
Heuchera parvifolia	Littleleaf alumroot
Hierochloe odorata	Common sweetgrass
Hippuris vulgaris	Common mare's-tail

Scientific name	*Common name*
Hordeum brachyantherum	Meadow barley
Hordeum jubatum	Foxtail barley
Hypericum scouleri ssp. scouleri	Western St. John's-wort
Ipomopsis aggregata	Scarlet gilia
Ipomopsis spicata ssp. orchidacea	Mountain spicate-gilia
Juncus arcticus ssp. littoralis	Baltic rush
Juncus longistylis	Long-styled rush
Juncus nodosus	Tuberous rush
Juncus saximontanus	Rocky Mountain rush
Juncus tenuis var. dudleyi	Slender rush
Juniperus communis var. depressa	Common juniper
Juniperus scopulorum	Rocky Mountain juniper
Koeleria macrantha	Junegrass
Krascheninnikovia lanata	Winterfat
Lactuca serriola	Prickly lettuce*
Lappula occidentalis var. occidentalis	Western stickseed
Lappula squarrosa	European stickseed*
Lemna minor	Lesser duckweed
Lepidium densiflorum	Common peppergrass
Lepidium perfoliatum	Clasping peppergrass*
Leptosiphon septentrionalis	Northern linanthus
Lesquerella carinata var. carinata	Keeled bladderpod
Leucopoa kingii	Spikefescue
Leymus cinereus	Great Basin wildrye
Linanthus pungens	Common prickly-phlox
Linum lewisii	Blue flax
Lithospermum ruderale	Western gromwell
Lomatium foeniculaceum	Fennel-leaved biscuitroot
Lomatium simplex var. simplex	Nineleaf biscuitroot
Lonicera involucrata	Bearberry honeysuckle
Lupinus argenteus ssp. argenteus	Silvery lupine
Lupinus argenteus var. rubricaulis	Silvery lupine
Lupinus sericeus	Silky lupine
Machaeranthera canescens ssp. canescens	Hoary aster
Mahonia repens	Oregon-grape
Maianthemum stellatum	Starry false Solomon's-seal
Malcolmia africana	Malcolmia*
Matricaria discoidea	Pineapple-weed*
Medicago lupulina	Black medic*
Medicago sativa ssp. sativa	Alfalfa*
Melilotus officinalis	White sweetclover*
Melilotus officinalis	Yellow sweetclover*
Mentha arvensis	Field mint
Mertensia ciliata	Ciliate bluebells
Mertensia oblongifolia	Leafy bluebells

Scientific name	*Common name*
Mimulus guttatus	Yellow monkeyflower
Minuartia nuttallii ssp. nuttallii	Nutall's sandwort
Monolepis nuttalliana	Povertyweed
Muhlenbergia filiformis	Pullup muhly
Muhlenbergia glomerata	Marsh muhly
Muhlenbergia richardsonis	Mat muhly
Myosotis scorpioides	Common forget-me-not*
Myriophyllum sibiricum	Common watermilfoil
Nassella viridula	Green needlegrass
Nasturtium officinale	Watercress
Oenothera caespitosa ssp. caespitosa	Tufted evening-primrose
Oenothera pallida ssp. trichocalyx	Pale evening-primrose
Opuntia polyacantha var. polyacantha	Plains prickly-pear
Orthocarpus luteus	Yellow owl-clover
Oxytropis deflexa var. sericea	Nodding locoweed
Packera cana	Woolly groundsel
Packera debilis	Weak groundsel
Packera paupercula	Balsam groundsel
Packera streptanthifolia	Alpine meadow groundsel
Packera streptanthifolia	Cleft-leaved groundsel
Parnassia palustris var. montanensis	Northern grass-of-Parnassus
Pedicularis crenulata	Meadow lousewort
Pedicularis groenlandica	Elephanthead lousewort
Penstemon humilis	Lowly beardtongue
Penstemon procerus var. procerus	Small-flower beardtongue
Penstemon radicosus	Matroot beardtongue
Penstemon subglaber	Subglabrous beardtongue
Petrophyton caespitosum	Rocky Mountain rockmat
Phacelia franklinii	Franklin's phacelia
Phalaris arundinacea	Reed canarygrass
Phleum alpinum	Alpine timothy
Phleum pratense	Timothy*
Phlox hoodii	Hood's phlox
Phlox kelseyi ssp. kelseyi	Kelsey's phlox
Phlox longifolia	Long-leaf phlox
Phlox multiflora	Many-flowered phlox
Picea engelmannii	Engelmann spruce
Picea pungens	Blue spruce
Pinus contorta	Lodgepole pine
Pinus flexilis	Limber pine
Plantago eriopoda	Alkali plantain
Plantago major	Common plantain
Platanthera aquilonis	Northern green bog-orchid
Poa annua	Annual bluegrass*
Poa bulbosa	Bulbous bluegrass*

Scientific name	*Common name*
Poa cusickii ssp. epilis	Cusick's bluegrass
Poa palustris	Fowl bluegrass
Poa pratensis	Kentucky bluegrass
Poa secunda	Sandberg bluegrass
Polemonium occidentale	Western Jacob's-ladder
Polygonum achoreum	Erect knotweed
Polygonum amphibium var. stipulaceum	Water smartweed
Polygonum aviculare	Common knotweed*
Polygonum douglasii ssp. douglasii	Douglas' knotweed
Polygonum viviparum	Alpine bistort
Populus angustifolia	Narrowleaf cottonwood
Populus tremuloides	Quaking aspen
Potentilla arguta	Glandular cinquefoil
Potentilla gracilis var. fastigiata	Slender cinquefoil
Potentilla gracilis var. pulcherrima	Soft cinquefoil
Potentilla norvegica	Norwegian cinquefoil
Potentilla ovina var. ovina	Sheep cinquefoil
Potentilla pensylvanica	Prairie cinquefoil
Primula incana	Mealy primrose
Prunella vulgaris ssp. lanceolata	Self-heal
Prunus virginiana var. melanocarpa	Chokecherry
Psathyrostachys juncea	Russian wildrye*
Pseudoroegneria spicata ssp. spicata	Bluebunch wheatgrass
Pseudotsuga menziesii	Douglas-fir
Pulsatilla patens ssp. multifida	Pasqueflower
Purshia tridentata	Bitterbrush
Pyrrocoma uniflora var. uniflora	One-flowered goldenweed
Ranunculus aquatilis var. diffusus new name	White water buttercup
Ranunculus cymbalaria	Shore buttercup
Ranunculus glaberrimus var. ellipticus	Sagebrush buttercup
Ranunculus hyperboreus	Floating water buttercup
Ranunculus inamoenus var. inamoenus	Unlovely buttercup
Ranunculus macounii	Macoun's buttercup
Ranunculus sceleratus var. multifidus	Blister buttercup
Ribes aureum var. aureum	Golden currant
Ribes cereum var. cereum	Wax currant
Ribes oxyacanthoides ssp. setosum	Missouri gooseberry
Rorippa curvipes var. truncata	Wasatch yellowcress
Rosa acicularis ssp. sayi	Prickly rose
Rosa woodsii var. woodsii	Woods' rose
Rumex aquaticus var. fenestratus	Western dock
Rumex maritimus var. fueginus	Golden dock
Rumex salicifolius var. mexicanus	Willow dock
Salix bebbiana	Bebb willow
Salix boothii	Booth's willow

Scientific name	*Common name*
Salix brachycarpa	Smallfruit willow
Salix candida	Hoary willow
Salix drummondiana	Drummond's willow
Salix exigua	Narrowleaf willow
Salix geyeriana	Geyer willow
Salix lucida ssp. caudata	Greenleaf willow
Salix lutea	Yellow willow
Salix melanopsis	Dusky willow
Salix planifolia	Planeleaf willow
Salsola tragus	Russian thistle*
Schoenocrambe linifolia	Flax-leaved plainsmustard
Schoenoplectus acutus var. acutus	Hardstem bulrush
Schoenoplectus tabernaemontani	Soft-stem bulrush
Scutellaria galericulata	Marsh skullcap
Sedum lanceolatum	Lance-leaved stonecrop
Selaginella densa	Compact spike-moss
Senecio hydrophilus	Water groundsel
Senecio integerrimus var. exaltatus	Western groundsel
Senecio serra	Butterweed groundsel
Shepherdia canadensis	Canada buffaloberry
Silene latifolia	White campion*
Sisymbrium altissimum	Tumblemustard*
Sisyrinchium idahoense var. occidentale	Western blue-eyed grass
Sium suave	Hemlock waterparsnip
Solidago canadensis var. salebrosa	Canada goldenrod
Solidago missouriensis var. missouriensis	Missouri goldenrod
Solidago nana	Low goldenrod
Sonchus arvensis ssp. uliginosus	Marsh sow-thistle*
Spiranthes romanzoffiana	Hooded lady's tresses
Stellaria crassifolia	Thickleaved starwort
Stellaria longipes	Longstalk starwort
Stenotus acaulis	Stemless goldenweed
Stuckenia filiformis ssp. filiformis	Slender-leaved pondweed
Stuckenia pectinata	Fennel-leaved pondweed
Swertia perennis	Swertia
Symphoricarpos oreophilus var. utahensis	Mountain snowberry
Symphyotrichum ascendens	Long-leaved aster
Symphyotrichum boreale	Boreal aster
Symphyotrichum eatonii	Eaton's aster
Symphyotrichum foliaceum var. apricum	Leafybract aster
Symphyotrichum spathulatum var. spathulatum	Western mountain aster
Taraxacum laevigatum	Red-seeded dandelion*
Taraxacum officinale	Common dandelion
Tetradymia canescens	Gray horsebrush
Thalictrum alpinum	Alpine meadowrue

Scientific name	*Common name*
Thalictrum venulosum	Veiny meadowrue
Thelypodium paniculatum	Panicled thelypody
Thinopyrum intermedium	Intermediate wheatgrass*
Thlaspi arvense	Field pennycress*
Townsendia nuttallii	Nuttall's Easter-daisy
Tragopogon dubius	Yellow salsify*
Trichophorum pumilum	Pygmy bulrush
Trifolium hybridum	Alsike clover*
Trifolium pratense	Red clover*
Trifolium repens	White clover*
Triglochin maritima	Seaside arrowgrass
Triglochin palustris	Marsh arrowgrass
Typha latifolia	Common cattail
Urtica dioica	Stinging nettle
Utricularia intermedia	Flat-leaf bladderwort
Utricularia macrorhiza	Greater bladderwort
Valeriana edulis	Tobacco-root
Valeriana occidentalis	Western valerian
Verbascum thapsus	Common mullein*
Verbena bracteata	Bracted vervain
Veronica americana	American brooklime
Veronica anagallis-aquatica	Water speedwell
Vicia americana ssp. minor	American vetch
Vicia cracca	Bird vetch*
Viola adunca	Early blue violet
Viola palustris	Marsh violet
Viola praemorsa ssp. linguifolia	Upland yellow violet
Zannichellia palustris	Horned pondweed
Zigadenus paniculatus	Panicled death-camas
Zizia aptera	Heart-leaved Alexanders

D.3 Mammal Species

The following lists show the scientific and common names of the mammal species that have been found on the National Elk Refuge in Wyoming.

Scientific name	*Common name*
Insectivora	Insectivores
Sorex cinereus	Masked shrew
Sorex merriami	Merriam's shrew
Sorex monticolus	Dusky or montane shrew
Sorex palustris	Water shrew

Scientific name	*Common name*
Chiroptera	Bats
Verspertilionidae	
Eptesicus fuscus	Big brown bat
Lasionycteris noctivagans	Silver-haired bat
Lasiurus cinereus	Hoary bat
Myotis ciliolabrum	Small-footed myotis
Myotis evotis	Long-eared myotis
Myotis lucifugus	Little brown myotis
Myotis volans	Long-legged myotis
Plecotus townsendii	Townsend's big-eared bat
Lagomorpha	Rabbits and Hares
Leporidae	
Lepus americanus	Snowshoe hare
Lepus townsendii	White-tailed jackrabbit
Rodentia	Rodents
Sciuridae (Squirrels)	
Glaucomys sabrinus	Northern flying squirrel
Marmota flaviventris	Yellow-bellied marmot
Spermophilus armatus	Uinta ground squirrel
Tamias amoenus	Yellow-pine chipmunk
Tamias minimus	Least chipmunk
Tamiasciurus hudsonicus	Red squirrel (pine squirrel, chickaree)
Geomyidae (Pocket gophers)	
Thomomys talpoides	Northern pocket gopher
Castoridae (Beavers)	
Castor canadensis	Beaver
Cricetidae	
Neotoma cinerea	Bushy tailed woodrat
Peromyscus maniculatus	Deer mouse
Arvicolinae (subfamily)	
Clethrionomys gapperi	Southern red-backed vole
Lemmiscus curtatus	Sagebrush vole
Microtus longicaudus	Long-tailed vole
Microtus montanus	Montane vole
Microtus pennsylvanicus	Meadow vole
Microtus richardsoni	Water vole
Microtus richardsoni	Richardson's vole
Ondatra zibethicus	Muskrat
Murinae (subfamily)	
Mus musculus	House mouse
Dipodidae	
Zapus princeps	Western jumping mouse
Erethizontidae (Porcupines)	
Erethizon dorsatum	Porcupine

Scientific name	*Common name*
Carnivora	Carnivores
Canidae (Canids)	
Canis latrans	Coyote
Canis lupus	Gray wolf
Vulpes vulpes	Red fox
Ursidae (Bears)	
Ursus americanus	Black bear
Ursus arctos	Grizzly bear
Procyonidae (Raccoons)	
Procyon lotor	Raccoon
Mustelidae (Mustelids)	
Lutra canadensis	Northern river otter
Mephitis mephitis	Striped skunk
Mustela erminea	Ermine (short-tailed weasel)
Mustela frenata	Long-tailed weasel
Mustela vison	Mink
Taxidea taxus	Badger
Felidae (Felids)	
Lynx rufus	Bobcat
Puma concolor	Mountain lion
Artiodactyla	Hoofed mammals
Cervidae	
Alces alces	Moose
Antilocarpa americana	Pronghorn
Cervus elaphus	Elk (wapiti)
Odocoileus hemionus	Mule deer
Odocoileus virgianus	White-tailed deer
Bovidae	
Bison bison	Bison (American buffalo)
Ovis canadensis	Mountain sheep (bighorn sheep)

D.4 Bird Species

The following lists show the scientific and common names of the mammal species that have been found on the National Elk Refuge in Wyoming. An asterisk (*) indicates a nonnative species.

Scientific name	*Common name*
Hummingbirds	
Selasphorus platycercus	Broad-tailed hummingbird
Selasphorus rufus	Rufous hummingbird
Stellula calliope	Calliope hummingbird

Scientific name	*Common name*
Perching birds	
Agelaius phoeniceus	Red-winged blackbird
Thus rubescens	American pipit
Bombycilla cedrorum	Cedar waxwing
Bombycilla garrulus	Bohemian waxwing
Carduelis pinus	Pine siskin
Carduelis tristis	American goldfinch
Carpodacus cassinii	Cassin's finch
Carpodacus mexicanus	House finch
Catharus fuscescens	Veery
Catharus guttatu	Hermit thrush
Catharus ustulatus	Swainson's thrush
Certhia americana	Brown creeper
Cinclus mexicanus	American dipper
Cistothorus palustris	Marsh wren
Contopus sordidulus	Western wood-pewee
Corvus brachyrhynchos	Common crow
Corvus corax	Common raven
Dendroica petechia	Yellow warbler
Dolichonyx oryzivorus	Bobolink
Dumetella carolinensis	Gray catbird
Empidonax minimus	Least flycatcher
Empidonax oberholseri	Dusky flycatcher
Empidonax occidentalis	Cordilleran flycatcher
Empidonax trailii	Willow flycatcher
Eremophila alpestris	Horned lark
Euphagus cyanocephalus	Brewer's blackbird
Geothlypis trichas	Common yellowthroat
Hirundo rustica	Barn swallow
Icteria virens	Yellow-breasted chat
Icterus bullockii	Bullock's oriole
Junco hyemalis	Dark-eyed junco
Lanius excubitor	Northern shrike
Lanius ludovicianus	Loggerhead shrike
Leucosticte tephrocotis	Gray-crowned rosy finch
Loxia curvirostra	Red crossbill
Loxia leucoptera	White-winged crossbill
Melospiza melodia	Song sparrow
Melospiza lincolnii	Lincoln's sparrow
Molothrus ater	Brown-headed cowbird
Myadestes townsendi	Townsend's solitaire
Nucifraga columbiana	Clark's nutcracker
Oporornis tolmiei	MacGillivray's warbler
Passer domesticus	House sparrow
Passerculus sandwichensis	Savannah sparrow

Scientific name	*Common name*
Passerella iliaca	Fox sparrow
Passerina amoena	Lazuli bunting
Perisoreus canadensis	Gray jay
Petrochelidon pyrrhonota	Cliff swallow
Pheucticus melanocephalus	Black-headed grosbeak
Pica hudsonia	Black-billed magpie
Pipilo chlorurus	Green-tailed towhee
Piranga ludoviciana	Western tanager
Plectrophenax nivalis	Snow bunting
Poecile atricapilla	Black-capped chickadee
Poecile gambile	Mountain chickadee
Pooecetes gramineus	Vesper sparrow
Regulus satrapa	Golden-crowned kinglet
Regulus calendula	Ruby-crowned kinglet
Riparia riparia	Bank swallow
Salpinctes obsoletus	Rock wren
Sayornis saya	Say's phoebe
Seiurus noveboracensis	Northern waterthrush
Setophaga ruticilla	American redstart
Sialia currucoides	Mountain bluebird
Sitta canadensis	Red-breasted nuthatch
Sitta carolinensis	White-breasted nuthatch
Spizella breweri	Brewer's sparrow
Spizella passerina	Chipping sparrow
Stelgidopteryx serripennis	Northern rough-winged swallow
Sturnella neglecta	Western meadowlark
Sturnus vulgaris	European starling*
Tachycineta bicolor	Tree swallow
Tachycineta thalassina	Violet-green swallow
Troglodytes aedon	House wren
Turdus migratorius	American robin
Tyrannus tyrannus	Eastern kingbird
Tyrannus verticalis	Western kingbird
Vermivora celat	Orange-crowned warbler
Vireo gilvus	Warbling vireo
Wilsonia pusilla	Wilson's warbler
Xanthocephalus xanthocephalus	Yellow-headed blackbird
Zonotrichia leucophrys	White-crowned sparrow
Woodpeckers	
Colaptes auratus	Northern flicker
Melanerpes lewis	Lewis' woodpecker
Picoides pubescens	Downy woodpecker
Picoides villosus	Hairy woodpecker
Sphyrapicus nuchalis	Red-naped sapsucker
Sphyrapicus thyroideus	Williamson's sapsucker

Scientific name	*Common name*
Gallinaceous birds	
Alectoris chukar	Chukar*
Perdix perdix	Gray partridge*
Tympanuchus phasianellus columbianus	Columbian sharp-tailed grouse
Bonasa umbellus	Ruffed grouse
Centrocercus urophasianus	Greater sage-grouse
Dendragapus obscurus	Blue grouse
Waterfowl	
Anas acuta	Northern pintail
Anas americana	American wigeon
Anas clypeata	Northern shoveler
Anas crecca	Green-winged teal
Anas cyanoptera	Cinnamon teal
Anas platyrhynchos	Mallard
Anas strepera	Gadwall
Aythya affinis	Lesser scaup
Aythya americana	Redhead
Aythya collaris	Ringed-neck duck
Branta canadensis	Canada goose
Bucephala albeola	Bufflehead
Bucephala clangula	Common goldeneye
Bucephala islandica	Barrow's goldeneye
Chen caerulescens	Snow goose
Cygnus buccinator	Trumpeter swan
Cygnus columbianus	Tundra swan
Lophodytes cucullatus	Hooded merganser
Mergus merganser	Common merganser
Oxyura jamaicensis	Ruddy duck
Shorebirds	
Actitis macularia	Spotted sandpiper
Capella gallinago	Common snipe
Catoptrophorus semipalmatus	Willet
Charadrius vociferus	Killdeer
Ereubetes mauri	Western sandpiper
Eupoda montana	Mountain plover
Himantopus mexicanus	Black-necked stilt
Limnodromus scolopaceus	Long-billed dowitcher
Limosa fedoa	Marbled godwit
Numenius americanus	Long-billed curlew
Phalaropus tricolor	Wilson's phalarope
Recurvirostra americana	American avocet
Tringa flavipes	Lesser yellowlegs
Tringa melanoleuca	Greater yellowlegs
Rails and coots	
Coturnicops noveboracensis	Yellow rail

Scientific name	*Common name*
Fulica americana	American coot
Porzana carolina	Sora
Cranes	
Grus canadensis	Sandhill crane
Bitterns, herons, and ibis	
Plegadis chihi	White-faced ibis
Ardea herodias	Great blue heron
Botaurus lentiginosus	American bittern
Bubulcus ibis	Cattle egret
Leucophoyx thula	Snowy egret
Nycticorax nycticorax	Black-crowned night-heron
Raptors	
Accipiter cooperii	Cooper's hawk
Accipiter striatus	Sharp-shinned hawk
Aquila chrysaetos	Golden eagle
Buteo jamaicensis	Red-tailed hawk
Buteo lagopus	Rough-legged hawk
Buteo swainsoni	Swainson's hawk
Cathartes aura	Turkey vulture
Circus cyaneus	Northern harrier
Falco columbarius	Merlin
Falco mexicanus	Prairie falcon
Falco peregrinus	Peregrine falcon
Falco sparverius	American kestrel
Haliaeetus leucocephalus	Bald eagle
Pandion haliaetus	Osprey
Owls	
Aegolius acadicus	Northern saw-whet owl
Asio flammeus	Short-eared owl
Asio otus	Long-eared owl
Athene cunicularia	Burrowing owl
Bubo virginianus	Great-horned owl
Strix nebulosa	Great grey owl
Seabirds	
Aechmophorus occidentalis	Western grebe
Pelecanus erythrorhynchos	White pelican
Phalacrocorax auritus	Double-crested cormorant
Podiceps caspicus	Eared grebe
Podilymbus podiceps	Pied-billed grebe
Gulls and terns	
Chlidonias niger	Black tern
Larus californicus	California gull
Larus philadelphia	Bonaparte's gull
Larus pipixcan	Franklin's gull
Sterna caspia	Caspian tern

Scientific name	*Common name*
Sterna forsteri	Forster's turn
Other birds	
Gavia immer	Common loon
Ceryle alcyon	Belted kingfisher
Chordeiles minor	Common nighthawk
Columba livia	Rock dove*
Streptopelia decaocto	Eurasian collared dove*
Zenaida macroura	Mourning dove

D.5 Amphibian and Reptile Species

The following lists show the scientific and common names of the amphibian and reptile species that have been found on the National Elk Refuge in Wyoming.

Scientific name	*Common name*
Ambystoma tigrinum	Tiger salamander
Bufo boreas boreas	Boreal toad
Charina bottae bottae	Rubber boa
Pseudacris maculate	Boreal chorus frog
Rana luteiventris	Columbia spotted frog
Thannophis elegans vagrans	Intermountain wandering garter snake
Thamnophis sirtalis fitchi	Valley garter snake

D.6 Fish Species

The following lists show the scientific and common names of the fish species that have been found on the National Elk Refuge in Wyoming. An asterisk (*) indicates a nonnative species.

Scientific name	*Common name*
Catostomus discobolus	Bluehead sucker
Catostomus ardens	Utah sucker
Catostomus platyrhynchus	Mountain sucker
Cottus bairdi	Mottled sculpin
Cottus beldingi	Paiute sculpin
Oncorhynchus clarkii	Snake River cutthroat trout
Oncorhynchus clarkia ssp. x O. mykiss	Snake River cutthroat trout x rainbow trout hybrid
Oncorhynchus mykiss	Rainbow trout*
Pimephales promelas	Fathead minnow*
Prosopium williamsoni	Mountain whitefish
Richardsonius balteatus	Redside shiner

Scientific name	*Common name*
Rhinichthys cataractae	Longnose dace
Rhinichthys osculus	Speckled dace
Salmo trutta	Brown trout*
Salvelinus fontinalis	Eastern brook trout*

Appendix E
Compatibility Determinations

E.1 Refuge Name and Date Established

- National Elk Refuge
- Established August 10, 1912

E.2 Refuge Purposes

The following excerpts describe the various purposes of the refuge as set in legal orders, laws, and regulations:

- as "a winter game (elk) reserve" (16 U.S.C. § 673, 37 Stat.293)
- as "a winter elk refuge" (37 Stat. 847)
- for "refuge and breeding grounds for birds" (Executive Orders 3596 and 3741)
- for "the grazing of, and as a refuge for, American elk and other big game animals" (16 U.S.C. § 673a, 44 Stat. 1246)
- for "the conservation of fish and wildlife" (16 U.S.C. § 742[a–j], Fish and Wildlife Act of 1956)
- for "opportunities for wildlife-oriented recreational development oriented to fish and wildlife, the protection of natural resources, and the conservation of threatened or endangered species" (16 U.S.C., § 460[k–l], Refuge Recreation Act)

E.3 National Wildlife Refuge System Mission

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

E.4 Description of Uses

The following uses are evaluated for their compatibility on the refuge:

- Hunting
- Fishing
- Wildlife Observation and Noncommercial Photography
- Environmental Education and Interpretation
- Research and Monitoring
- Commercial Filming, Audio Recording, and Still Photography
- Commercial Guiding, Outfitting, Game Retrieval, and Wildlife-Viewing Tours

Hunting

The CCP proposes to continue to provide elk and bison hunting consistent with the Bison and Elk Management Plan, including adaptively modifying hunting regulations to achieve herd size objectives and extending accommodations for hunters with disabilities. The refuge will continue to allow elk and bison retrieval from the Bridger-Teton National Forest to Elk Refuge Road south and west of Twin Creek subdivision, allow a ceremonial tribal bison hunt with annual harvest of up to five bison, prohibit the hunting of any other wildlife species other than elk and bison, and promote voluntary use of lead-free ammunition.

In addition, the refuge will expand hunting opportunities for young people. We will work with partners to develop a hunter mentoring program. By scheduling the existing youth hunt to later in the season, young hunters will have a better chance of observing and harvesting elk. Options will include designating a weekend midseason (of the adult hunter season) for youth only or adding a weekend after the end of the regular elk season.

The refuge will provide more outreach for other refuge users to promote education and awareness of the refuge hunting program. Staff will develop bear attractant regulations for hunting on the refuge, encourage the carry of bear spray while hunting, and consider requiring hunters to carry bear spray. Staff may develop hunter-use management tools such as hunter checkpoints, hunter success surveys, and mandatory reporting of tag use to better manage hunt program opportunities.

Staff will coordinate with WGFD to develop specific refuge hunting opportunities by making available limited-quota type 6 tags in Hunt Area 77 on the refuge to increase cow elk harvest. We will also work with WGFD to develop a limited-quota antlered elk hunt on the refuge to provide more quality opportunities using limited-quota, type 1 tags in Hunt Area 77. The refuge will open currently closed areas on the southern and western boundaries of the refuge to archery hunters to create more harvest opportunities.

We will analyze and consider more hunter access areas and designated parking lots. The staff will look at more access for bison hunters on the northern end of the refuge though the Teton Valley Highlands subdivision, either on the western end of the subdivision to hunt retrieval road 6 or on the eastern end to hunt retrieval road 7. We will consider access for archery hunters on the western boundary of the refuge next to the Jackson National Fish Hatchery.

Availability of Resources

The refuge updates with available resources the current directional signs and brochures. Maintenance of access roads, parking, hunting and information kiosks, and public use signs is closely tied to Maintenance Management System funding. The refuge's base money will pay for the update and printing of brochures.

The refuge will need more law enforcement staff and resources (1) to manage significant changes in the hunting program to reduce disturbance to wildlife and habitat, (2) to carry out and encourage preventative law enforcement efforts, and (3) to check compliance with public use and hunting regulations.

Anticipated Impacts of Use

The hunting program will continue to provide hunters ample opportunity for quality hunting experiences without materially detracting from the mission of the Refuge System or the establishing purposes of the refuge. We will keep the public use brochures and the refuge's Web site up-to-date and readily available to hunters. Staff will continue to monitor hunter success and satisfaction through random contacts with hunters in the field and in the refuge office.

Elk and bison hunting programs on the National Elk Refuge are essential to achieve the population objectives outlined in the Bison and Elk Management Plan. Although hunting directly affects the hunted species and might indirectly disturb other species, limits on harvest and access for recreational hunting would make sure that populations do not fall to unsustainable levels. By its nature, hunting creates a disturbance to wildlife and directly affects the individual animals being hunted. We will design and monitor hunting to offer a safe and quality program and to keep adverse effects within acceptable limits.

Other effects from hunting activity include conflicts with individuals participating in wildlife-dependent, priority public uses such as wildlife observation and photography. This could decrease the visitor satisfaction during the hunting season.

Public Review and Comment

This compatibility determination was presented for public review and comment as part of the 45-day public comment period for the draft CCP and EA for the National Elk Refuge.

Determination

Hunting is a compatible use on the National Elk Refuge.

Stipulations Necessary for Compatibility

Hunters will be required to follow refuge-specific regulations for acquisition of hunting permits; access, parking, and travel restrictions; and weapons and ammunition limitations. Limiting access and monitoring the use could help limit any adverse effects.

Justification

The National Wildlife Refuge System Act of 1966, other laws, and the Service's policy allow hunting on a national wildlife refuge when it is compatible with the purposes for which the refuge was established and acquired. Hunting is a form of wildlife-dependent recreation and is identified as a priority public use in the Improvement Act. Based on anticipated biological effects described above and in the EA, we find that hunting on the refuge in accordance with State regulations will not interfere with the purposes for which the refuge was established and will support management objectives. Special refuge regulations are in place to reduce negative effects on habitat and wildlife.

Mandatory 15-year Reevaluation Date: 2030

Fishing

This use will be a continuation of the historical activity of noncommercial fishing. Public use areas such as parking and fishing areas, as well as interpretive panels, signs, kiosks, and other structures might be installed and supported to facilitate the fishing program. Areas on the refuge that are seasonally sensitive to migratory birds will remain closed to public entry and use. The refuge will open only selected areas to fishing. Special refuge regulations governing fishing will be available in refuge brochures.

The CCP proposes to allow fishing on the refuge in accordance with State regulations. The refuge will provide fishing opportunities during daylight hours. We will maintain fishing access along Highway 89, along with the parking turnouts along upper Flat Creek. The Gros Ventre River, upper Flat Creek, lower Flat Creek, lower Nowlin Creek and Sleeping Indian Pond are open to fishing according to season dates and regulations set by WGFD. All other refuge ponds, Flat Creek downstream from the old Crawford Bridge site, and Nowlin Creek upstream from the posted fishing boundary will remain closed to fishing.

Besides sponsoring Kids' Fishing Day with Jackson National Fish Hatchery and WGFD, the refuge will start programs that attract more young people to fish at the refuge. Future programs could include casting instruction, fishing skills clinics, and a mentoring program for young anglers.

The Flat Creek fishery is managed for a native, wild, and trophy-sized population of Snake River cutthroat trout. Long-time devotees of Flat Creek report a decline in the opportunity to fish for large cutthroats. Recent fish surveys show that nonnative trout (brook, brown, and rainbow) account for almost half of the trout population in Flat Creek. There is a need for management of this fishery to support the quality of the fishing experience.

Availability of Resources

The refuge has adequate administrative and management staff to support the fishing program.

Anticipated Impacts of Use

Temporary disturbance of wildlife may occur near fishing activity. Fishing will temporarily decrease the fish population until natural reproduction or stocking replenished the population. Frequency of use will be directly dependent on fish populations and their feeding activity. When fish populations were high and active, public use will increase. Minimal disturbance to ground-nesting birds might occur from anglers walking along rivers and streams. Littering could also become a problem. We anticipate no long-term negative effects on resources.

Public Review and Comment

This compatibility determination was presented for public review and comment as part of the 45-day public comment period for the draft CCP and EA for the National Elk Refuge.

Determination

Fishing is be a compatible use on the National Elk Refuge in accordance with State regulations.

Stipulations Necessary for Compatibility

Refuge regulations allow access to fishing areas during daylight hours only. A scheduled gate opening at daylight on the August 1 season opening will be consistent with refuge regulations. We will post access gates with opening time information and conduct public outreach.

The typical Flat Creek anglers are avid flycasters that have adopted catch-and-release principles as their conservation ethic. The refuge needs to create an educational component that will convince our anglers to harvest nonnative trout. Special refuge

regulations might be necessary to require anglers to remove nonnative trout caught in Flat Creek to meet management objectives.

Justification

Fishing is a form of wildlife-dependent recreations and is identified as a priority public use in the Improvement Act. Based on the biological effects addressed above and in the EA, we find that fishing will not interfere with the purposes for establishment of the refuge. Current staff levels and money are adequate. Special refuge regulations are in place to reduce negative effects on refuge habitat and wildlife.

Mandatory 15-year Reevaluation Date: 2030

Wildlife Observation and Noncommercial Photography

A variety of habitats and many species of wildlife on the refuge provide observation and photography opportunities year-round. The refuge will continue to provide wildlife observation and photography opportunities such as (1) observation blinds, (2) an up-to-date species list for the refuge, and (3) allowing the use of portable viewing and photography blinds through the issuance of special use permits. These activities may take place on foot, bicycle, automobile, horse, cross-country skis, and snowshoes.

Refuge facilities bring visitors closer to wildlife. New facilities for observing and photographing wildlife (such as observation platforms, trails, auto tour routes, photography blinds, and webcams) may be developed. In addition, the CCP proposes maintaining access to existing turnouts, trails, and other observation sites. The primary viewing turnouts and designated observation sites follow:

- upper viewing platform on the second story of the visitor center
- Bert Raynes Boardwalk and remote-viewing platform on the eastern side of the visitor center lawn
- turnout north of the visitor center and the Flat Creek Bridge, which has a viewing platform and National Elk Refuge sign (turnout will continue to be plowed in winter, thus providing year-round access to the turnout)
- turnout along Highway 89 north of Jackson, which has a kiosk and interpretive panel about the purpose of the fence and the elk "jumps" (refer to "Fencing" in chapter 3, section 3.3) (turnout will continue to be plowed in winter by the Wyoming Department of Transportation, giving travelers on Highway 89 a safe place to pull over and view wildlife; however, plowed snow would pile up on the northern end of the turnout, blocking access to the kiosk and interpretive panel)
- with added turnouts, about 10 turnouts will be available on Elk Refuge Road. They will be plowed during winter months to encourage vehicles to move off the road to view wildlife

Elk Refuge Road and Flat Creek Road will be open to the public for wildlife observation and access to national forest lands from May 1 through November 30. During winter, 3.5 miles of Elk Refuge Road (from the refuge entrance to the Twin Creek subdivision) will be open to provide access to national forest lands and wildlife-viewing opportunities. Access to the refuge beyond the Twin Creek subdivision will continue to be restricted as part of an area closure to protect wintering wildlife and is coordinated with the Bridger-Teton National Forest.

In addition the refuge will use the Jackson Hole Community Pathways to develop a more prominent access route across visitor center lawn to the existing remote-viewing platform and develop a boardwalk through wetland areas near the visitor center. We may build a photo blind along the boardwalk for noncommercial photography. The refuge may use webcams to provide remote wildlife-viewing opportunities.

Availability of Resources

Sufficient resources are available to administer, manage, and check this use of wildlife observation and noncommercial photography. Existing refuge infrastructure will support these activities. The construction and maintenance of roadways, kiosks, observation platforms, and trails, as well as law enforcement activities to make sure that visitors comply with refuge regulations while conducting these activities, are the principle expenses associated with wildlife observation and photography. An extra park ranger, law enforcement officer, and maintenance worker, as proposed in the CCP, will enhance

public opportunities for these uses and improve the quality and quantity of opportunities.

Anticipated Impacts of the Use

The proposed wildlife observation and photography uses, including development of facilities to support those uses, will foster public appreciation and understanding of the Greater Yellowstone Ecosystem and the importance of refuge habitats for wildlife conservation.

Short-term effects may include the temporary displacement of bison, elk, birds, and other wildlife to adjacent habitats during the initial positioning and removal of portable blinds, cameras, and other equipment. Observation areas are in locations that provide consistent wildlife-viewing opportunity with minimal disturbance to wildlife.

Hiking during the breeding season, when confined to open trails and roads will have little or no effect on wildlife. Bicycling will be restricted to roadways open to vehicular traffic to reduce disturbance to wildlife. Some animals and birds would be flushed from foraging or resting habitats by the approach of people on trails.

Winter disturbance to resident wildlife will be temporary and minor. The destruction of ground bird nests by horses (allowed only during hunting) and the disturbance to other wildlife will be minimal because of the seasonal restrictions inherent to the hunting season.

The area affected by these disturbances will be small compared to the overall habitat available. Furthermore, all areas are available to wildlife for undisturbed use during closed hours, and we do not anticipate that disturbance caused by observation and photography will cause wildlife to leave the refuge. We find that disturbance from wildlife observation and noncommercial photography programs will be biologically insignificant. We expect no long-term effects if recommended stipulations are followed.

Public Review and Comment

This compatibility determination was presented for public review and comment as part of the 45-day public comment period for the draft CCP and EA for the National Elk Refuge.

Determination

Wildlife observation and noncommercial photography are compatible uses on the National Elk Refuge.

Stipulations Necessary for Compatibility

The refuge will issue special use permits to all individuals using blinds for observation and photography on the refuge. Staff will issue five special use permits for designated areas in any given year. The use of small observation blinds will be available on a first-come, first-serve basis. If the number of requests for blinds exceeded five, the permitting process will be reviewed and modified as necessary. Refuge staff will give information to visitors using permanent or portable observation and photography blinds on proper use and etiquette of these structures to reduce disturbance to wildlife and their natural environments and other refuge visitors:

- Visitors need to notify refuge staff before arrival at the refuge for observation and photography.
- Refuge staff decides locations of blinds, which might be limited to areas next to public access roads.
- Refuge staff decides if, when, where, and for how long access may be allowed to photograph at individual areas.
- Visitors need to erect and remove portable blinds daily.

The refuge will support seasonal closures to protect sensitive wildlife areas and reduce disturbance to fish and wildlife. We will restrict non-Service vehicles to county and public access roads in the refuge.

We will design viewing areas to reduce disturbance effects on wildlife and all refuge resources while providing a good opportunity to view wildlife in natural environments.

The refuge will allow foot traffic (hiking, cross-country skiing, and snowshoeing) only on designated trails, roads open to motorized vehicles, and in the refuge hunt area during the refuge hunting season. We will restrict use of horses to the hunting program or to roadways open to motorized vehicles year-round. The refuge will restrict bicycling to designated trails and roadways open to motorized vehicles.

Justification

Wildlife observation and photography are forms of wildlife-dependent recreation and are identified as priority public uses in the Improvement Act. These uses, both existing and future enhanced programs as prescribed in the CCP, a compatible with the pur-

poses of the refuge and the mission of the Refuge System. These uses are not only justified but are encouraged by the Improvement Act. Wildlife observation and photography can instill, in citizens of all ages, a greater appreciation for wildlife and its habitat. This appreciation could extend to the Refuge System and other conservation agencies.

Disturbance from wildlife observation and photography is not expected to adversely affect wildlife populations. Most wildlife observation is confined within a set distance from existing roadways. In some locations, the infrastructure helps to concentrate visitors in areas that can allow wildlife observation and photography opportunities at safe distances that reduce disturbance to wildlife.

Based on anticipated biological effects described above and in the EA, we find that wildlife observation and noncommercial photography on the refuge will not interfere with the purposes for which the refuge was established. Limiting access and monitoring the uses could help limit any adverse effects.

Mandatory 15-year Reevaluation Date: 2030

Environmental Education and Interpretation

The refuge will provide opportunity for student field trips on an "as-arranged" basis. Temporary and impromptu outdoor classrooms may be established or used in wetland and riparian habitats; however, seasonal closures may occur to avoid effects on threatened and endangered species or sensitive habitats.

Interpretive panels and auto tour brochures will give visitors information about habitat, wildlife, management actions.

The CCP proposes to continue environmental education and interpretation and add the following to improve these programs to foster appreciation and understanding of the Refuge System and the resources of the refuge:

- The refuge will develop a self-guided interpretive tour route on Elk Refuge Road and Flat Creek Road on the eastern side of the refuge, including interpretive turnouts, signage, brochures, or mobile technology. We will need to address safety mitigation during critical times of year (hunting and bison hazing). The refuge will need to update and replace interpretive signs as needed, with panels related to the tour route theme.
  - First phase (winter route)—Develop the route from Elk Refuge Road entrance to Twin Creek subdivision for approximately 3.5 miles.
  - Second phase (summer route)—Develop the route from Twin Creek subdivision to the McBride area; open May 1–December 1 with an interpretive kiosk at the McBride parking area.
  - Third phase—Increase traffic control signing from the McBride area to the eastern parking lot and include the traffic information in the brochure. (If we encouraged or promoted traffic to the east parking lot, we would need to make a major change to the road for safety. Currently, this is a one-lane road around McBride Ridge.)
- We may develop short multimedia presentations that would be available on demand. This would respond to visitors' needs and preferences as well as allow refuge staff to update segments with minimal cost and staff time.
- We will emphasize the role of national wildlife refuges versus national parks and national forests.
- The refuge will use the North Highway 89 Pathway during open season to interpret wetland values or other messages. Refuge staff will cooperate with Teton County to evaluate pathway effects on wildlife and habitat and adjust use as appropriate.
- Refuge staff will develop a more prominent access route across visitor center lawn to the existing remote-viewing platform and develop a boardwalk through wetland areas near the visitor center. A photo blind may be developed along the boardwalk for noncommercial photography.
- We will develop more accessible observation sites on the refuge.
- Refuge staff may take part in special events and activities offsite to bring the refuge message to large numbers of people as time and staff allow.
- The refuge will update interpretive panels, brochures, Web sites, and maps.

Availability of Resources

The refuge will use annual operations money, grants, regional project proposals, and challenge cost-share agreements to enhance environmental education and interpretation activities, directional signs, and brochures.

The visitor services staff relies on a large residential volunteer workforce as the means to offer formal and informal interpretation during the summer months when visitor center visitation peaks. Volunteers also provide formal and informal interpretation during the winter months. The refuge will seek money for permanent or seasonal interpreters to improve programming at the visitor center, Miller House, and offsite programs.

To meet the demand for environmental education during the school year, we use money from nongovernmental partnerships to hire seasonal winter naturalists. Refuge volunteers offer environmental education programs in the spring.

Anticipated Impacts of the Use

We will continue to promote a greater public understanding and appreciation of the refuge resources, programs, and issues through interpretive, outreach, and environmental education programs. The refuge staff will continue to provide environmental education and interpretation both on and off refuge lands. Presentations, both on and off Service lands, will be provided to refuge visitors, school groups, and organizations, helping us reach a broader audience.

Updated brochures, interpretive panels, and other educational materials will help visitors understand refuge resources, ecosystem processes, and land management. Features such as the proposed auto tour route and accessible observation sites will provide access to the many sights and sounds of the refuge.

We will manage onsite presentations to reduce disturbance to wildlife, habitat, and cultural resources.

We will manage onsite presentations to reduce disturbance to wildlife, habitat, and cultural resources; however, there might be a short-term, low-level effect on the immediate and surrounding area. Effects may include trampling of vegetation and temporary disturbance to nearby wildlife species during the activities. Development and implementation of interpretive and education programs will have minimal and biologically insignificant effects on refuge resources.

Public Review and Comment

This compatibility determination was presented for public review and comment as part of the 45-day public comment period for the draft CCP and EA for the National Elk Refuge.

Determination

Environmental education and interpretation are compatible uses on the National Elk Refuge.

Stipulations Necessary for Compatibility

The refuge will hold onsite activities where minimal effect on wildlife and habitats will occur.

All motor vehicles associated with environmental education and interpretation will remain on designated roads open to vehicular traffic.

Staff will check use patterns and will make adjustments in timing, location, and duration of activities as needed to limit disturbance to wildlife and habitat.

We will review new environmental education and interpretation activities to make sure these activities met program objectives and were compatible.

Justification

Environmental education and interpretation are forms of wildlife-dependent recreation and are priority public uses of the Refuge System. Environmental education and interpretation will increase public awareness and appreciation of the significant wildlife and habitat values of the refuge and the Refuge System. We anticipate that such appreciation and understanding will foster increased public support for the Refuge System and conservation of America's wildlife resources.

Based on the anticipated biological effects described above and in the EA, we find that environmental education and interpretation on the refuge will not interfere with the purposes for which the refuge was established. Limiting access and monitoring the uses could help limit any adverse effects.

Mandatory 15-year Reevaluation Date: 2030

Research and Monitoring

The refuge will allow research and monitoring on a variety of biological, physical, and social issues and concerns to address management information needs or other issues. Studies will be conducted by Federal,

State, and private entities, including the U.S. Geological Survey, State and private universities, and independent researchers and contractors.

Each year, the refuge issues special use permits for biological and physical research studies; normally, we get fewer than 10 requests each year. The refuge will give priority to studies that contribute to the enhancement, protection, preservation, and management of the refuge's native plant, fish, and wildlife populations and their habitats. Research applicants must submit proposals that describe the following:

- objectives of the study
- justification for the study
- detailed study methods and a schedule
- potential effects on wildlife and habitat including short- and long-term disturbance, injury, or mortality
- measures the researcher will take to reduce disturbances or other effects
- personnel involved and their qualifications and experience
- status of necessary permits (such as scientific collecting permits and endangered species permits)
- costs to the refuge and refuge staff time requested, if any
- anticipated progress reports and end products, such as reports or publications

Refuge staff will review research permit applications and issue special use permits if approved. Evaluation criteria for the issuance of special use permits will include, but not be limited to, the following:

- We will give higher priority over other requests to research that will contribute to specific management issues, the purposes of the refuge, or the mission of the Refuge System.
- We will not approve research that would conflict with other ongoing research, monitoring, or management programs.
- We will be less likely to approve research projects that could be conducted off refuge lands.
- We will likely not approve research that would cause undue disturbance or would be intrusive. The refuge will carefully weigh the degree and type of disturbance when evaluating a research request.
- We will decide if the research evaluation made any effort to reduce disturbance through study design including adjusting location, timing, number of permittees, study methods, and number of study sites.
- We will likely deny the request if staff levels or logistics make it impossible for refuge staff to check researcher activity in a sensitive area.
- We will consider and agree on the length of the project before approval.
- To reduce disturbance to wildlife, we will not permit researchers in closed areas, unless specifically authorized. The refuge will permit vehicular access only on roads and trails normally open to the public.

Availability of Resources

Current staff will be adequate to manage research and monitoring projects at anticipated levels. Reviewing a permit application, drafting and issuing the special use permit, and making compliance assessments will take an average of 15 hours of staff time per permit.

Access points, vehicles, miscellaneous equipment, and limited logistical support may be available at the refuge manager's discretion. Temporary housing on the refuge may be available for use by researchers while studying refuge resources, at the refuge manager's discretion.

Anticipated Impacts of Use

We expect some degree of disturbance with all research activities, because researchers might use Service roads or enter areas that are closed to the public. Research activities might disturb fish and wildlife and their habitats. For example, the presence of researchers could cause waterfowl to flush from resting and feeding areas, cause disruption of birds and other wildlife on nests or breeding areas, or increase predation on individual nests and animals as predators follow human scent or trails. To wildlife, the energy cost of disturbance could be appreciable in terms of disruption of feeding, displacement from preferred habitat, and the added energy expenditure to avoid disturbance. Some research might require

collection of samples or handling of wildlife. Efforts to capture animals could cause disturbance, injury, or death to groups of wildlife or to individuals.

Sampling activities could cause compaction of soils and the trampling of vegetation, the establishment of temporary foot trails through vegetation, and disruption of bottom sediments in wetlands. The removal of vegetation or sediments by core sampling methods could increase localized turbidity and disrupt nontarget plants and animals. Installation of posts, equipment platforms, collection devices, and other research equipment might present a hazard to heavy equipment operators if these items were not adequately marked and removed at the right times or on completion of the project.

Public Review and Comment

This compatibility determination was presented for public review and comment as part of the 45-day public comment period for the draft CCP and EA for the National Elk Refuge.

Determination

Research and monitoring are compatible uses on the National Elk Refuge.

Stipulations Necessary for Compatibility

Refuge staff will use the above criteria for evaluating and determining whether to approve a proposed study. Before conducting investigations, researchers will obtain a special use permit from the refuge that contained specific stipulations for when, where, and how the research would be conducted. If research methods were found to have potential effects on habitat or wildlife, it must be shown that the research was necessary for conservation management of resources on the refuge. The researchers will develop measures to reduce potential effects to be included as part of the study design; these measures will be conditions in the special use permit. The refuge manager will have the discretion to prohibit research that causes undo harm or disturbance or that would not contribute to the purposes of the refuge or the mission of the Refuge System.

Researchers will follow all refuge rules and regulations unless otherwise exempted by refuge management. Extremely sensitive wildlife habitats and species will be sufficiently protected from disturbance by limiting research activities in these areas. The refuge will review projects annually, and researcher will submit annual progress reports. Refuge staff will check research activities for compliance with conditions of the special use permit. At any time, refuge staff might accompany the researchers to determine potential effects. Staff could decide that approved research and special use permits be terminated because of observed effects. The refuge manager could also cancel a special use permit if the researcher was out of compliance or to make sure there is wildlife and habitat protection.

Specific stipulations in the special use permit will vary by research project, but will be designed to reduce impacts to wildlife and their habitats and to make sure visitors, researchers, and refuge staff were safe. To reduce potential safety hazards, researchers must clearly mark posts, equipment platforms, fencing materials, and other equipment left unattended. Such items must be promptly removed on completion of the research.

Researchers must possess all applicable State and Federal permits for the capture and possession of protected species, for conducting regulated activities in wetlands, and for any other regulated activities.

Research involving collections will be extremely restricted. Collections will be limited to type or voucher specimens only, require preapproval by the refuge manager, and include verification of compliance with all State and Federal collection permits and requirements.

Researchers will promptly submit findings, such as annual status reports and a final report, to the refuge manager for inclusion in the decisionmaking and management process.

Justification

Research and monitoring will be activities that provide essential information necessary for the appropriate and effective management of refuge resources:

- Research can help provide answers to complex questions, when those answers are not readily apparent and are vital to determining effective management strategies.

- Monitoring will be necessary to quantify or qualify the results of management actions. This is a basic step in the adaptive resource management process and necessary to guide modifications to management actions for improved results.

We will issue research and monitoring permits only when the information they provided was so valuable that it outweighed the temporary disturbance and minor effects on wildlife and their habitats. We expect minimal effects on refuge wildlife and habitats with research studies, because special use permits will include conditions to make sure that these effects are kept to a minimum.

Mandatory 10-year reevaluation date: 2025

Commercial Filming, Audio Recording, and Still Photography

Commercial motion pictures and audio recordings are defined as the digital or film recording of a visual image or sound recording by a person, business, or other entity for a market audience, such as for a documentary, television, feature film, advertisement, or similar project. It does not include news coverage or amateur and visitor use.

Commercial photography is defined as a visual recording (motion or still) by firms or individuals other than news media representatives who intend to distribute their photographic content for money or other consideration. This includes the creation of educational, entertainment, or commercial enterprises as well as advertising audiovisuals for the purpose of paid product or services, publicity, and commercially oriented photo contests.

The National Elk Refuge provides tremendous opportunities for commercial filming and photography of bison, elk, migratory birds, and other wildlife. Each year, the refuge staff receives 6–15 requests to conduct commercial filming or photography on refuge lands. Refuge staff review requests for commercial photography, motion pictures, and audio recordings and issue special use permits for approved requests. We evaluate each request on an individual basis using several U.S. Department of the Interior, agency, and Refuge System policies (such as 43 CFR Part 5, 50 CFR 27.71, and 8 RM 16).

Evaluation criteria will include the following:

- Commercial photography, motion pictures, and audio recordings must (1) show a means to increase public appreciation and understanding of wildlife or natural habitats, (2) enhance public knowledge, appreciation, and understanding of the Refuge System, or (3) facilitate outreach and education goals of the refuge. The refuge will deny the use and not issue a special use permit if none of the previous criteria were met.

- We will not approve activities that cause undue disturbance to wildlife or habitat. Refuge staff will carefully weigh the degree and type of disturbance when evaluating a request.

- We will not approve requests that would conflict with other management programs or would impair existing wildlife-dependent recreational uses.

- If logistics or lack of staff made it impossible for the refuge staff to monitor the activity, we might deny the request, depending on the specific circumstances.

Availability of Resources

The commercial filming, audio recording, and still photography uses will be administered with current resources. Administrative costs for review of applications and issuance of special use permits and staff time to conduct compliance checks may be offset by a fee system designated for the agencies within the U.S. Department of the Interior.

Anticipated Impacts of Use

Wildlife filmmakers and photographers tend to create the greatest disturbance of all wildlife observers (Dobb 1998, Klein 1993, Morton 1995). While observers frequently stop to view wildlife, photographers are more likely to approach the animals; even a slow approach by photographers tends to have behavioral consequences to wildlife (Klein 1993). Photographers often remain close to wildlife for extended periods in an attempt to habituate the subject to their presence (Dobb 1998). Furthermore, photographers with low-power lenses tend to get much closer to their subjects (Morton 1995). This usually causes more disturbance to wildlife as well as habitat, including the trampling of plants. Handling of animals and disturbing vegetation (such as cutting plants and removing flowers) or cultural artifacts is prohibited on refuge lands.

Issuance of special use permits with strict guidelines and followup by refuge staff for compliance will help to reduce or avoid these effects. Permittees who did not follow the stipulations of their special use permits could have their permits revoked, and further applications for filming or photographing on the refuge would be denied. The refuge could issue a notice of violation to permittees who operate outside the conditions of their permits and violate refuge regulations.

Public Review and Comment

This compatibility determination was presented for public review and comment as part of the 45-day public comment period for the draft CCP and EA for the National Elk Refuge.

Determination

Commercial filming, audio recording, and still photography are compatible uses on the National Elk Refuge.

Stipulations Necessary for Compatibility

We will use the evaluation criteria described earlier to decide if commercial filming, audio recording, or still photography was a compatible use.

All commercial filming will require a special use permit that (1) describes conditions that protect the refuge's values, purposes, resources, and public health and safety, and (2) prevents unreasonable disruption of the public's use and enjoyment of the refuge. Such conditions may be, but are not limited to: specifying road conditions when access will not be allowed, establishing time limitations, and identifying routes of access. These conditions will be identified to prevent (1) excessive disturbance to wildlife, (2) damage to habitat or refuge infrastructure, or (3) conflicts with other visitor services or management activities. Staff and workloads will determine if special access to closed areas of the refuge will be allowed case-by-case.

The special use permit will stipulate that imagery produced on refuge lands will be made available for environmental education, interpretation, outreach, internal documents, or other suitable uses. In addition, any commercial products must include proper credits to the refuge, the Refuge System, and the Service.

Still photography will require a special use permit, with specific conditions as outlined above, if one or more of the following occurred:

- Photography takes place at locations where or when members of the public are not allowed.
- Photography uses models, sets, or props that are not part of the location's natural or cultural resources or administrative facilities.
- The refuge has higher administrative costs to provide management and oversight to avoid impairment of the resources and values of the site, limit resource damage, and decrease health and safety risks to the visiting public.
- The photographer intentionally manipulates vegetation to create a shot, for example, cutting vegetation to create a blind.

To reduce the effects on refuge lands and resources, the refuge staff will make sure that all commercial filmmakers and commercial still photographers (regardless of whether a special use permit were issued) comply with policies, rules, and regulations. The staff will monitor and assess the activities of all filmmakers, audio recorders, and still photographers.

Justification

Commercial filming, audio recording, and still photography are economic uses that, to be compatible, must contribute to the achievement of the refuge purposes, mission of the Refuge System, and the mission of the Service. Providing opportunities for these uses should result in an increased public awareness of the refuge's ecological importance as well as advancing the public's knowledge and support for the Refuge System and our agency. The stipulations outlined above and conditions imposed in the special use permits issued to commercial filmmakers, audio recorders, and still photographers will make sure that these wildlife-dependent activities occur with minimal adverse effects to resources or visitors.

Mandatory 10-year reevaluation date: 2025

Commercial Guiding, Outfitting, Game Retrieval, and Wildlife-Viewing Tours

Flat Creek is a popular fishing destination especially in August, and some time periods seem to be overcrowded. Private anglers have asked us why we issue guided fishing permits since they can add to the crowding. Law enforcement has identified several unpermitted guiding outfitters in the past two seasons and suspects that there is little respect for the refuge permitting requirements. Creating a limit for the total number of permits and setting quotas of two trips, two guides, and a maximum of two clients per day could have a desired result of dispersing anglers. Charging a permit fee could create a sustained funding mechanism for maintaining fishing access signing and the printing of fishing regulations.

The refuge has allowed guided elk and bison hunts by special use permit since 2008. This service has helped young, novice, and elderly hunters and hunters with limited equipment to enjoy a quality, well-equipped hunting experience. Guided hunting will continue to increase the potential for hunters unfamiliar with the refuge to successfully harvest an

animal, contributing to meeting the refuge population objectives. Fees collected will help offset the costs of administering this program.

The refuge has allowed game retrieval services by special use permit for decades. Elk and bison are large, making it challenging for a young, inexperienced, physically challenged, or ill-equipped hunter to field-dress or transport a large carcass from an area closed to motor vehicles to the hunter's vehicle.

We will continue to allow wildlife-viewing tour companies to operate on the refuge through a special use permit that outlined special conditions for operation including required safety mitigation. Several of the tour companies have attended National Elk Refuge–sponsored training to enable them to provide accurate, interpretive wildlife information. The visitor services staff will continue communication throughout the year with wildlife tour companies to give them with current information about management practices, operations, and issues.

The refuge will continue to support a contracted interpretive sleigh ride program in winter and work closely with the contractor to provide quality education and interpretation through a unique wildlife-viewing opportunity.

Availability of Resources

The refuge will administer commercial guiding, outfitting, game retrieval, and wildlife-viewing tours with current resources. Administrative costs for review of applications, issuance of special use permits, and staff time to make compliance checks may be offset by a fee system designated for the agencies within the U.S. Department of the Interior.

Anticipated Impacts of the Use

Fishing and hunting guides assist visitors by providing local knowledge and equipment to enhance their client's chances for a successful outdoor experience. Limitations placed in the special use permits will restrict these guiding operations and prevent an exclusive right to an area or the exclusion of the public. Fishing guides can help clients catch and release fish in a manner that prevents injuries to the fish. Hunting guides likely improve the potential for their clients to harvest a bison or elk, which helps move the herds closer to the population objectives outlined in the Bison and Elk Management Plan; this will be a positive contribution to the refuge's management efforts.

Permittees for game retrieval services will be constrained by the same travel restrictions as hunters, operating only in areas and on routes that were open to hunters. Wildlife disturbance will be minimal in these areas, which are already subject to hunter activities. Game retrieval services will prevent carcass spoilage and provide a service to hunters who might be unable to process and retrieve a harvested elk or bison. These services will contribute to a quality hunting program and may help increase total harvest.

Wildlife-viewing tour companies provide wildlife observation and interpretation opportunities primarily to tourists visiting Jackson Hole, many of which arrive by aircraft and need ground transportation to wildlife-viewing areas. Tour company vehicles, along with tourists in personal vehicles, have parked along Elk Refuge Road in the winter to observe bighorn sheep and have caused traffic congestion. The proposed construction of additional parking areas along Elk Refuge Road near Miller Butte will help reduce this problem.

The sleigh ride program will continue to provide a unique and spectacular setting to present a wildlife interpretive message that was important to the mission of the National Elk Refuge and raised awareness of National Wildlife Refuge System. This program is anticipated to continue to reach between 20,000 and 25,000 people annually. Horse-drawn sleighs and wagons will cause insignificant disturbance to elk and other wildlife.

The above commercial activities will require special use permits, which will include strict guidelines and conditions to prevent the exclusion of the public or damage and disturbance to wildlife and their habitats. Refuge staff monitoring these activities for compliance with restrictions will help prevent conflicts with wildlife or the public. Permittees who did not follow the conditions outlined in their special use permits could have their permits revoked and further applications denied.

Public Review and Comment

This compatibility determination was presented for public review and comment as part of the 45-day public comment period for the draft CCP and EA for the National Elk Refuge.

Determination

Commercial guiding, outfitting, game retrieval, and wildlife-viewing tours are compatible uses on the National Elk Refuge.

Stipulations Necessary for Compatibility

Commercial guiding, outfitting, game retrieval, and wildlife-viewing tours must (1) show a means to extend public appreciation and understanding of wildlife or natural habitats, (2) enhance education, appreciation, and understanding of the Refuge Sys-

tem, or (3) facilitate outreach and education goals of the refuge. Failure to show any of these criteria will result in a special use permit being denied.

Special use permits for these uses will (1) describe conditions that protect the refuge's values, purposes, resources, and public health and safety, and (2) prevent unreasonable disruption of the public's use and enjoyment of the refuge. Such conditions may be, but will not be limited to, specifying road conditions when access will not be allowed, establishing time limitations, and identifying routes of access.

For game retrieval services, we will prohibit off-road vehicles and require companies to operate only in areas and on routes that are open to hunters.

The refuge will set these conditions to prevent excessive disturbance to wildlife, damage to habitat or refuge infrastructure, or conflicts with other visitor services or management activities. To reduce the effects on our lands and resources, the refuge staff will make sure that all commercial guides, outfitters, game retrieval services, and wildlife-viewing tour companies (regardless of whether a special use permit is issued) comply with policies, rules, and regulations.

Justification

Commercial guiding, outfitting, game retrieval, and wildlife-viewing tours are economic uses that will need to contribute to the achievement of the refuge purposes, mission of the Refuge System, or the mission of the Service. Providing opportunities for these uses should result in an increased public awareness of the refuge's ecological importance as well as advancing the public's knowledge and support for the Refuge System and the Service. The stipulations outlined above and conditions imposed in the special use permits issued to commercial guides, outfitters, game retrieval services, and wildlife-viewing tour companies will make sure that these wildlife-dependent activities occur with minimal adverse effects to resources or visitors.

Mandatory 10-year Reevaluation Date: 2025

E.5 Approval of Compatibility Determinations

Submitted by:



Steve Kallin, Project Leader — Date
National Elk Refuge
Jackson, Wyoming

Reviewed by:



Mike Blenden, Refuge Supervisor — Date
U.S. Fish and Wildlife Service, Region 6
National Wildlife Refuge System
Lakewood, Colorado

Approved by:



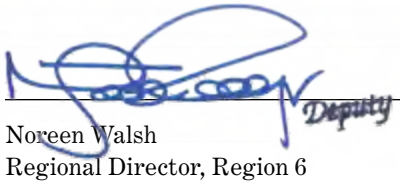
Will Meeks, Assistant Regional Director — Date
U.S. Fish and Wildlife Service, Region 6
National Wildlife Refuge System
Lakewood, Colorado

Appendix F
Environmental Compliance

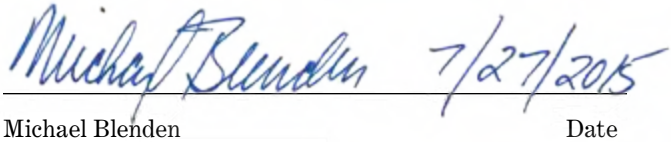
Environmental Action Statement
U.S. Fish and Wildlife Service, Region 6
Lakewood, Colorado

Within the spirit and intent of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record.

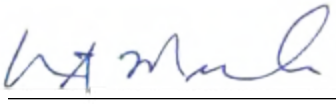
I have determined that the action of implementing the "Comprehensive Conservation Plan—National Elk Refuge" is found not to have significant environmental effects, as determined by the attached "finding of no significant impact" and the environmental assessment as found with the draft comprehensive conservation plan.



Noreen Walsh — Date
Regional Director, Region 6
U.S. Fish and Wildlife Service
Lakewood, Colorado



Michael Blenden — Date
Refuge Supervisor, Region 6
U.S. Fish and Wildlife Service
Lakewood, Colorado



Will Meeks — Date
Assistant Regional Director, Region 6
National Wildlife Refuge System U.S. Fish and Wildlife Service
Lakewood, Colorado



Steve Kallin — Date
Refuge Manager
National Elk Refuge
U.S. Fish and Wildlife Service
Jackson, WY

Finding of No Significant Impact

U.S. Fish and Wildlife Service, Region 6
Lakewood, Colorado

Introduction

This finding of no significant impact provides the basis for management decisions for the final comprehensive conservation plan and environmental assessment for the National Elk Refuge, Wyoming. The comprehensive conservation plan (CCP) was prepared along with an environmental assessment (EA) in compliance with the National Environmental Policy Act and relevant planning policies. In preparing the final CCP, we worked closely with the Wyoming Game and Fish Department, Grand Teton National Park, Bridger-Teton National Forest, Teton County Planning Department, nongovernmental organizations and individuals who contributed input to the plan.

Alternatives

Based on an analysis of comments collected from the public, input from our staff, and a review of the needs of the Improvement Act and NEPA, we identified key issues for the National Elk Refuge. These were addressed in the alternatives for future management which are summarized below.

Alternative A (Current Management)

Alternative A is the no-action alternative, which represents the current management of the National Elk Refuge. This alternative provides the baseline against which to compare the other alternatives. It also fulfills a need of the National Environmental Policy Act of 1969. Under alternative A, our management activity would continue unchanged. We would not develop any new management, restoration, or education programs at the refuge. Current habitat and wildlife practices benefiting migratory species and other wildlife would not be expanded or changed. Habitat management would remain focused primarily on benefiting elk, bison, and nesting birds. Our staff would keep monitoring, inventory, and research activities at current levels. Budget and staff levels would remain the same with little change in overall trends. Programs would follow the same direction, emphasis, and intensity as they do now.

Alternative B (Enhance Public Use and Intensive Resource Management)

An important aspect of this alternative would be to limit public use to appropriate and compatible wildlife-dependent uses—hunting, fishing, wildlife observation, photography, environmental education, and interpretation—and shift away from non-wildlife-dependent uses. There would be increased development in some areas of the refuge to address increased public use at area-specific intensive use locations. Options to experience and observe would be enhanced. The other emphasis would be to meet habitat and wildlife population objectives through intensive management actions. Because of increased public opportunities, refuge staff would focus more on intensive refuge-specific monitoring, rather than ecosystem monitoring, to gauge the effects of public use on habitat and wildlife.

Alternative C (Emphasize Intact Ecosystems and Promote Natural Processes)

Given the National Elk Refuge is part of the Greater Yellowstone Ecosystem, one of the largest relatively intact ecosystems on the planet, refuge management would emphasize those qualities that make the ecosystem unique. Public use emphasizes interpretation, education, and outreach over recreational opportunities that are direct experiences. Educational and interpretive programs would include more experiences off the refuge.

Alternative D (Promote Natural Habitats and Balance Public Use) – PROPOSED ACTION

Refuge managers would strike a balance between management activity and allowing natural processes. We would need to identify priorities for research and monitoring—between refuge-specific monitoring and ecosystem-based monitoring—because increased public use would still require some refuge-specific monitoring. The proposed action represents balanced public use by providing some increase in developed areas while allowing other areas to remain undeveloped or to return to a natural state. In many cases, public use would emphasize outreach, interpretation, and education over recreational opportunities that involve direct experiences.

Public Involvement and Outreach

Public scoping started with a notice of intent to prepare the draft CCP and EA that we published in the Federal Register on October 22, 2010 (75 Federal Register 65370). We distributed information through news releases, issuance of the first planning update, and a public meeting held January 11, 2011, at Snow King Resort in Jackson, Wyoming, from 4 p.m. to 7 p.m. Before this and early in the preplanning phase, we outlined a process that would be inclusive of diverse stakeholder interests and would involve a

range of activities for keeping the public informed and ensuring meaningful public input. Information was distributed through news releases, planning updates, and public meetings. We received more than 230 comments orally and in writing during the scoping process. There were letters from eight organizations and four agencies. The planning team considered all of the comments throughout the planning process.

Comments on the Draft Plan and EA

A notice of availability for the draft CCP and EA was published in the Federal Register on September 9, 2014 (79 Federal Register 53440) announcing the availability of the draft CCP and EA, our intention to hold a public meeting, and a request for comments. During the public review the Service held one public meeting on September 25, 2014 in Jackson, WY. Public participation in the CCP review process was strong with more than 200 copies of the draft plan distributed to individuals on the mailing list. In addition to the oral comments recorded at the public meeting, 41 emails and letters were received. The comment period closed October 9, 2014.

Decision

Based on this assessment and comments received, I have selected the following preferred alternative:

- A slightly modified Alternative D for refuge management

The preferred alternative was selected because it best meets the purposes for which the National Elk Refuge was established and is preferable to the "no-action" alternative in light of physical, biological, economic, and social factors. The preferred alternative will achieve a reasonable balance between significant resource management issues, the refuge purposes, National Wildlife Refuge System mission, management policies of the Service, and the interests and perspectives of all stakeholders.

We have considered the environmental and relevant concerns presented by agencies, organizations, and individuals on the proposed action to develop and implement a comprehensive conservation plan for the National Elk Refuge. The substantive issues and comments raised have been addressed in the final CCP.

Alternative D was revised from the proposed action after our consideration of many comments received from agencies, other stakeholder organizations, and the public during the comment period. Revisions to the key management actions of Alternative D for refuge management relate to hunting and habitat connectivity. The most significant revisions are listed below:

- The Refuge and its partner organizations will continue to promote the voluntary non-lead ammunition program with a detailed review of the program in five years.
- References to 'predator harvest' and 'predator hunting season' are removed from the CCP.
- The Refuge program which provides free bear spray to hunters and promotes its use will continue with a detailed review of the program in five years.
- The Refuge will consider partnership opportunities to build wildlife crossings for Highway 89 to reduce vehicle/wildlife collisions and improve habitat connectivity.

Management of the refuge will comply with all Federal laws and regulations that provide direction for managing units of the Refuge System. Various methods that involve rest, water level control, burning, mechanical, chemical, and cultural-related activities will be used to accomplish refuge goals and objectives.

Finding and Basis for Decision

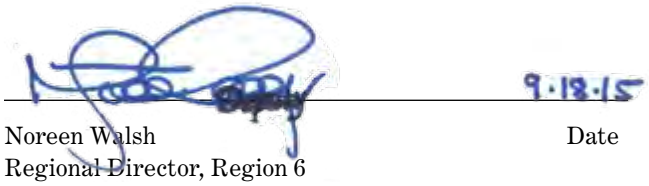
I find that the preferred alternative is not a major Federal action that would significantly affect the quality of the human environment within the meaning of Section 102(2) (C) of the National Environmental Policy Act of 1969. Accordingly, the preparation of an environmental impact statement on the proposed actions is not required.

The following is a summary of anticipated environmental effects. The implementation of the preferred alternative will:

- manage for wildlife as a priority, with emphasis on providing winter forage for elk and bison;
- not adversely impact endangered or threatened species or their habitat;
- increase the sustainability and resiliency of the refuge and improve ability to adjust to the uncertainty of climate change;
- continue to control invasive species, especially species not native to the region;
- reduce opportunities for the introduction and/or spread of non-native invasive plant species;

- develop monitoring protocols to improve management decision-making, particularly related to habitat relationships of federally threatened and endangered wildlife species or selected wildlife species on Tier 1 & 2 of the State of Wyoming's list of species of greatest conservation needs;
- improve the coordination of the refuge with the Greater Yellowstone Coordinating Committee and/or other research groups to improve our understanding of the local impacts from climate change;
- not adversely impact archaeological or historical resources;
- enhance interpretation of cultural resources and restore the historic Miller Ranch buildings;
- preserve refuge water rights, and explore opportunities to improve water use efficiency and other water-related factors within our water rights to support wildlife;
- provide a balance between resource protection and providing wildlife-dependent recreational opportunity without negatively impacting natural resources;
- improve both consumptive and non-consumptive public use opportunities;
- enhance environmental education opportunities with improvements to staffing and the Jackson and Greater Yellowstone Visitor Center;
- increase staffing to appropriate levels to accomplish goals and objectives;
- not have a disproportionately high or adverse human health or environmental effect on minority or low-income populations;
- maintain public and employee safety as a mission critical factor;
- expand resource protection appropriately with increased public use opportunities.

The State of Wyoming has been notified and given the opportunity to review the comprehensive conservation plan and associated environmental assessment.



Noreen Walsh — Date
Regional Director, Region 6
U.S. Fish and Wildlife Service
Lakewood, Colorado

Appendix G

Intra-Service Section 7 Consultation

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
5353 Yellowstone Road, Suite 308A
Cheyenne, Wyoming 82009

AUG 25 2015

In Reply Refer To:
06E13000-2015-F-0132

Memorandum

To: Refuge Manager, U.S. Fish and Wildlife Service, National Elk Refuge, Jackson, Wyoming

From: Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming

Subject: Intra-Service Consultation for the National Elk Refuge Draft Comprehensive Conservation Plan and Environmental Assessment

Thank you for your memo and Intra-Service Section 7 Biological Evaluation Form (Biological Evaluation Form) dated and received in our office on June 2, 2015, requesting Intra-Service section 7 consultation on the National Elk Refuge (Refuge) Draft Comprehensive Conservation Plan (CCP) and Environmental Assessment (hereafter, Project). Based on additional information and subsequent conversations between our staffs, you requested formal section 7 consultation on July 13, 2015, pursuant to the Endangered Species Act of 1973 (ESA), as amended, 16 U.S.C. 1531 *et seq*. In the Biological Evaluation Form, the Refuge requested concurrence from the U.S. Fish and Wildlife Service, Wyoming Ecological Services Field Office, for its determinations of "may affect, not likely to adversely affect" for the yellow-billed cuckoo (*Coccyzus americanus*) and the gray wolf (*Canis lupis*), and "may affect, not likely to jeopardize" the greater sage-grouse (*Centrocercus urophasianus*) and whitebark pine (*Pinus albicaulis*), both candidates for listing under the ESA. The Biological Evaluation Form also included a "no effect" determination for the Canada lynx (*Lynx canadensis*) and a "may affect, likely to adversely affect," determination for grizzly bear (*Ursus arctos horribilis*).

The Project is located within all or portions of T41N and T42N, R115W and 116W, all sections within the Refuge boundary, Teton County, Wyoming. The CCP will guide management of the Refuge from 2015 to 2030. The CCP provides an overview of all management actions affecting refuge habitats, wildlife populations, public use activities, facilities, and staffing that were not addressed in the 2007 Bison and Elk Management Plan and Environmental Impact Statement. The CCP is intended to function as a general guidance document; therefore, the CCP lacks project-level detail that will be addressed in subsequent step-down plans.

We have reviewed the information in the Biological Evaluation Form for potential effects to listed and candidate species, and we provide our concurrence in accordance with section 7(a)2) of the ESA (50 CFR §402.13). We have completed the attached Biological Evaluation Form accordingly.

Pursuant to section 7(a)(2) of the ESA (50 CFR §402.14), the attached biological opinion addresses the effects of the Project on grizzly bears. The biological opinion is based on information provided in the Intra-Service Section 7 Biological Evaluation Form prepared by the Refuge, updated on July 13, 2015.

Consultation History:

- July 8, 2015—Lisa Solberg Schwab of my office and Eric Cole of the Refuge verbally communicated about adding additional conservation measures that the Refuge has in place to the Biological Evaluation Form;
- July 10, 2015—The Refuge made additional edits to the Intra-Service Consultation memo;
- July 13, 2015—Lisa Solberg Schwab and Eric Cole discussed the impacts to the grizzly bear and concluded that formal consultation was necessary to be consistent with the Elk and Bison Management Plan;
- July 20, 2015—Additional correspondence was exchanged regarding the cumulative impacts section of the Biological Opinion; and
- July 24, 2015—The Refuge provided a copy of the signed signature page of the Intra-Service memo to this office.

A complete administrative record of this consultation is on file at the Wyoming Ecological Services Field Office in Cheyenne, Wyoming. If you have any questions regarding this consultation, please contact Lisa Solberg Schwab of my office at the letterhead address or phone (307) 367-5340.

Attachment 1 (Biological Opinion)
Attachment 2 (Intra-Service Section 7 Biological Evaluation Form)

cc: FWS, National Elk Refuge, Jackson, WY (E. Cole) (eric_cole@fws.gov)
WGFD, Statewide Non-Game Bird and Mammal Program Supervisor, Lander, WY (Z. Walker) (zack.walker@wyo.gov)
WGFD, Statewide Habitat Protection Coordinator, Cheyenne, WY (M. Flanderka) (mary.flanderka@wyo.gov)
WGFD, Habitat Protection Secretary, Cheyenne, WY (N. Stange) (nancy.stange@wyo.gov)
WGFD, Statewide Large Carnivore Section Supervisor, Lander, WY (D. Thompson) (daniel.thompson@wyo.gov)

Intra-Service Section 7 Biological Evaluation Form - Region 6

Originating Person: Eric Cole, Refuge biologist

Date Submitted: 2 June 2015

Telephone Number: 307-201-5432

I. **Service Program and Geographic Area or Station Name:** National Elk Refuge

II. **Flexible Funding Program** (e.g. Joint Venture, etc) if applicable: Not applicable

III. **Location:** Location of the project including County, State and TSR (township, section & range): Teton County, Wyoming, T41-T42, R1 15-116, all sections within National Elk Refuge (NER) boundary.

IV **Species/Critical Habitat:** List federally endangered, threatened, proposed, and candidate species or designated or proposed critical habitat that may occur within the action area.
1) Grizzly bear, Threatened
2) Gray wolf, Experimental Population, considered Threatened on national wildlife refuges
3) Canada lynx, Threatened
4) Yellow-billed Cuckoo, Threatened
5) Greater sage-grouse, Candidate
6) Whitebark pine, Candidate

No critical habitat has been designated within the NER boundary

V. **Project Description:** Describe proposed project or action or, if referencing other documents, prepare an executive summary (attach additional pages as needed): The Comprehensive Conservation Plan (CCP) for the NER will guide management of NER from 2015 to 2030. The CCP provides an overview of all management actions affecting refuge habitats, wildlife populations, public use activities, facilities, and staffing that were not addressed in the 2007 Bison and Elk Management Plan and EIS. The CCP is intended to function as a general guidance document, and therefore it lacks project-level detail that will be addressed in subsequent step down plans. See section VI, Determination of Effects for a summary of the net effects of the NER CCP on federally listed and candidate species.

VI. **Determination of Effects:**

(A) **Description of Effects:** Describe the action(s) that may affect the species and critical habitats listed in item IV. Your rationale for the Section 7 determinations made below (B) should be fully described here.

1) **Grizzly bear (threatened); May Affect, Likely to Adversely Affect:** This finding is

consistent with the biological opinion issued for the Section 7 consultation associated with the 2007 Bison and Elk Management Plan. There have been only 2 confirmed grizzly bear observations on NER since 1994, but we predict increased use of NER by grizzly bears within the 15 year life of the CCP. Currently elk and bison hunting seasons result in approximately 150-300 elk gut piles from November-December and150-300 bison gut piles from August-January on NER, and this represents a significant food source for grizzly bears with interactions between bears and hunters likely to increase if grizzly bear activity increases on NER. CCP proposed actions are unlikely to affect the number of elk and bison carcasses on NER, but the following CCP actions are likely to minimize the risk of grizzly bear mortality due to human/bear interactions: 1) Increased education efforts including distribution of materials promoting the use of bear spay, techniques to minimize human/bear interactions, and proper food/game meat storage techniques for hunters; 2) Bear safety training for NER staff and volunteers. NER staff and volunteers are required to carry bear spray in the field; and 3) Food/Waste storage guidelines at NER facilities that are consistent with Teton County Wyoming regulations. These actions will be implemented within the first of year of the CCP. 2)CCP actions are also designed to encourage the use of non-lead rifle ammunition, which potentially could reduce lead exposure by bears scavenging on elk and bison gut piles, but research to support physiological or population benefits to Grizzly bears is lacking.

2) **Gray wolf (considered threatened on NER pending court decisions); May Affect, but Not Likely to Adversely Affect:** Gray wolves have consistently used NER during winter months since 1999 and have consistently denned on NER since 2005. CCP proposed actions codify existing NER policy of protecting wolf den sites from human disturbance. We anticipate that this will have a net positive effect on wolf populations over time.

3) **Canada lynx (threatened); No Effect:** NER elevation ranges from 6,200 to 6,700 feet with no suitable habitat for Canada lynx. NER does not have any LAU or critical habitat designated, nor does the refuge share any LAU boundaries with Grand Teton National Park. There have been no confirmed Canada lynx observations on NER in 103 years of record keeping, and we do not anticipate any future habitat changes on NER that would facilitate occupancy by Canada lynx.

4) **Yellow-billed cuckoo (candidate); May Affect, but Not Likely to Adversely Affect:** Although there have been no confirmed Yellow-billed cuckoo observations on NER in 103 years of record keeping, there is approximately 550 acres of cottonwood riparian habitat on NER. CCP proposed actions will likely result in a slight increase in cottonwood regeneration associated with exclosure construction. In the long term this may result in modest increases in Yellow-billed cuckoo habitat and may positively affect cuckoo populations should the species occupy the refuge in the future.

5) **Greater sage-grouse (candidate); May Affect, but Not Likely to Jeopardize Candidate or Proposed species/critical habitat:** There is one sage-grouse lek on NER and extensive use of NER sagebrush plant communities has been documented. Local research suggests winter habitat is the limiting factor on the Jackson Hole sagegrouse population and that tall, dense sagebrush stands are a key habitat feature for this species. CCP actions are designed to protect existing tall dense sagebrush stands from disturbance and encourage an increase in the spatial distribution exhibiting these characteristics over

the 15-year life of the CCP. All habitat treatments will comply with the Wyoming Governor's Executive Order for habitat treatments in sage-grouse habitat. Public access is restricted on NER during winter months and during the strutting period. We anticipate that these CCP actions may results in a slight positive effect on the Jackson Hole sage-grouse population over the 15 year life of the plan.

6) Whitebark pine (candidate); Not Likely to Jeopardize Candidate or Proposed species/critical habitat: NER elevation ranges from 6,200 to 6,700 feet with no suitable habitat for Whitebark pine. There have been no confirmed Whitebark pine observations on NER in 103 years of record keeping, and we do not anticipate any future habitat changes on NER that would facilitate occupancy by Whitebark pine.

(B) Determination: Determine the anticipated effects of the proposed project on species and critical habitats listed in item IV. Check all applicable boxes and list the species (or attach a list) associated with each determination.

	Determination
No Effect: This determination is appropriate when the proposed project will not directly or indirectly affect (neither negatively nor beneficially) individuals of listed/proposed/candidate species or designated/proposed critical habitat of such species. **No concurrence from ESFO required. Canada lynx**	X
May Affect but Not Likely to Adversely Affect: This determination is appropriate when the proposed project is likely to cause insignificant, discountable, or wholly beneficial effects to individuals of listed species and/or designated critical habitat. **Concurrence from ESFO required. Gray wolf, Yellow-billed cuckoo**	X
May Affect and Likely to Adversely Affect: This determination is appropriate when the proposed project is likely to adversely impact individuals of listed species and/or designated critical habitat. **Formal consultation with ESFO required. Grizzly bear**	X
May affect but Not Likely to Jeopardize candidate or proposed species/critical habitat: This determination is appropriate when the proposed project may affect, but is not expected to jeopardize the continued existence of a species proposed for listing or a candidate species, or adversely modify an area proposed for designation as critical habitat. **Concurrence from ESFO optional., Greater sage grouse, Whitebark pine**	X
Likely to Jeopardize candidate or proposed species/critical habitat: This determination is appropriate when the proposed project is reasonably expected to jeopardize the continued existence of a species proposed for listing or a candidate species, or adversely modify an area proposed for designation as critical habitat. **Conferencing with ESFO required.**	

Signature &/, _____ Date 7/24/2015
[Supervisor at originating station]

Reviewing Ecological Services Office Evaluation (check all that apply):

A. Concurrence _X_ Nonconcurrence ____
Explanation for nonconcurrence:

B. Formal consultation required __ X_
List species or critical habitat unit

Grizzly Bear

C. Conference required __
List species or critical habitat unit

Name of Reviewing ES Office: Wyoming Eco)ogjcal Services Field Office

Signature _____ Date 8-25-2015
R. Mark Sattelberg
Field Supervisor
Wyoming Ecological Services Field Office

BIOLOGICAL OPINION

Effects to the Grizzly Bear
from implementation of the National Elk Refuge's
Comprehensive Conservation Plan
Teton County, Wyoming

06E13000-2015-F-0132

Prepared by:
U.S. Fish and Wildlife Service
Wyoming Ecological Services Field Office

August 25, 2015

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BIOLOGICAL OPINION

DESRIPTION OF THE PROPOSED ACTION

As defined in the Endangered Species Act (ESA) Section 7 regulations (50 CFR 402.02), "action" means "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States or upon the high seas." The "action area" is defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." The direct and indirect effects of the actions and activities must be considered in conjunction with the effects of other past and present federal, state, or private activities, as well as the cumulative effects of reasonably certain future state or private activities within the action area.

The U.S. Fish and Wildlife Service (Service) manages the National Wildlife Refuge System. The National Wildlife Refuge System Improvement Act of 1997 requires that every refuge develop a Comprehensive Conservation Plan and revise it every 15 years, as needed. The National Elk Refuge (Refuge) Comprehensive Conservation Plan (CCP) will guide management of the Refuge from 2015 to 2030. The CCP provides an overview of all management actions affecting Refuge habitats, wildlife populations, public use activities, facilities, and staffing that were not addressed in the 2007 Bison and Elk Management Plan and Environmental Impact Statement. The CCP is intended to function as a general guidance document, and therefore, it lacks project-level detail that will be addressed in subsequent step down plans.

The proposed action is identified as alternative D in the CCP. As such, the objectives and strategies presented in chapter 6 of the CCP will be carried out over the next 15 years, unless the CCP is formally revised. The CCP includes six broad goals: climate change, landscape-scale conservation, habitat and wildlife, visitor services, visitor and employee safety and resource protection, and administrative. Each of these goals includes two or more objectives, and each objective has one or more strategies. The goals, objectives and strategies are described in chapter 6 of the CCP and are incorporated by reference. The CCP also describes the affected environment (chapter 4) and environmental consequences (chapter 5). Information from the CCP and the Intra-Service Biological Evaluation Form relevant to grizzly bear are described below in more detail.

Adaptive Management of Elk and Bison Populations

The Refuge will adaptively manage bison, elk, and other wildlife populations and habitats as outlined in the Bison and Elk Management Plan (Plan). Goals of the Plan include habitat conservation, maintaining sustainable populations, managing numbers of elk and bison, and disease management. The proposed action will contribute to maintaining sustainable population of elk and bison that are healthy, at a reduced risk of contracting non-endemic diseases, and able to adapt to changing environmental conditions. Specific outcomes include:

- Work in collaboration with the Wyoming Game and Fish Department (WGFD) to reduce the Jackson elk herd and maintain an objective of 11,000 elk (after the initial reduction, approximately 5,000 elk are expected to winter on the Refuge). As herd sizes and habitat

objectives are achieved, further reduce feeding or elk numbers, based on established criteria and changing social, political, or biological conditions. Use hunting on the Refuge, and when necessary, the elk herd reduction program in the Grand Teton National Park (Park), to assist the state of Wyuming in managing herd sizes, sex and age ratios, and summer distributions.

- Work in collaboration with the WGFD to establish a genetically viable bison herd of approximately 500 animals, with as close to an even sex ratio as possible to maximize maintenance of genetic variation over time. Initiate a WGFD-administered bison hunt on the Refuge.

Adaptive Management of the Habitat

Under the proposed action, the Refuge will provide secure, sustainable ungulate grazing habitat characterized primarily by native vegetation that is healthy, productive and sustained for the benefit of elk, bison, and other native species. Activities included urnl r th proposed action will be implemented in concert with restoring and perpetuating natural ecosystem functions of native habitats used by bison and elk in the Refuge. Specific actions include:

- Initiate habitat restoration projects to improve native and cultivated forage and achieve desired conditions and goals. Continue to flood irrigate 800 to 2,000 acres per year (324-809 ha/yr) of cultivated land, and convert up to 1,200 acres (445 ha) from flood to sprinkler irrigation.
- Protect woody vegetation (willow, aspen, and cottonwood) on the Refuge by rotating small exclosures until habitats have recovered. Prescribed fire could be used and logging allowed on the Refuge inside exclosures.
- Work with private and agency partners to minimize bison and elk conflicts with adjacent landowners (e.g., by providing human and/or financial resources to manage co-mingling and reduce crop depredation by elk and bison on private lands).

Chronic Wasting Disease/Brucellosis

The Refuge will coordinate with the Wyoming Game and Fish Department (WGFD) to increase surveillance in elk for chronic wasting disease, a fatal transmissible disease of white-tailed deer, mule deer, and elk. The objective of surveillance is to provide a 95 percent confidence level of discovering infection at 1 percent prevalence in the Jackson elk herd. If infection is found, strategies from the state's Chronic Wasting Disease Management Plan (WGFD 2006) will be implemented to reduce transmission. These strategies include removing clinically consistent elk, removing 50 animals within 5 miles of the index case, and another 50 elk within l0 miles if an additional positive animal is found during collection of the first 50; enforcing carcass movement and disposal restrictions; decreasing duration of feeding and expanding the distribution of feeding to the extent possible; and potentially decreasing elk densities through hunting or other management strategies.

The Refuge and Grand Teton National Park, John D Rockefeller, Jr., Memorial Parkway will work cooperatively with the state of Wyoming and others to reduce the prevalence of brucellosis in the elk and bison populations in order to protect the economic interests and viability of the

livestock industry and reduce the risk of adverse effects for other non-endemic diseases not currently present in the Jackson elk and bison populations.

- Allow the WGFD to vaccinate elk and bison for brucellosis on the Refuge as long as logistically possible. The WGFD will use brucellosis vaccine Strain 19 on elk and RB5I on calf and non-pregnant female bison along feedlines during feedline operations.
- Initiate a public education effort to build understanding of natural elk and bison behavior, ecology, distribution, disease implications, and effects of other species.

Strategies for Hunting/Reduction Programs

The Refuge and the National Park Service will work cooperatively with the WGFD to achieve populations objectives for elk and bison (including herd ratios and elk herd segment sizes), by establishing hunting seasons within hunting units or elk reduction areas. The WGFD will formally establish objectives and strategies after public review and approval by the Wyoming Game and Fish Commission.

During the life of the CCP, elk hunting opportunities on the Refuge will decline from an average of 733 hunters per year to 420 to 487 hunters per year. Areas outside of the Refuge will increase to an estimated 5,600 to 5,870 hunters per year, an increase of 29 to 35 percent. For the herd unit as a whole, the number of elk hunters could range from an estimated 6,793 to 7,314 per year, which is an increase of 2 to 10 percent compared to average baseline conditions.

It is also anticipated that an estimated 140 to 150 bison will be harvested each year to reduce bison numbers to a herd of approximately 500 animals. Each year, about 50 bison will be harvested from the Bridger-Teton National Forest and the 90 to 100 bison on the Refuge. Based on previous success rates, it will take an average of about 175 to 190 bison hunters in Jackson Hole each year to achieve these harvest objectives. Once the bison herd reaches population objectives, the number of bison harvested each year will decline to about 70 bison.

- Hunting regulations and program design would focus on the safety of the Refuge user and surrounding community. Safety rules, procedures, job hazard analyses, reporting requirements, and regional safety office oversight would help to keep Refuge employees safe while working to achieve station objectives.
- Promote voluntary use of lead-free ammunition.
  Develop regulations for storage of bear attracta.11.ts and bear-deterrent practices aid encourage carry of bear spray.

Reduced Reliance on Supplemental Feeding

The Bison and Elk Management Plan calls for reduced reliance on supplemental feeding. Encouraging elk and bison use of grassland habitats on the northern end of the Refuge would reduce forage use and conserve forage on the southern end of the Refuge, reducing the need for supplemental feeding.

- Identify criteria for beginning and ending feeding each year in consultation with the WGFD.
- In collaboration with the WGFD, develop a structured framework of adaptive management actions that include established criteria for progressively transitioning from intensive supplemental winter feeding to greater reliance on free-standing forage, based on some or all of the following considerations:
    1. Level of forage production and availability on the Refuge;
    2. Desired herd sizes and sex and age ratios;
    3. Effective mitigation of bison and elk co-mingling with livestock on private lands;
    4. Prevalence of brucellosis, chronic wasting disease, and other wildlife diseases;
    5. Winter distribution patterns of elk and bison; and
    6. Public support.

Visitor and Employee Safety

The proposed action includes providing for the safety, security, and protection of visitors, employees, natural and cultural resources, and facilities throughout the Refuge.

- Develop bear regulations (food and trash handling) for resident employees and volunteers.
- Offer improved programs at the visitor center, Miller House, and offsite areas with more permanent or seasonal interpreters.
- Provide housing for staff and volunteers as available.
- Add up to five family houses and more seasonal housing.

Conservation Measures

Conservation measures are actions to benefit or promote the recovery of listed species that are included by the federal agency as an integral part of the proposed action. These actions will be taken by the federal agency or applicant, and serve to minimize or compensate for, project effects on the species under review. These may include actions taken prior to the initiation of consultation, or actions which the federal agency or applicant have committed to complete in a biological assessment or similar document. The following are conservation measures implemented by the Refuge as part of the proposed action.

- The Refuge will continue ongoing educational measures related to limiting the risk of hunter-grizzly conflict and hunting-caused grizzly bear mortality, as well as bear safety training for Refuge staff and volunteers.
- Refuge staff and volunteers will be required to carry bear spray in the field and adapt and modify these measures as changing circumstances and information warrant.
- The Refuge will implement food/waste storage guidelines on Refuge facilities and with any Refuge permitted activities such as hunting.
- The Refuge will encourage the use of non-lead rifle ammunition to reduce lead exposure by grizzly bears scavenging on elk and bison gut piles.

Action Area

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. For the purposes of this biological opinion (BO), we have defined the action area to include the Refuge. The Refuge is a 24, 700-acre (9,996 hectare) unit of the National Wildlife Refuge System administered by the Service. The action area includes the entire boundary for the National Elk Refuge located within Teton County, Wyoming, within Townships 41N and 42N, Ranges 115W and 116W, including all of the sections within this area.

For purposes of this biological opinion, we will also consider portions of surrounding lands in the Bridger-Teton National Forest and the other areas outside of the Refuge as part of the action area due to the projected long-term increase in the number of hunters as a result of the proposed action. The action area will be discussed in terms of Game Management Units (GMU) or Existing Hunting Areas (Area). The following is a brief description of the Refuge GMUs' general locations within the action area:

Area 77. National Elk Refuge. Beginning where U.S. Highway 26 crosses the Gros Ventre River; easterly up said river to the Bridger-Teton National Forest boundary; southerly along said boundary to Flat Creek; westerly along said creek approximately 3.5 miles to the second road crossing; southerly along said road 0.8 mile to a trail junction; westerly along a marked boundary to the Refuge fence; northerly along said fence to the Gros Ventre River.

STATUS OF THE SPECIES/CRITICAL HABITAT

Please note that the literature, the 1993 Recovery Plan, and other documents such as the 2007 Conservation Strategy use three different ecosystem terms related to grizzly bears in northwestern Wyoming, southwestern Montana, and southeastern Idaho: Greater Yellowstone Area (GYA), Greater Yellowstone Ecosystem (GYE), and Yellowstone Grizzly Bear Ecosystem (YGBE). These terms all describe the Yellowstone ecosystem and for this BO, we regard them as more or less synonymous because the geographic scale at which any distinctions occur does not affect project analyses or potential impacts.

Grizzly bears are among the largest terrestrial mammals in North America. South of the United States - Canada border, adult females range from 250 to 350 pounds and adult males range from 400 to 600 pounds. Grizzly bears are relatively long-lived, living 25 years or longer in the wild. Grizzly bears are omnivorous, opportunistic feeders that require foods rich in protein or carbohydrates in excess of maintenance requirements in order to survive seasonal pre-and post-denning requirements. Grizzly bears are homeo-hypothermic hibernators, meaning their body temperature drops no more than nine degrees Fahrenheit (five degrees Centigrade) during winter when deep snow, low food availability, and low ambient air temperatures appear to make winter sleep essential to grizzly bears' survival (Craighead and Craighead 1972a, 1972b). Grizzly bears excavate dens and require environments well covered with a blanket of snow for up to five months, generally beginning in fall (September to November) and extending until spring (March to April) (Craighead and Craighead 1972b; Pearson 1972).

No critical habitat has been designated or proposed for grizzly bear; therefore, none will be affected.

Life History

Grizzly bears are large animals with great metabolic demands requiring extensive home ranges. The search for energy-rich food appears to be a driving force in grizzly bear behavior, habitat selection, and intra/inter-specific interactions. Grizzly bears historically used a wide variety of habitats across the North America, from open to forested, temperate through alpine and arctic habitats, once occurring as far south as Mexico.

The grizzly bear is an opportunistic omnivore that uses a wide variety of plant and animal food sources. The literature provides comprehensive information on food items that grizzly bears consume. A recent synthesis of this information summarized that they consume up to 234 different foods, 75 of which are eaten on a regular basis, with the higher caloric foods being army cutworm moths, various ungulate species such as elk and moose, cutthroat trout, and whitebark pine seeds (IGBST 2013). Combined food habit studies from the GYA show that grizzly bears not only display dietary plasticity among individuals and in different portions of the ecosystem, but also across seasonal, annual, and decadal time periods (IGBST 2013).

Grizzly bears in the GYA have the highest percentage of meat consumption in their diet of any inland grizzly bear population with about 40 to 80 percent comprised of some form of animal matter (male bears tend to consume higher percentages of meat) (Jacoby et al. 1999 as cited in Robbins et al. 2006). Meat in the grizzly bear's diet varies by season and available forage. Ungulates are an especially important food source for bears in the spring and fall (Knight et al. 1984), and use of carcasses in Yellowstone National Park is well documented (Podruzny and Gunther 200 I).

Army cutworm moths are an important food source for some bears in the GYA (Mattson et al. 1991). Army cutworm moths congregate in remote, high altitude alpine talus areas and feed on alpine flowers. These moths provide important dietary fat in the fall, when grizzly bears are preparing for hibernation, and are also positively correlated with bear reproductive success (Bjomlie and Haroldson 2001). During times of great moth abundance, White et al. (1999, as cited in Robison et al. 2006) estimated a grizzly bear may eat up to 40,000 moths per day and more than one million per month, representing 47 percent of its annual caloric budget. Army cutworm moth congregation sites are in remote areas and therefore, potentially reduce human-bear conflicts by isolating the bears. Spawning cutthroat trout in streams surrounding Yellowstone Lake have been an important food source for grizzly bears (Mattson and Reinhart 1995). Grizzly bears will eat ants (Mattson 2001) and earthworms (Mattson et al. 2002); small mammals, such as pika and marmots, form a relatively minor portion of the bear's diet. In addition to eating wild ungulates, some grizzly bears consume domestic ungulates to varying degrees in some portions of the GYA, either in the form of carrion or as prey.

Grizzly bears also eat a variety of vegetative foods. Whitebark pine seeds are an important fall source of food to some bears when seeds are available (as a masting species, whitebark pines

only produce good crops every 2 to 3 years). Those bears with access to whitebark pines consume the seeds that they scavenge from red squirrel cone caches (Mattson and Reinhart 1997). Previous studies have demonstrated associations between whitebark pine cone production and survival of independent bears, fecundity (number of female cubs/female bear/yr), movements, and frequency of management actions (IGBC 2013). Cone crop failures influence foraging behavior that may increase vulnerability to human-caused mortality. When whitebark pine production is poor, grizzly bears tend to use lower elevations, where the risk of bear-human conflict is greater and survival is less (IGBST 2013). This is likely due to bears seeking alternative food sources, such as exotic clover species (Reinhart et al. 2001) and yampa, which occur at lower elevations and closer to humans. In addition to pine seeds supplying a food source high in fat, good whitebark pine seed crops also keep some grizzly bears occupied at high elevations far from intense human use. Other grizzly bear seasonal plant use includes roots (Mattson 1997), graminoids, horsetail, forbs, and fruits, such as whortleberry and huckleberry (Knight et al. 1984, Mattson et al. 1991). Bears also eat limited amounts of mushrooms.

Grizzly bears generally construct dens in areas far from human disturbance at elevations of approximately 2,000 to 3,050 meters (6,500 to 10,000 ft). Grizzly bears den from the end of September to the last week in April or early May, with entrance and emergence dates affected by the gender and reproductive status of the bears. Denning bears can be disturbed by winter sport activities, such as snowmobiling; studies have focused on minimizing disturbance by controlling access to important denning areas (Haroldson et al. 2002, Podruzny et al. 2002). If pregnant female bears are disturbed in their dens and this disturbance causes them to relocate to a new den prior to parturition, negative consequences can occur in the form of reduced cub fitness and survival (Linnell et al. 2000, Swenson et al. 1997).

Adult grizzly bears are normally solitary, except females with cubs or during short breeding relationships. They will tolerate other grizzly bears at closer distances when food sources are concentrated and siblings may associate for several years following weaning (Jonkel and Cowan 1971; Craighead 1976; Egbert and Stokes 1976; Glenn et al. 1976; Herrero 1978). Across their range, home range sizes vary from about 50 square miles or more for females to a few hundred square miles for males. Overlap of home ranges is common. Grizzly bears have one of the lowest reproductive rates among terrestrial mammals, resulting primarily from the late age at first reproduction, small average litter size, and the long interval between litters. Mating occurs from late May through mid-July.

Females in estrus will accept more than one adult male (Homocker 1962), and can produce cubs from different fathers the same year (Craighead et al. 1995). Age of first reproduction and litter size may be nutritionally related (Herrero 1978; Russell et al. 1978). Average age at first reproduction in the lower 48 states for females is 5.5 years and litter size ranges from one to four cubs that stay with the mother up to two years. Males may reach physiological reproductive age at 4.5 years but may not be behaviorally reproductive due to other dominant males preventing mating.

Habitat fragmentation is significant to large carnivores requiring wide vegetative and topographic habitat diversity (Servheen 1986). Loss and fragmentation of habitat is particularly relevant to the survival of grizzly bears. Large expanses of unfragmented habitat are important

for feeding, breeding, sheltering, traveling and other essential behavioral patterns. Grizzly bears occur at low densities, have low reproductive rates, exhibit individualistic behavior, and are largely dependent on riparian habitats also used extensively by people; thus, grizzly bear populations are susceptible to human influences. Grizzly bears may avoid key habitats due to human generated disturbances, or become habituated and food conditioned, which may ultimately lead to the animal being destroyed. Historically, as human settlements, developments, and roads increased in grizzly bear habitat, grizzly bear populations became fragmented. As fragmented population segments become smaller and/or isolated, they are more vulnerable to extinction, especially when human-caused mortality pressures continue. Linkage zones, or zones of habitat connectivity within or between populations of animals, foster the genetic and demographic health of the species. Bader (2000) displayed potential secure areas that are spatially distributed within known male and female grizzly bear dispersal distances and he believes that the available information shows that effective linkages are possible for grizzly bear use and these linkage areas would increase persistence probabilities.

Population Dynamics, Status and Distribution

The grizzly bear originally inhabited a variety of habitats from the Great Plains to the mountains of western North America, from central Mexico to the Arctic Ocean. With the advent of Euroamerican colonization in the early nineteenth century, grizzly bear numbers were reduced from over 50,000 to less than 1,000 in North America south of the Canadian border. Today, the grizzly bear occupies less than two percent of its former range south of Canada (USFWS 1993). In the conterminous 48 States, only five remaining areas have either remnant or self-perpetuating populations.

The grizzly bear was listed as a threatened species under the ESA in the lower 48 states on July 28, 1975 (40 FR 31736). The Service identified the following as factors establishing the need to list: (1) present or threatened destruction, modification, or curtailment of habitat or range; (2) overutilization for commercial, sporting, scientific, or educational purposes; and (3) other manmade factors affecting its continued existence. The two primary challenges in grizzly bear conservation are the reduction of human-caused mortality and the conservation of remaining habitat (USFWS 1993).

The grizzly bear recovery plan (Recovery Plan) was completed on January 1982 and was revised in 1993 (USFWS 1993). The 1993 revised Recovery Plan delineated grizzly bear recovery zones in six mountainous ecosystems in the U.S. The Recovery Plan details recovery objectives and strategies for the grizzly bear recovery zones in the ecosystems where grizzly bear populations still persist. Four of the recovery zones are the Northern Continental Divide (NCDE), Yellowstone Grizzly Bear (YGBE), Cabinet-Yaak (CYE) and Selkirk (SE) Ecosystems. The Recovery Plan also includes recovery strategies for the North Cascades Ecosystem in Washington, where only a very fow grizzly bears are believed to remain, and for the Selway-Bitterroot ecosystem of Idaho and Montana, where suitable grizzly bear habitat still occurs.

Grizzly bear recovery zones (RZ) were established to include areas large enough and of sufficient habitat quality to support a recovered bear population in each zone. According to the

1993 Recovery Plan, a recovery zone is defined as that area in each grizzly bear ecosystem within which the population and habitat criteria for achievement of recovery will be measured. However, the GYA RZ recovery criteria have since been updated to include criteria applicable to the entire GYA ecosystem, such as population estimates and mortality thresholds.

Table 1. Estimated grizzly bear population size (individuals) and population growth rate by Recovery Zone or Ecosystem (USFWS 2011b, IGBST 2014c).

Recovery Zone or Ecosystem	Estimated Population Size	Trend (% chan2e annually)
Greater Yellowstone Area Ecosystem	674 and 839	+Oto 2%
Northern Continental Divide RZ	930	+3%
Cabinet-Yaak RZ	42	-3.8%
Selkirk RZ	88**	+1.9%
North Cascades RZ	<20	unknown
Bitterroot RZ	0	n/a

*Reflects two methods for estimating population (see Greater Yellowstone Area subsection below.) This population estimate covers the entire ecosystem. The GYA includes our defined action area.
**Estimate includes 30 in U.S. and 58 in Canada

Habitat degradation and fragmentation, and negative human/bear interactions are the primary factors responsible for grizzly bears' current threatened status (USFWS 201 la). Grizzly bears preferentially use large areas with a low density of roads and low levels of human activity. Secure habitat is an important component for minimizing habitat degradation and fragmentation, and is defined as areas larger than 4 hectares (ha) (l0 acres) in size and greater than 500 meters (m) from an open road (Interagency Conservation Strategy Team 2007). The average amount of secure habitat in each recovery zone ranges from 53 percent in the Selkirks to 86 percent in the GYA (USFWS 201 lb).

Northern Continental Divide (NCDE): Grizzly bears are well distributed throughout the NCDE Recovery Zone and their range has expanded outside of the recovery zone boundary to the east, and somewhat to the west and south (USFWS 2013). The Grizzly Bear Management Plan for Western Montana identifies 37,460 square kilometers (sq km) (14,463 sq mi) of the NCDE as occupied, including some intervening habitat between the NCDE and the Cabinet-y aak. The estimate of average annual population growth was re-calculated in 2012 with a resulting rate of 3.03 percent per year across the time period from 2004-2011 and a total population estimate of approximately 930 to 942 bears. The NCDE population of grizzly bears is contiguous with grizzly bears in Canada, resulting in high genetic diversity (Proctor et al. 2012, as cited in USFWS 2013). Grizzly bears are well distributed throughout the NCDE Primary Conservation Area and Zone I although density is higher inside the Primary Conservation Area (see Kendall et al. 2009; Mace and Roberts 2011, as cited in USFWS 2013).

Cabinet-Yaak (CYE): The CYE Recovery Zone is estimated to contain at least 40 to 45 grizzly bears (Kasworm et al. 2007, as cited in USFWS 2011 b). Separate population estimates were

made for the Cabinet Mountains and the Yaak River drainage because there is no documented movement of grizzly bears between these two portions of the RZ. The Cabinet Mountains lie south of the Yaak River drainage and contain about 60 percent of the RZ. There are approximately 15 individuals in the Cabinet Mountains and 25 to 30 individuals in the Yaak portion of the RZ (Kasworm et al.2007, as cited in USFWS 201 lb). There are another estimated 24 grizzly bears in Canada directly across the border from the Yaak (Proctor et al. 2012, as cited in USFWS 201 lb).

Selkirks (SE): The estimated population size is 88 grizzly bears in the SE RZ, with 30 in the U.S. and 58 in Canada (Proctor et al. 2012, as cited in USFWS 201 lb). While this population estimate represents a substantial increase in bears in the SE since 1999, it must be interpreted cautiously until more accurate data are available. The estimate for the U.S. portion of the SE is based on expert opinion (Wakkinen 2010, as cited in USFWS 201 lb). It is estim;:ited that the population of grizzly bears in the SE is slowly increasing at a rate of 1 .9 percent annually.

North Cascades (NCASC): The population in the NCASC is estimated to be fewer than 20 animals within the 24,605 sq km (9,500 sq mi) RZ. The population in adjacent British Columbia is estimated to be less than 25 grizzly bears within a 9,800 sq km (3,784 sq mi) art!a (North Cascades Grizzly Bear Recovery Team 2004, as cited in USFWS 2011 b). The distribution of grizzly bears within the NCASC is unknown due to a lack of data (USFWS 2011 b).

Greater Yellowstone Area (GYA): The 23,828 sq km (9,209-sq mi or 5.89 million ac) OYA RZ includes portions of Wyoming, Montana, and Idaho and portions of six National Forests (Beaverhead, Bridger-Teton, Custer, Gallatin, Shoshone, and Caribou-Targhee), Yellowstone and Grand Teton National Parks, John D. Rockefeller, Jr. Memorial Parkway, Bureau of Land Management, and adjacent private and state lands. The range of grizzly bears in the entire GYA has increased, as evidenced by the 48 percent increase in occupied habitat between the 1970s and early 2000s, and it is still expanding (Pyare et al. 2004, Schwartz et al. 2002, IGBST 2013). The most recent estimate of the known area occupied by grizzly bears in the entire OYA is approximately 50,280 sq km (19,413 sq mi or 12,424,320 ac) (Bjornlie 2013).

The GYA represents the most distant portion of the current grizzly bear range in the U.S. and has been the primary focus of grizzly bear recovery efforts to date. Range expansion and population increases, including into southern portions of the GYA, have been concurrent with the Refuge implementing many of the actions described in the proposed action, and with other federal and non-federal actions described in the baseline below. This means that historical activities comparable to the proposed action have had little to no discernible effect on the population's trend toward recovery.

Recovery efforts have been very successful and the number and distribution of grizzly bears in this population have exceeded target recovery levels for nearly two decades. For example, the population of independent female grizzly bears has grown from less than 30 in 1983 to more than 250 (Schwartz et al. 2011, Haroldson and Frey 2013). Recovery work continues to reduce grizzly bear mortalities and ensure habitat standards for maintaining a recovered population in this ecosystem.

Best available science suggests the GYA ecosystem grizzly bear population is stable to slightly increasing. In 2014, estimates of the number of grizzly bears in the GYA were 674 or 839 depending on the methods used to estimate population size (see Conservation section for details) (IGBST 2014c). Current analysis indicates that this grizzly bear population grew an average of 4 percent or more annually from 1983 to 2001. The population's rate of growth slowed to Oto 2.2 percent during 2002 to 2011, likely because of the increase in grizzly bear density in the GYA (IGBST 2012, IGBST 2013). The grizzly bear population in the GYA met its recovery goals in the mid-1990s, has exceeded recovery goals every year since, and may be nearing carrying capacity (IGBST 2013).

The Service proposed to establish a Distinct Population Segment of the grizzly bear for the GYA and surrounding lands and concurrently delist it from the ESA on November 17, 2005 (70 FR 69854; USFWS 2005). The final rule to delist the grizzly bear was published on March 28, 2007, and became effective April 30, 2007 (72 FR 14866; USFWS 2007). An order was issued by the Federal District Court in Missoula on September 21, 2009, which enjoined and vacated the delisting of the GYA grizzly population. In compliance with this order, the GYA grizzly population is again treated as a threatened population under the ESA. The District Court decision was appealed on two primary issues: (1) adequacy of regulatory mechanisms after delisting (i.e., the Conservation Strategy) and, (2) the potential threat of whitebark pine decline on the GYA grizzly bear population. The 9th Circuit Court of Appeals rendered a decision in November 2011 and reversed the District Court decision regarding the adequacy of protections provided under the Conservation Strategy but upheld the District Court decision that the Service had not sufficiently articulated that whitebark pine decline was not a threat to the GYA grizzly population. In response to this the Interagency Grizzly Bear Committee and Yellowstone Ecosystem Subcommittee tasked the IGBST to provide information and further research relevant to whether grizzly bears do find alternative foods to whitebark pine seeds, literature to support this statement, and whether impacts can occur to individual bears without causing the overall population to decline (IGBST 2013).

Human-grizzly bear interactions have been increasing in the GYA due, in part, to increasing human use and development, increasing bear numbers, and bears and people both expanding the range of occupancy, thereby increasing the chances of adverse encounters. The frequency of grizzly bear-human conflicts is inversely associated with the abundance of natural bear foods (Gunther et al. 2004). Mortalities from grizzly bear-human conflicts currently are a primary source of grizzly bear mortality (see IGBST annual reports and mortality database). Table 2 summarizes the 461 known and probably grizzly bear mortalities from 1997 to 2014 in the GYA (IGBST 2014a).

Table 2: Known and probable grizzly bear mortalities in the GYA, 1997-2014.

Cause of Mortality	Number of Bear Mortalities	Percent of Total Mortality
Natural injury or deformity	4	0.8
Predation	35	7.3
Malnutrition	3	0.6
Old age	6	1.3
Poached/malicious	24	5.0
Hunting DLP*	104	21.8
Backcountry camp illegal	3	0.6
Backcountry camp DLP*	13	2.7
Front Country DLP*	8	1.7
Front country mgmt. removal	80	16.8
Human aggr/injury/fatality-mgmt removal	11	2.3
Sheep related illegal	1	0.2
Sheep depredation mgmt. removal	8	1.7
Cattle depredation mgmt. rmoval	43	9.0
Mgmt capture mortality	3	0.6
Research capture mortality	6	1.3
Road kill	22	4.6
Hunting related illegal	2	0.4
Horse depredation mgmt. removal	1	0.2
Specific undetermined	93	19.5
Poisoning	1	0.2
Non-hunting backcountry DL*	6	1.3
Total	**477**	**100.0**

*DL (and DLP) means Defense of Life (and DL or property)

Conservation

In an effort to facilitate consistency in the management of grizzly bear habitat within and across ecosystems, the Interagency Grizzly Bear Guidelines were developed by the Interagency Grizzly Bear Committee (IGBC) (5 I FR 42863, November 26, 1986) for use by land managers. The IGBC developed specific land management guidelines for use in each of the five ecosystems including the YGBE.

Recovery zones also have been established for the grizzly bear and include areas large enough and of sufficient habitat quality to support a recovered bear population. According to the Grizzly Bear Recovery Plan (USFWS 1993), a recovery zone is defined as that area in each grizzly bear ecosystem within which the population and habitat criteria for achievement of recovery will be measured. Areas outside of recovery zones may provide habitat that grizzly bears will use but are not considered necessary for the survival and recovery of this species. The area outside the

recovery zone but within the 10-mile buffer area is managed to consider and protect grizzles and their habitat whenever possible recognizing that population and mortality data within this zone are collected and pertinent to recovery criteria. Beyond the 10-mile buffer, grizzly bear mortalities or populations are not considered when determining whether recovery goals have been met, although protection is still accorded to the grizzly bear under the ESA.

The Yellowstone Grizzly Bear Recovery Zone (RZ) covers approximately 2,200,729 hectares (5,438,000 acres) of primarily NPS and National Forest Service (NFS) lands, roughly 89 percent of the currently known distribution of the grizzly bears in the YGBE. Yellowstone and Grand Teton National Parks make up 39 percent of the YGBE recovery zone. Private holdings and other ownership make up 2.1 percent of the recovery zone and the remaining 58.5 percent occurs on lands managed by the National Forest Service (ICST 2007). The Refuge is outside of the RZ.

Areas within the Recovery Zone are stratified into Management Situation Zones 1, 2, or 3; each having a specific management direction according to the Interagency Grizzly Bear Guidelines (IGBC 1986).

> **Management Situation 1** (MS 1): lands contain population centers of grizzlies are key to the survival of the species, and are where management decisions will favor the needs of the bear even when other land use values compete.
>
> **Management Situation 2** (MS2): lands are those areas that lack distinct population centers and the need for this habitat for survival of the grizzly bear is more uncertain. The status of such lands is subject to review. Here, management will at least maintain those habitat conditions that resulted in the area being classified as MS2.
>
> **Management Situation** 3 (MS3): designation is intended for lands where grizzly bears may occur infrequently. There is high probability that federal activities here may affect the species survival and recovery. Management focus is on human-bear conflict minimization, rather than habitat maintenance and protection.

All grizzly bear recovery zones were subdivided into smaller units to facilitate both the assessment of projects and recovery objectives. Bear management units (BMU) were formally delineated throughout each zone. The BMU were designed to:

- Assess the effects of existing and proposed activities on grizzly bear habitat without having the effects diluted by consideration of too large an area;
- Address unique habitat characteristics and grizzly bear activity and use patterns;
- Identify contiguous complexes of habitat which meet year-long needs of the grizzly bear; and
- Establish priorities for areas where land use management needs would require cumulative effects assessments.

The low survival at adult females was identified as the single most important factor in causing the decline in the Yellowstone population prior to the mid-1980's (Knight and Eberhardt 1985). The current Recovery Plan (USFWS 1993) outlines demographic goals to objectively measure and monitor the recovery of the Yellowstone grizzly bear population. That plan defines a recovered population as one that can sustain the existing level of known and unknown human-caused mortality that exists in the ecosystem and is well-distributed throughout the recovery zone. Demographic recovery criteria outlined for the Yellowstone recovery zone include:

(1) Observation of 15 females with cubs of the year annually (unduplicated sightings) over a 6-year running average;

(2) Occupation of 16 of the 18 BMUs by females with young from a running 6-year sum of verified observations, and no 2 adjacent BMUs unoccupied with a study to be initiated in the Plateau and Henry's Lake BMUs to determine the capability of these units to support females with cubs;

(3) Known, human-caused mortality not to exceed 4 percent of the current population estimate (based on most recent 3-year sum of females with young); with no more lhan 30 percent of this total mortality limit incurred by females; and,

(4) These mortality limits cannot be exceeded during any 2 consecutive years.

Threats

Isolation from human activities is extremely important for bear survival, due to the tendency of grizzly bears to rapidly habituate to human foods. Food-conditioned bears often must be eliminated or removed from developed areas. Avoiding human-caused bear mortality is a goal of the Recovery Plan and is essential to maintaining a viable grizzly bear population (USFWS 1993).

Primary threats grizzly bears are associated with motorized and dispersed recreational use and forest management activities, including timber harvest. Recreation use includes hunting, fishing, camping, horseback riding, hiking, biking, off-road vehicle (ORV) use, and snowmobiling. Direct human-caused mortality is the most obvious threat to the grizzly bear. This kind of mortality can occur in several ways (1) defense of human life or property, (2) management removals, (3) mistaken identification by big game hunters, or (4) malicious killing. Nuisance bears are removed to defend human life or property, usually because they have become dangerously bold as a result of food conditioning and habituation at campsites, lodges, resorts, and private residences or they become habituated predators of livestock (Knight and Judd 1983).

Human-grizzly bear interactions have been increasing in the YGBE due, in part, to increasing human use and development, increasing bear numbers, and bears and people both expanding their range of occupancy, increasing the chances of adverse encounters. The frequency of grizzly bear-human conflicts is inversely associated with the abundance of natural bear foods (Gunther et al. 2004). Most grizzly bear mortalities are directly related to grizzly bear-human conflicts. The Interagency Conservation Strategy Team (2014c) reported known human caused

mortalities from 1997 to 2014. Of336 human-caused mortalities, 31.5 percent were hunting related, 7.1 percent were poaching, and 15. 8 percent were related to livestock (see table 2 for a complete list). The greatest increase in grizzly bear mortalities in recent years is self-defense in fall by big game hunters.

There are a number of naturally or semi-naturally occurring factors that also may influence Yellowstone grizzly bear population levels. Whitebark pine provides an important food source for grizzly bears. Blister rust, which has severe consequences on whitebark pine in the Northern Continental Divide Ecosystem, has been observed in the Yellowstone area. The Yellowstone cutthroat trout, which is an important food source for grizzly bears to the area, has been negatively influenced by introduced lake trout, which are less available to bears due to their deeper water habits (Reinhart et al. 2001). Winter-killed ungulates are an important food supply but ungulate populations vary widely in numbers and are influenced by weather conditions. The reintroduction of wolves has increased competition for ungulate prey and winter-killed carrion. Recent fires may have impacts on available food and cover over the short term, particularly to individual bears with heavily burned home ranges. Fire, in general, over time stimulates many forage species and berries preferred by bears, provided alternate food supplies and cover is available to maintain bears through the immediate aftermath of the fire.

Army cutworm moths (ACM) in some areas could be affected by agricultural pesticide use, and due to some bears' reliance on this food resource, there was a concern that certain pesticides may bioaccumulate in bears. Recent investigation into this possibility indicates that, while pesticides are present in ACMs to trace quantities they are most likely not sufficient to cause direct adverse effects on, or biomagnify in bears (Robinson et al. 2006). This study cautions, however, that pesticide use is a relevant concern when addressing bear conservation issues. Due to their unique physiology including hyperphagia (increased appetite), brown fat accumulation and torpor, bears may assimilate and excrete certain chemicals in unique ways. Further research is recommended including sampling and analysis of blood hair, and fat samples in order to monitor this, potential threat as available pesticides and their listed uses change.

Grizzly bears have also experienced displacement from available habitat (loss of habitat effectiveness due to human disturbance) due to increased human uses from (1) expanding road access in wilderness areas (Kasworm and Manley 1989), (2) ORV use and (3) recreation use. They have also experienced loss of existing available habitat due to (I) increased development on private land related primarily to residential housing, and (2) potential for increased development on public land related primarily to oil/gas and recreation development. The grizzly bear also faces a decrease in value of available habitat due to (1) a loss of biodiversity (especially early-succession related vegetative types), and (2) sub-optimal composition, structure, and juxtaposition of vegetation as a result of fire suppression management strategies and advancing succession. Finally the bear faces isolation due to fragmentation of available habitat due to (1) major development of private land (2) construction of major highways that block or restrict movement, (3) inadequate provision for linkage on minor roads and highways, and (4) large blocks of clearcuts.

ENVIRONMENTAL BASELINE

Under the provisions of section 7(a)(2), when considering the "effects of the action" on listed species, the Service is required to consider the environmental baseline. Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all federal, state, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed federal projects in the action area that have undergone section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation in progress.

Status of Species habitat within the Action Area

The PCA, or grizzly bear recovery zone as it was initially described (USFWS 1993) was delineated to define an area within which to focus grizzly bear recovery efforts after the species were listed in 1975. At the time the boundary was delineated, grizzly bears were uncommon in Grand Teton National Park (GTNP) and surrounding areas, including the Refuge.

Historically, incidental grizzly bear use was only documented on the northern parts of the Refuge. However, recent observations in the southern part of GTNP bordering the Refuge suggest that increased grizzly bear activity on the Refuge is likely in the near future. Grizzly bears had not been observed on the Refuge since 1994, but a sow and three cubs were observed feeding on a bison gut pile in August 2013. There have been incidental observations of grizzly bears in the northern part of the Refuge. Based on recent observations adjacent to and within the Refuge, there is an anticipation of increased use of the Refuge by grizzly bears. Grizzly bears have been seen within 5 miles of Refuge houses. As the GYE bear population continues to expand southward into presently unoccupied areas, and with continued habituation of bears to human presence and activity, the potential for the occurrence of bears on the Refuge will likely increase.

Shifts in grizzly bear seasonal distribution within the GYE appear to be directly related to resource availability. Recent research indicates that bears in Yellowstone National Park (YNP) are 2 times more likely to be found outside of the park during the early hunting season. This movement occurred regardless of the relative yearly production and abundance of whitebark pine seed production (Haroldson et al. 2004). Elk hunting seasons in the GYE begin as early as September 10 and run through December 3. This period coincides with late hyperphagia in GYE grizzly bears, as well as the time period (September-October) during which the majority of hunting-related grizzly bear mortalities have occurred (Haroldson et al. 2004)

Hunting related deaths resulting from human grizzly conflict remain the most significant source of known grizzly bear mortality in the GYE (Haroldson et al. 2004, USFWS 2003). In the PCA itself: analysis of the potential correlation between hunter numbers and levels of known and probable grizzly bear mortality from 1987 to 1997 indicated little relationship (USFWS 2003).

This analysis did not consider the relationship between hunter numbers and grizzly bear mortality in areas outside of the PCA. While the high level of hunting-related grizzly mortality

has not been directly linked to hunter numbers in the PCA, it is nonetheless primarily the result of chance encounters between bears and hunters in the field, conflicts over ungulate carcasses and conflicts in hunter camps often as a result of game meat being kept in campsites (USFWS 2003; Haroldson et al. 2004).

Within the Refuge, Area 77 is dominated by mixed shrub and sagebrush shrubland interspersed with grassland. Riparian woodland habitat consists primarily of narrowleaf cottonwood *(Populus angustifolia)* and willow *(Salix* spp) stands. Aspen woodlands occur on many hillsides, often some distance from water sources. Small patches of conifer forest occur within the hunt area and consist of Douglas-fir *(Pseudotsuga menziesii),* lodgepole pine *(Pinus contorta)* and junipers. Agricultural areas and cultivated fields occur throughout the hunt area. The relatively even and open nature of terrain within the hunt area provides excellent foraging habitat for ungulates, but largely precludes grizzly-bear use and occupancy.

Factors Affecting Speci_es Environment within the Action Area
General Factors

Past and ongoing actions within the action area and within the grizzly bear Recovery Zone are likely to affect GYE grizzly bears moving through the action area whether their home range is within or adjacent to the action area. These actions include:

- Livestock grazing (which would impact grizzly bears through management actions),
- Private land development,
- Firewood cutting,
- Road use/management/improvements,
- Timber harvest,
- Recreation activities that lead to human-bear conflicts,
- Vegetation management,
- Wild and prescribed fire, and
- Loss or decline of important food sources (e.g, whitebark pine seeds due to fire suppression).

Past projects, their effects on grizzly bears, and the level of incidental take have also been considered in the environmental baseline. Previous formal consultation in the vicinity of the action area addressed transportation projects and grazing permits. The projects are: (1) the Grand Teton National Park Transportation Plan (WY003, February 9, 2007); (2) domestic livestock grazing in Grand Teton National Park (WY9351, May 2, 2006); (3) the Federal Highway Administration's Highway 287/26 Reconstruction project (i.e., Togwotee Pass Highway) (WY5998, August 22, 2003); (4) the Forest Service issuance of commercial grazing permits on the Bridger-Teton National Forest (WY4715, December 3, 2002); and (5) the Re-initiation of formal consultation on Grand Teton National Park and National Elk Refuge Bison and Elk Management Plan/EIS (WY13F0094, September 13, 2013). These pr jects, their affects to the grizzly bears, and the level of incidental take have been considered in the environmental baseline for this biological opinion.

EFFECTS OF THE ACTION

Under section 7(a)(2) of the ESA, "effects of the action" refers to the direct and indirect effects of an action on the species or critical habitat, with the effects of other activities interrelated or interdependent with that action. Direct effects are immediate effects of the proposed action on the species or its habitat. Indirect effects are those caused by the proposed action and are later in time, but still are reasonably certain to occur (50 CFR 402.02). The effects of the action are added to the environmental baseline to determine the future baseline and to form the basis for the determination in this opinion. Should the federal action result in a jeopardy situation and/or adverse modification conclusion, the Service may propose reasonable and prudent alternatives that the federal agency can take to avoid violation of section 7(a)(2). The effects discussed below are the result of direct and indirect impacts of implementing the proposed action and are addressed according to the management goals outlined in the CCP. They are broken down and discussed further according to key actions occurring under each goal.

Habitat conservation

Under the proposed action 800 to 2,000 acres per year (324-809 ha/yr) of cultivated land will continue to be flood irrigated, while up to 1,200 acres (445 ha) will be converted from flood to sprinkler irrigation. Restoration of native species to 4,500 acres (1,821 ha) of existing agriculture fields will occur in GTNP and exclosures will be used on the Refuge to allow recovery of willow, aspen and cottonwood stands. These actions will likely result in an overall minor decrease in total herbaceous forage available for elk and bison but will improve the overall quality of available forage. While these actions may alter ungulate distributions and densities, and cause elk in the Jackson herd to alter their movements within and outside of the Refuge in response to the changes, it is unlikely that these factors would have any significant impact on the GYE grizzly bear population. These habitat alterations would not impact the elk herd size overall, the goal is to disperse the elk into other habitats providing more functional habitats within and outside of the Refuge. This would not change a grizzly bear food source, it may provide additional food opportunities for bears using the areas outside of the Refuge.

Sustainable populations/ Elk and bison numbers

Supplemental feeding

Under the proposed action, supplemental feeding will be reduced from current levels and replaced by greater ungulate reliance on standing forage. A reduction in supplemental feeding may lead to changes in ungulate distribution and increased mortality and would likely cause elk and bison to return to a more natural pattern of sustenance influenced to a greater degree by factor such a climate and availability of native forage. Supplemental feeding likely reduces the effects of density in the Jackson elk herd (Lubow and Smith 2004); therefore, density-dependent effects on seasonal juvenile survival and dispersal may become more apparent as supplemental feeding is reduced. These effects, however, along with associated decrease in adult and juvenile elk survival rates, are likely to be negligible since the Jackson elk herd is maintained below carrying capacity (Lubow and Smith 2004). While minor increases in elk mortality as a result of reduced supplemental feeding may be beneficial to grizzly bears in the Project area due to increased availability of carcasses providing only be a temporary benefit. As the elk herds adjust

to their change in food resources few elk will perish. In addition, the additional carcasses will comprise a small proportion of a bear's yearly diet due to other abundant food resources and the presence of other scavengers (e.g., wolves, coyotes, ravens, etc.) on the landscape.

Elk hunt

The Jackson elk herd comprises one of the largest concentrations of elk in North America with an estimated 13,000 individuals whose seasonal distributions allow them to be considered as being divided into four herd segments (Grand Teton, Yellowstone, Teton Wilderness, and Gros Ventre). The elk migrate across several jurisdictional boundaries, including the Refuge, GTNP, JDR Memorial Park, Yellowstone National Park, Bridger-Teton National Forest, Bureau of Land Management resource areas and state and private lands. Because of its large size, wide distribution, effects on vegetation, and importance to the area's predators and scavengers, the Jackson elk herd contributes significantly to the ecology of the southern GYE.

Elk hunting has been an annual event on the Refuge since 1955 and is the primary management tool used to control the Jackson elk herd population both on the Refuge and throughout the Jackson elk herd units. As part of the proposed action, there will be a short term increase in hunter numbers on the Refuge from 733 to 1,000 and an increase from 220 to 300 elk harvested annually. In the long term, overall hunter numbers on the Refuge will likely decrease to 470 to 487, as will the number of elk harvested (126 to 146). Hunting on the Refuge currently occurs in Area 77; however, a small hunt area may potentially be added in the southern portion of the Refuge in order to force elk back into other hunt areas. Hunting will be strictly managed and the areas available to hunting frequently patrolled. Hunting permits issued for the Refuge are day-use only and do not allow hunters to camp overnight. Hunters will be educated by the Refuge staff on bear safety and identification; hunters will be carrying bear spray, and will abide by food and game storage regulations. Despite these aforementioned factors and the fact that habitat on the Refuge is relatively open and generally lacks densely forested areas, it is becoming more likely that the risk of human-caused conflict resulting in hunting-caused grizzly bear mortality associated with elk hunts will be greater in either the short or long term as grizzly bears continue to expand their range and a result of the proposed action.

Bison hunt

A bison hunt will occur under the proposed action in order to reduce the herd size on the Refuge, increase bison distribution, limit bison conflict with elk along feed lines, and reduce the potential for disease transmission. A reduction in herd size will also contribute to enhancement of habitat through a decrease in the damage caused by excessive grazing and browsing of willow, aspen and cottonwood stands. Initially the bison hunt will reduce herd size by 140 to 150 bison per year, of which, 90 to 100 will be removed' on the Refuge and 50 will be removed from the Bridger-Teton National Forest. The hunts will involve an average of 175 to 190 bison hunters each year. In the long term, the Elk and Bison Management Plan estimates that average of 70 bison will be killed ammally, with an average of 90 hunters participating in the hunt. This represents a substantial increase over recent numbers of bison being harvested and bison hunters on the Refuge. Despite the increase in the number of hunters on the Refuge, due to the aforementioned factors (i.e. livestock grazing, private land development, firewood cutting,

road/use/management/improvements, timber harvest, recreation activities, vegetation management, wild and prescribed fire, and loss or decline of important food sources) and conditions associated with hunts on Refuge, the risk of human-caused conflict resulting in hunting-caused grizzly bear mortality is considered to be low, both in the short and the long term. The risk of hunter-caused grizzly mortality associated with bison hunts in the Bridger-Teton National Forest is considered to be higher than on the Refuge, especially in the northern portions of Area 8l east of Elk Ranch and between Buffalo Fork and Spread Creek.

Disease management

In order to maintain the health of elk and bison populations while continuing supplemental feeding at reduced levels, a variety of disease management techniques will be explored (e.g., vaccination, selective fertility control, age- and sex-specific harvest). Under the proposed action, WGFD personnel will be allowed to use brucellosis vaccine Strain 19 on elk and RBSI on calf and nonpregnant female bison along feedlines during feedline operations. Grizzly bears may consume elk or bison exposed to these brucellosis vaccines; however, research indicates that there are no significant adverse effects of the RB5 l vaccine on nontarget species (Januszewski et al. 200 I). No clinical trials have been executed to detennine if vaccine Strain 19 is safe for nontarget species; however, the vaccine has been used on WGFD feedgrounds for 17 years without any noticeable adverse clinical, histological or reproductive effects on nontarget species. Since vaccination activities will occur within the Refuge along feedlines it is not expected that there will be a risk of disturbance to grizzly bear associated with the action.

Food Storage

Grizzly bears have been seen within 5 miles of Refuge houses. Bears that become habituated to human garbage or other food rewards will need to be relocated or destroyed. Teton County passed local policies and practices to manage household garbage storage and disposal to prevent access by bears, which can quickly become habituated to this food source. The Refuge will develop garbage storage and disposal rules for Refuge residents and visitors that are consistent with the spirit of local regulations; these policies and practices will describe proper trash disposal, food storage, and use of bird feeders. These actions will be implemented within the first of year of the CCP. Implementation of these food/waste storage policies will help prevent grizzly bears foraging in the Refuge from developing associations with human food/waste and residences.

Education

Bear safety training for Refuge staff and volunteers has been in place for the last several years, and Refuge staff and volunteers are required to carry bear spray in the field. Under the CCP, the Refuge will provide education on grizzly bear/human interactions for staff and visitors including: distribution of materials promoting the use of bear spays, techniques to minimize human/bear interactions, and proper food/game meat storage techniques for hunters. Education, training, and use of bear spray will further reduce the likelihood of human-bear conflicts that would otherwise result in the relocation or removal of grizzly bears. Under the proposed action the Refuge will also education the public about the use of non-lead rifle ammunition, which potentially could

reduce lead exposure to bears scavenging on elk and bison gut piles. Research specifically supporting physiological or population benefits to Grizzly bears from reduced lead exposure does not exist, but a change in ammunition type will not result in adverse effects and may be beneficial.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Cumulative Effects within the Action Area

Potential activities that could cumulatively affect the grizzly bear within the Refuge planning area include: (1) livestock grazing on state or private lands, (2) residential development that may impact habitat through degradation, removal, and fragmentation or sedimentation of waterways, (3) expanded road networks on state and private lands that may result in fragmentation of habitat, (4) infrastructure associated with urban expansion and mineral development including pipelines and powerlines, (5) spread of invasive species on private and state lands in the planning area, (6) actions undertaken by private landowners that impact the health and performance of watersheds, (7) mineral and other development, the construction and maintenance of rights-of-way, and vegetation treatments (e.g., prescribed burns, mechanical, or chemical treatments) on state and private lands contribute that may result in removal of vegetation and increased sedimentation, and (8) other forms of surface disturbance on state or private lands that may result in permanent facilities such as roads, well pads, mines, or quarries.

Certain components of these non-federal activities, if completed, could displace or modify the behavior of grizzly bears. Grizzly bear habitats could also be modified or degraded by the above-listed non-federal activities which are reasonably certain to occur within the Refuge planning area. Some of these activities could be situated near important grizzly bear habitats or linkages on Refuge-administered lands.

Cumulative Effects Adjacent to the Action Area and Grizzly Bear Recovery Zone

Cumulative effects of actions outside the action area and within the grizzly bear Recovery Zone are likely to affect resident grizzly bears moving through the action area whether their home range is within or adjacent to the action area. These actions include:

- Livestock grazing (which would impact grizzly bears through management actions),
- Private land development,
- Firewood cutting,
- Road use/management/improvement.
- Timber harvest,
- Recreation activities that lead to human-bear conflicts,
- Vegetation management,

- Wild and prescribed fire, and
- Loss or decline of important food sources (e.g., whitebark pine seeds due to fire suppression),

The activities would cumulatively contribute to increased mortality risks reduce availability of secure habitat, and diminish habitat effectiveness for grizzly bears. However, the total cumulative impact of the above listed activities, as well as, other unidentified actions occurring within the grizzly bear recovery zone do not appear to be adversely affecting population recovery, as evidenced by the expanding grizzly bear population in the GYA (Eberhardt and Knight 1996; Schwartz et al. 2002; Pyare et al. 2004).

CONCLUSION

After reviewing the current status of the grizzly bear, the environmental baseline for the action area, the effects of the action and the cumulative effects, it is the Service's biological opinion that the effects of implementing the CCP on the Refuge on grizzly bears are not likely to jeopardize the continued existence of this species. No critical habitat has been designated for this species; therefore, none will be affected. Implementing regulations for section 7 (50 CFR 402) define "jeopardize the continued existence of" as to "engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." We base our conclusion that the proposed action is not likely to jeopardize the continued existence of grizzly bears primarily on the information presented in the Intra-Service Section 7 Biological Evaluation Form prepared for the proposed action and information in our files. We have summarized our rationale for this non-jeopardy conclusion below.

1. An accurate estimate of grizzly bear population size in the Greater Yellowstone Ecosystem has always been elusive given the bear's normally isolated existence in remote inaccessible terrain. However, this species has increased in numbers since the year of its listing. The range of the grizzly bear in the Greater Yellowstone Ecosystem has also increased dramatically since the 1970s (IGBST 2012, Pyare et al. 2004, Schwartz et al. 2002, USFWS 2005).

2. Although the existing level of hunting on the Refuge has not previously resulted in grizzly-human conflict, we anticipate some level of conflict will occur as a result of hunting related activities, because the best available information suggests the GYE grizzly bear population is stable to increasing and is expanding its range. During the 15-year life of the CCP, we expect the number of bears on the Refuge will increase. The number of conflicts resulting in relocation or removal of grizzly bears will be low, however, due to the open nature of the terrain on the Refuge and high levels of human activity and visibility, as well as implementation of hunter/grizzly bear education, use of bear spray and proper food/game meat storage techniques. With the possibility of increased grizzly bear numbers in this area there is a possibility of grizzly bears becoming habituated to human residences on the Refuge due to human food/waste however, management relocations and mortality due to management removals within the

area, is unlikely with the implementation of food/waste storage practices within the Refuge, it is our opinion that the proposed action will not appreciably reduce the likelihood of both the survival and recovery of grizzly bears.

INCIDENTAL TAKE STATEMENT

Section 4(d) and 9 of the ESA, as amended, prohibit the take of listed species of fish or wildlife without a special exemption. The ESA defines take as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. A special rule under the ESA is in effect for grizzly bears in the 48 conterminous states of the United States (50 CFR 17.40(b), Special Rule). Under the terms of the Special Rule, taking is prohibited except as provided in paragraphs 17.4(b)(l)(i)(B)through (F). The exceptions to the take prohibition include the defense of human life and the removal of nuisance bears when the taking conforms to the requirements specified in the regulations. Although there are exceptions to the take prohibition for grizzly bears, the exceptions do not address all sources of incidental take that may result from the proposed federal action. For example, harm is further defined by regulation (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to wildlife by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the federal agency or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Refuge so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Refuge has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the Refuge (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of the incidental take, the Refuge must report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement [50 CFR 402.14(i)(3)].

Amount or Extent of Take Anticipated

The Service anticipates that grizzly bears could be taken as a result of future management activities implemented under the Refuge CCP. The incidental take is expected to be in the form of harm that is tied to hunting activities. In 2013, the Refuge was included in the re-initiation of formal consultation on Grand Teton National Park and National Elk Refuge Bison and Elk Management Plan/EIS (Plan) (WY13F0094). Under that consultation the Service anticipated two grizzly bears on the Refuge may be incidentally taken directly or indirectly as a result of the Plan during the 9-year period of the biological opinion. The incidental take of two grizzly bears

exempted in the biological opinion for the Plan are not include in the biological opinion for the CCP, because that take is already exempted.

At the broad scale of this consultation, the Service is unable to anticipate all other possible circumstances that may involve the take of grizzly bears due to the actions implemented under the CCP, because the CCP is a planning level document and does not authorize specific projects. Therefore, the Service conservatively anticipates that some level of incidental take, both lethal and non-lethal, may occur due to specific actions implemented under the CCP. However, the amount or extent of take is unquantifiable at this time. Any actions implemented under the CCP that may adversely affect the grizzly bear will require separate formal section 7 consultation at the project level. Therefore, incidental take will be assessed, and coverage under the terms of section 7(b)(4) and section 7(o)(2) of the ESA will be granted as appropriate, at the project level during formal consultation.

EITect of the take

In this biological opinion, the Service has determined that this level of anticipated take is not likely to result in jeopardy to the grizzly bear. This is based in part, on the fact that measured population parameters in past years have met established recovery plan levels, while bear mortality has generally been below the threshold levels established in the Recovery Plan. However, the Service anticipates that the direct and indirect effects of implementing hunting activities under the CCP along with implementation of the Interagency Grizzly Bear Guidelines and Refuge-committed conservation measures could result in incidental take. Take in the form of harm may occur as a result of lethal management actions to address nuisance bears associated with hunting conflicts, hunters shooting bears out of self-defense, or harm resulting from non-lethal relocation of grizzly bears from occupied habitats as a result of grizzly bear/human food/waste conflicts. Despite the amount of potential prey in the elk population using the Refuge, there have only been two confirmed grizzly bear observations since 1994; suggesting that the Refuge does not contain all of the necessary habitat requirements for grizzly bears to maintain a presence. Therefore, although this could change in the future with continued expansion of the grizzly bear, the effects to the GYA populations should be minimal compared to areas with high grizzly bear use. No critical habitat for the grizzly bear has been designated; therefore none will be affected.

Reasonable and prudent measures

Reasonable and prudent measures (RPMs) are nondiscretionary measures that are necessary and appropriate to minimize the impact of incidental take. Because the incidental take statement does not exempt any incidental take, no RMPs are necessary and appropriate to minimize the impacts of the incidental take.

Instead, the Refuge will consult individually over the impacts of site-specific projects authorized by the CCP that "may affect" grizzly bears. These future consultations will provide a means for site-specific analysis and documentation of levels of any potential incidental take of grizzly bears. At the individual project level, the Refuge has committed to implement measures to minimize grizzly bear/human conflicts, and grizzly bear habituation to human activities in the

CCP planning area. For site-specific projects that are likely to adversely affect grizzly bears, the Refuge will monitor impacts and prepare reports describing the progress of each such site-specific project, including implementation of the associated project-specific reasonable and prudent measures, and impacts to the grizzly bear (50 C.F.R.§ 402.14[i][3]).

TERMS AND CONDITIONS

Because there are no reasonable and prudent measures, there are no terms and conditions.

CONSERVATION RECOMMENDATIONS

Sections 7(a)(l) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans or to develop information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's section 7(a)(l) responsibility for the species:

CRI. The Service recommends that the Refuge follow all management actions that minimize impacts to grizzly bears as identified in the CCP and the Bison and Elk Management Plan/EIS.

CR2. The Service recommends that the Refuge include a clause on all use authorizations that allows for temporary cessation of activities, temporary cancellation, or as a last resort permanent cancellation if needed to resolve a grizzly-human conflict situation.

CR3. The Service recommends the Refuge continue ongoing educational measures related to limiting the risk of hunter-grizzly conflict and hunting-caused grizzly bear mortality, as well as bear safety training for Refuge staff and volunteers. Refuge staff and volunteers will be required to carry bear spray in the field and adapt and modify these measures as changing circumstances and information warrant.

CR4. The Service recommends that food/waste storage guidelines are implemented on Refuge facilities and with any Refuge permitted activities such as hunting.

CR5. The Service recommends that CCP actions encouraging the use of non-lead rifle ammunition is implemented to reduce lead exposure by grizzly bears scavenging on elk and bison gut piles.

CR6. In the event that a grizzly bear is killed within the action area as a result of hunting-related conflict, the Refuge will notify the Service's Wyoming Field Office (307-772-2374) and the Service's Law Enforcement Office (307-261-6365) within 24 hours.

CR7. In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

CR8. The Refuge should parlicipale in ongoing interagency efforts to identify map and manage linkage habitats essential to grizzly bear movement. Please contact the Service's grizzly bear recovery coordinator for information.

CRlO. If grizzly bears are sighted on the Refuge during the implementation period of the project all hunting acli vilies uu the: Rc:fuge should be reassessed in order to determine the potential risk of hunter-grizzly conflict.

CRl 1. The Service recommends the Refuge not allowing artificial elk calls, which can draw bears to hunters.

CR12. The Service recommends the Refuge providing a secure camping area for participants where carcasses can be safely stored out ofreach of bears.

REINITIATION NOTICE

This concludes consultation on the action outlined in your July 13, 2015, request for consultation on the effects of the CCP on grizzly bears. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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In Reply Refer To:
06E13000-2015-F-O132a

Memorandum

To: Refuge Manager, U.S. Fish and Wildlife Service, National Elk Refuge, Jackson, Wyoming

From: Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming

Subject: Corrections to the Biological Opinion for the National Elk Refuge Draft Comprehensive Conservation Plan and Environmental Assessment

On August 26, 2015, Lisa Solberg Schwab of my staff spoke with you regarding inconsistencies between current management on the National Elk Refuge (Refuge) and information in the biological opinion (BO) dated August 25, 2015. This memorandum transmits corrections to our BO on the National Elk Refuge Draft Comprehensive Conservation Plan (CCP) and Environmental Assessment. Corrections include minor technical changes and do not alter our conclusion that the effects of implementing the CCP on the Refuge are not likely to jeopardize the continued existence of the grizzly bear.

1. Pages 5 and 21 of the BO states, *"Initiate habitat restoration projects to improve native and cultivated forage and achieve desired conditions and goals. Continue to flood irrigate 800 to 2,000 acres per year (324-809 ha/yr) of cultivated land, and convert up to 1,200 acres (445 ha) from flood to sprinkler irrigation."*

In July 2009 the Refuge wrote the Final Plan and Environmental Assessment (EA) for the Irrigation Expansion Project. This EA expanded the total acreage of irrigated land on the Refuge by 3,435 acres. The 1,200 acres of irrigated land in the BO included only those management units identified in the 2007 Bison and Elk Plan/EIS and not the additional acres from the Irrigation Expansion Project; therefore, the BO should state the total area covered by the sprinkler system at the National Elk Refuge as 5,035 acres.

2. Page 22 of the BO states, *"hunters will be carrying bear spray."* While it is true that "Refuge staff and volunteers will be required to carry bear spray in the field" (p. 7), the Refuge will not require hunters to use bear spray even though the Refuge will educate and encourage hunters to use this approach. This approach was articulated under the proposed action (Alternative D in the CCP) in that the refuge will "Develop regulations for storage of bear attractants and bear-deterrent practices and encourage carry of bear spray" (Service 2014, p.76). This is confirmed in the BO, which states the Refuge will "encourage carry of bear spray" (p. 6) and distribute "materials promoting the use of bear sprays" (p. 23). Therefore, based on the preferred alternative in the CCP, the BO should state, "The Refuge will educate, encourage and even at times provide free bear spray for hunter use; however, hunters are not required to carry bear spray."

We cite the use of bear spray in the rationale for our jeopardy analysis, but the use of bear spray is included within a long list of other physical conditions and management actions (p. 25). Cumulatively, these conditions and actions support the conclusion that the number of conflicts resulting in the relocation or removal of grizzly bears is low. The use of bear spray is only one small part of the list, and bear spray will be used by Refuge staff and volunteers. We expect some hunters will also carry bear spray. The fact that not every hunter will carry bear spray does not alter our conclusion.

This concludes our updates to the BO for the National Elk Refuge Draft Comprehensive Conservation Plan and Environmental Assessment. If you have any questions regarding this consultation, please contact Lisa Solberg Schwab of my office at the letterhead address or phone (307) 367-5340.

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April 2016



BASIC COMMUNICATIONS STRATEGY

SECTION I: GENERAL INFORMATION

1. **Plan title:** Release of the National Elk Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA)

2. **DTS number: 44T**

3. **What is the action triggering this communications plan?** *(Please explain in no more than three sentences)*

The CCP and EA have been approved since September 2015. A separate engagement strategy for the Bison and Elk Management step-down plan is currently in development and will be soon available for leadership review.

4. **What is the proposed date to announce this action? Why has that date been selected?** *(Please note whether this date is flexible)*

We propose to release this CCP/EA no later than early October 2016.

SECTION II: GOALS AND MESSAGES

5. **What are our primary communications goals?**

Our primary communications goal is to inform our partners at the Wyoming Game and Fish Department, National Park Service, U.S. Forest Service, and the local public that the CCP/EA have been finalized and certain activities under the CCP are underway. Our secondary communications goal is to draw a clear line between the CCP/EA and the Bison and Elk Management Plan, separating those items in the minds of our constituents and indicating to interested stakeholders information about the latter plan is forthcoming this Fall.

6. **What are our key messages?** *(List no more than four!)*

- The purpose of Comprehensive Conservation Plans is to guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will

implement to protect species, manage habitats, and support compatible, public recreational and other uses.

- A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).
- Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.
- The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in Grand Teton National Park and John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the refuge, including supplemental feeding. A separate announcement and a series of meetings on the Bison and Elk Management Plan are forthcoming.

SECTION III: IMPLEMENTATION

7. Who is leading this communications effort? *(Check one. Note if the response is neither of these, you should be using either a Partnership, Full or Targeted plan)*

◉ **Region** ○ **HQ**

8. Which programs and/or regions does this issue involve?

The National Elk Refuge (R6)

Refuges (R6)

External Affairs (R6)

9. Implementation timeline:

Date	Time	Tactic	Responsible
11/14/16	9:00 a.m. MDT	Contact Brad Hovinga, Regional Wildlife Supervisor, WGFD	Steve Kallin
11/14/16	9:00 a.m. MDT	Congressional notifications	Ryan Moehring and Steve Kallin
11/14/16	11:00 a.m. MDT	Distribute press release	Ryan Moehring Lori Iverson will also forward the news release to the NER's news release list.
11/14/16	11:00 a.m. MDT	Post Final CCP on Mountain-Prairie Refuge Planning website. Distribute Final CCP (electronic and hard copy) to individuals on the CCP mailing list.	Danielle Stevens will work with Rob Mansheim to post files on RO website. Toni Griffin will distribute the Final CCP to the mailing list.
11/14/16	11:00 a.m. MDT	Post press release on R6 website and FWS homepage. Also, post link to press release on social media	Rob Mansheim Lori Iverson will send out a link on the NER's Twitter account.
11/14/16	11:00 a.m. MDT	Email Dear Interested Party Letter to interested stakeholders.	Toni Griffin

10. Which communications tools are needed to support these strategies and tactics? *(Be as specific as possible about the products identified and who will produce them)*

Tool	Responsible	Due Date
News Release	Ryan Moehring	Complete
Communications Plan	Ryan Moehring	Complete
Dear Interested Party Letter	Toni Griffin	Complete

11. Which agencies, organizations and/or individuals should be notified?

Stakeholder Name	Contact Info	Pro/Anti/ Neutral	Contact By
Grand Teton National Park	David Vela, Superintendent; david_vela@nps.gov.	neutral	Day before announcement
National Park Service, Intermountain Region	James Doyle, Chief – Communication and Legislation; 303-969-2321; james_doyle@nps.gov	neutral	Day before announcement
Bridger-Teton National Forest	Patricia O'Connor, Supervisor; poconnor@fs.fed.us	neutral	Day before announcement
Wyoming Game and Fish Department	Brad Hovinga; brad.hovinga@wyo.gov	neutral	Day before announcement

12. Who are the primary points of contact for this action?

Media coordinators *(For national-level plans, list at least one person from HQ Public Affairs and others from region/program if appropriate. For regional-level plans, only regional coordinators are required. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov

Congressional coordinators *(Optional. Enter name, email and phone)*

- Ryan Moehring, 303-236-0345; Ryan_Moehring@fws.gov
- Roya Mogadam, 303-236-4572; Roya_Mogadam@fws.gov

Subject matter experts available for interview *(Must be approved by HQ Public Affairs for an HQ-led announcement or Regional Public Affairs for region-led announcement. Enter name, email and phone)*

- Steve Kallin, 307-201-5409; Steve_Kallin@fws.gov

Additional technical experts for reference *(Enter name, email and phone)*

- Eric Cole, 307-201-5432; Eric_Cole@fws.gov

SECTION IV: DOCUMENT INFO

13. Date Created **Created By**

8/12/2016	Ryan Moehring

14. Date last edited **Edited By**

3/7/2017	Ryan Moehring

SECTION V: CONGRESSIONAL CONTACT LISTS

Delegation Contacts

Member Title	State	Member Name	STAFF_EMAIL
Senator	Wyoming	John Barrasso	brian_clifford@barrasso.senate.gov; kaitlynn_glover@ba kristi_wallin@barrasso.senate.gov
Senator	Wyoming	Michael Enzi	alison_mcguire@enzi.senate.gov karen_mccreery@enzi.senate.gov
Representative	Wyoming	Cynthia Lummis	landon.stropko@mail.house.gov tucker.fagan@mail.house.gov

Committee Contacts

N/A

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:
FWS/R6/NWRS/Planning
MAILSTOP 60130

MAILING ADDRESS:
P.O. Box 25486, DFC
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Boulevard
Lakewood, Colorado 80228-1807

Dear Reader:

We, the U.S. Fish and Wildlife Service (Service), are pleased to provide you with a copy of the comprehensive conservation plan (CCP) for the National Elk Refuge. The CCP will guide refuge management over the next 15 years. These plans includes goals, objectives, and strategies for refuge programs, and detail the combination of actions we will implement to protect species, manage habitats, and support compatible, public recreational and other uses.

During the planning process, we worked closely with representatives from the National Park Service, the Wyoming Game and Fish Department, and the Teton County Planning Department. A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected Alternative D as the preferred management alternative.

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.

We will work closely with Wyoming Game and Fish Department and other Federal, State, and local partners to evaluate and manage habitats for the benefit of bison, elk, migratory birds, and other native species. An emphasis on adaptive management, including monitoring the effects of habitat management practices and use of research results to direct ongoing management, will be a priority.

We will use this plan, along with the Bison and Elk Management Plan (2007), as guidance for managing the refuge over the next 15 years. This comprehensive conservation plan will complement, not replace, the Bison and Elk Management Plan. A stepdown management plan is currently being drafted for the Bison and Elk Management Plan. This plan will outline, consistent with the Bison and Elk Management Plan, guidance to adaptively manage bison and elk herds to meet the goals and objectives outlined in the Bison and Elk Management Plan.

Prior to finalizing the stepdown management plan, the Service will conduct a thorough public engagement process with neighboring communities and other members of the public on how they can help shape the future refuge experience and to listen to and address concerns they bring to our attention. Public input is incredibly important to the Service.

Our public engagement process will include clearly explaining to the refuge's neighbors and other stakeholders what decisions have already been made as well as how their input will be used and can influence the decisions that are yet to be made regarding how we move forward with the

stepdown management plan. We intend to listen to and implement feedback received from refuge neighbors and other interested stakeholders.

The CCP document can be viewed online at https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. For more information about the CCP, please contact Steve Kallin, Project Leader at (307) 733-9212, or Steve_kallin@fws.gov.

Thank you for your continued interest in this planning process.

Sincerely,

Will Meeks
Assistant Regional Director
National Wildlife Refuge System

From: Ryan Moehring
To: Steve Kallin
Subject: RE: CCP Congressional Contacts
Date: Monday, November 14, 2016 10:23:00 AM

Hi Steve,

Many thanks for doing that. I have also been in touch with the state directors for the WY delegation, as well as the governor's office. Lori and I have spoken about the rollout and I think we are in a good place there. I also spoke with Toni, who is going to make sure the Planning page is updated w/ the most current info. I'll issue the news release at 11:00 a.m. and will coordinate closely with you and your staff on any incoming. Thanks for all of your patience and hard work.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Monday, November 14, 2016 10:20 AM
To: Ryan Moehring
Subject: CCP Congressional Contacts

Hi Ryan:

Just letting you know that I have called each of the congressional aids we normally communicate with for the Wyoming delegation to give them a heads-up on the CCP release. I spoke with Pam Buline (Senator Barrasso), but needed to leave messages with: Nikki Brunner (Senator Enzi) and Pat Aullman (Congresswoman Lummis).

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Ryan Moehring
To: "Renny MacKay"
Cc: "Sara DiRienzo"
Subject: FW: Management Plan Completed for National Elk Refuge
Date: Monday, November 14, 2016 10:27:00 AM

Renny/Sara,

Just a quick heads up on the below. I hope all is well on team Red Shirt!

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Ryan Moehring [mailto:ryan_moehring@fws.gov]
Sent: Monday, November 14, 2016 10:13 AM
To: Ryan Moehring
Cc: Roya Mogadam
Subject: Management Plan Completed for National Elk Refuge

Good morning,

Please find below a news release we will issue later today, announcing the availability of the final Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) that will guide management of the National Elk Refuge in Jackson Hole, Wyoming for the next 15 years.

A copy of the final CCP/EA can be found here: https://www.fws.gov/mountain-prairie/refuges/planningpdfs/NER/NER_FinalCCP_Book_2016-1110(reduced).pdf.

Should you have any questions about this announcement, please contact me or Roya Mogadam (Roya_Mogadam@fws.gov, 303-236-4572).

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

Web | Facebook | Twitter | Flickr | YouTube

Management Plan Completed for National Elk Refuge

LAKEWOOD, Colo. – The U.S. Fish and Wildlife Service (Service) has released a final Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) that will guide management of the National Elk Refuge (Refuge) in Jackson Hole, Wyoming for the next 15 years. The management decisions included in the CCP are a result of thorough environmental review and input from the local community and other stakeholders.

A draft CCP and EA were released in September of 2014 and underwent 60 days of public review and public meetings. Based on an extensive review of feedback, comments, and internal reviews, the Service has selected a preferred management alternative (Alternative D).

Alternative D is a blended option that would both increase public use opportunities with an emphasis on the six priority wildlife-dependent uses (hunting, fishing, wildlife observation, photography, environmental education, and interpretation) and focus management efforts on promoting natural processes and supporting the Greater Yellowstone Ecosystem.

The CCP and EA are companion documents to the Bison and Elk Management Plan, which provides goals, objectives, and strategies for managing bison and elk on the National Elk Refuge and in the Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway. Therefore, the CCP does not address bison and elk management on the Refuge, including supplemental feeding. Instead, the CCP addresses all other aspects of refuge management including migratory bird conservation, threatened and endangered species recovery, habitat management, visitor use, and management of cultural resources.

The final CCP/EA is available online here: https://www.fws.gov/mountain-prairie/refuges/wy_ner.php. Hard copies are available at the refuge administrative offices located at 675 E. Broadway in Jackson. For questions about the CCP/EA, please call 307-733-9212.

Established in 1912, the National Elk Refuge spans approximately 25,000 acres and provides wildlife with a variety of habitat types, including grassy meadows, marshes, forest, sagebrush, and rock outcrops. Although the Refuge is best known for the largest herd of wintering elk in the world, nearly 175 species of birds and at least 47 mammal species have been observed on the Refuge. A free-roaming bison herd also winters at the Refuge. Each year, roughly 500,000 people visit the National Elk Refuge to enjoy the views and charismatic wildlife.

To learn more about the refuge, visit: https://www.fws.gov/refuge/National_Elk_Refuge/about.html.

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. We are both a leader and trusted partner in fish and wildlife conservation, known for our scientific excellence, stewardship of lands and natural resources, dedicated professionals, and commitment to public service.

For more information on our work and the people who make it happen, visit http://www.fws.gov/mountain-prairie/. Connect with our Facebook page at http://www.facebook.com/USFWSMountainPrairie, follow our tweets at http://twitter.com/USFWSMtnPrairie, watch our YouTube Channel at http://www.youtube.com/usfws and download photos from our Flickr page at http://www.flickr.com/photos/usfwsmtnprairie/.

– FWS –

From: Ryan Moehring
To: Steve Kallin
Subject: RE: CCP Congressional Contacts
Date: Monday, November 14, 2016 11:19:00 AM

Thanks, Steve. Perfect. I also reached out to Renny Mackay, WGFD Communications Director. I think we have our bases covered.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Monday, November 14, 2016 11:06 AM
To: Ryan Moehring
Subject: RE: CCP Congressional Contacts

Ryan:

I have also talked to WGFD Regional Supervisor Brad Hovenga and informed him about the CCP release.

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Ryan Moehring [mailto:ryan_moehring@fws.gov]
Sent: Monday, November 14, 2016 10:24 AM
To: Steve Kallin
Subject: RE: CCP Congressional Contacts

Hi Steve,

Many thanks for doing that. I have also been in touch with the state directors for the WY delegation, as well as the governor's office. Lori and I have spoken about the rollout and I think we are in a good place there. I also spoke with Toni, who is going to make sure the Planning page is updated w/ the most current info. I'll issue the news release at 11:00 a.m. and will coordinate closely with you and your staff on any incoming. Thanks for all of your patience and hard work.

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Monday, November 14, 2016 10:20 AM
To: Ryan Moehring
Subject: CCP Congressional Contacts

Hi Ryan:

Just letting you know that I have called each of the congressional aids we normally communicate with for the Wyoming delegation to give them a heads-up on the CCP release. I spoke with Pam Buline (Senator Barrasso), but needed to leave messages with: Nikki Brunner (Senator Enzi) and Pat Aullman (Congresswoman Lummis).

Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

From: Ryan Moehring
To: Ryan Moehring
Subject: FW: FW: Step Down Plan, Jackson Hole Media
Date: Monday, March 06, 2017 2:42:07 PM

Thanks,
Ryan

Ryan Moehring
Public Affairs
U.S. Fish and Wildlife Service
Mountain-Prairie Region
303-236-0345

From: Munoz, Anna [mailto:anna_munoz@fws.gov]
Sent: Thursday, October 06, 2016 2:31 PM
To: Will Meeks
Cc: Roya Mogadam; Ryan Moehring
Subject: Re: FW: Step Down Plan, Jackson Hole Media

First, why did he say that the delay is related to the election? I'm not sure where that came from and it makes it sound politically driven by the Administration(s). Unless there is some other local election he is referring to? The longer discussion period is the better answer.

We need to develop some key talking points before his next interview with News & Guide (or anyone else) as I fear there might be a disconnect.

We can chat more tomorrow. I can meet at 9:30 if that will provide us more time.

Anna

On Thursday, October 6, 2016, Will Meeks <Will_Meeks@fws.gov> wrote:
Looping you in. Thoughts?

Let's talk tomorrow when we are chatting about Branding. I have to wrap both conversations up in thirty minutes.

Will Meeks
U.S. Fish and Wildlife Service
Mountain Prairie Region
Assistant Regional Director
National Wildlife Refuge System
303-236-4303 (w)
720-541-0310 (c)

From: Steve Kallin [mailto:steve_kallin@fws.gov]
Sent: Thursday, October 06, 2016 12:00 PM

To: Mike Blenden
Cc: Will Meeks; Maureen Gallagher; Cris Dippel; Lori Iverson; Eric Cole
Subject: Step Down Plan, Jackson Hole Media

Mike:

This is a follow-up to our recent conversation about the BEMP Step Down Plan.

After being interviewed by the Jackson Hole News and Guide for the attached article, the news reporter asked me about the status of the Step Down Plan. I told him the decision was made to delay the process because of the election and for a longer discussion period with the public. He said the local rumor is that it was delayed due to the poor relationship between R-6 FWS Leadership and the WGFD due to the Grizzly Bear delisting process. He asked if the Regional Office would give him the same reasons for the delay if he called them. I told him I believed the RO would tell him the same thing said and gave him your contact information. Yesterday, this same reporter called and said his paper wants him to do a story on the Step Down Plan for this next week's paper (Wednesday).

We are in an awkward position. A news release announcing that we are delaying the Step Down Plan process will surely anger many because this process has taken several years and they want to see us move forward. At the same time, a news release would likely motivate those opposed to any change, and trigger a blistering attack criticizing us for mismanagement and starving elk, similar to last year's "feedback". If we were following the Step Down Communications and Engagement Plans, we would be more proactive and better positioned to address the management criticism we all expect to occur again this year. However, for a number of reasons as I previously recommended, we should not follow these plans prior to the upcoming feed season if we are not going to start making changes to the upcoming feeding program.

I suggest that I do the interview with the reporter from the New & Guide and in addition to the reasons I initially gave him for the delay, that we add time separation between the CCP and the Step Down Plan to avoid confusion. What is the status of the CCP and when can we expect to release it?

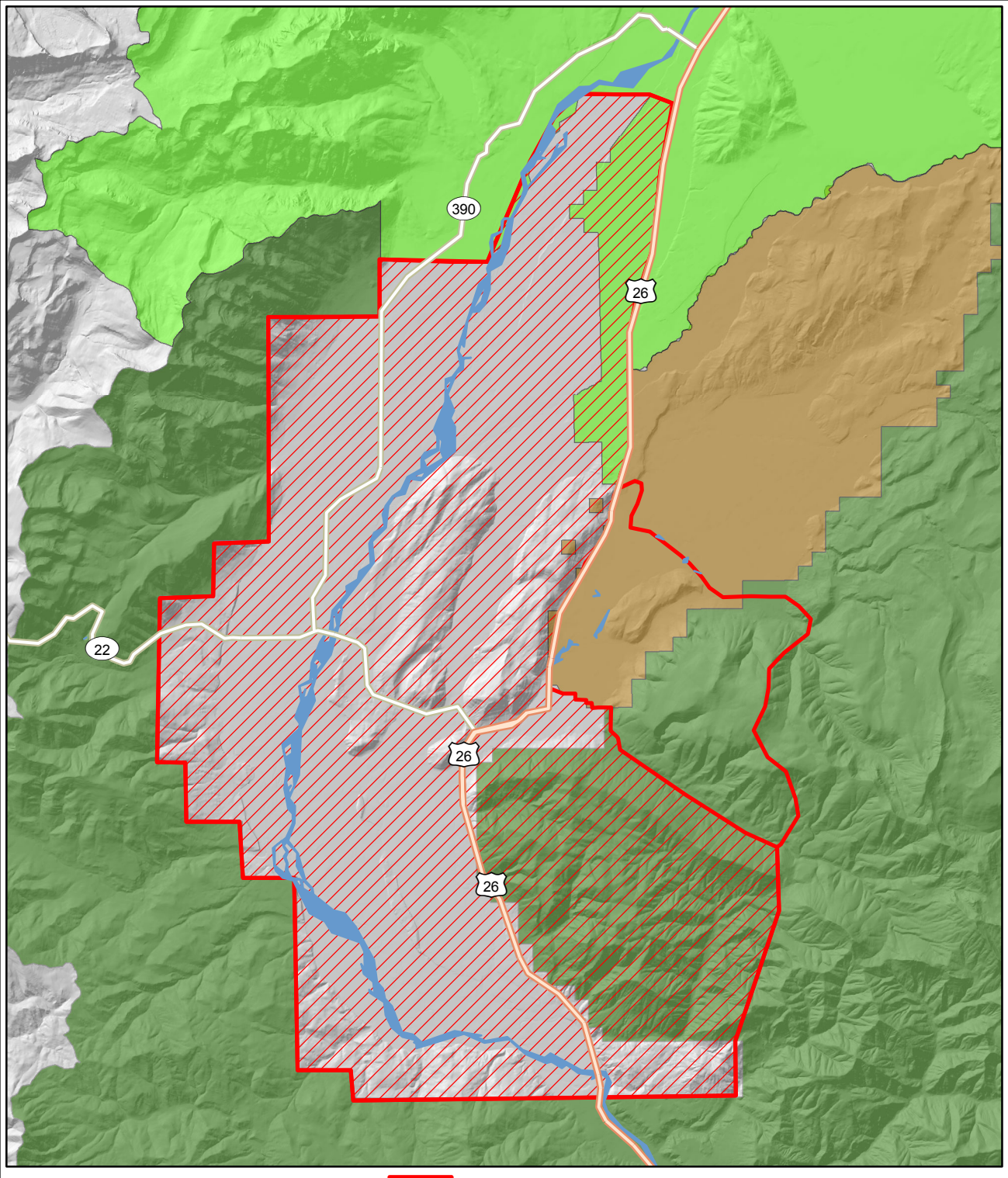
Let me know your thoughts and be prepared for a call from this reporter.

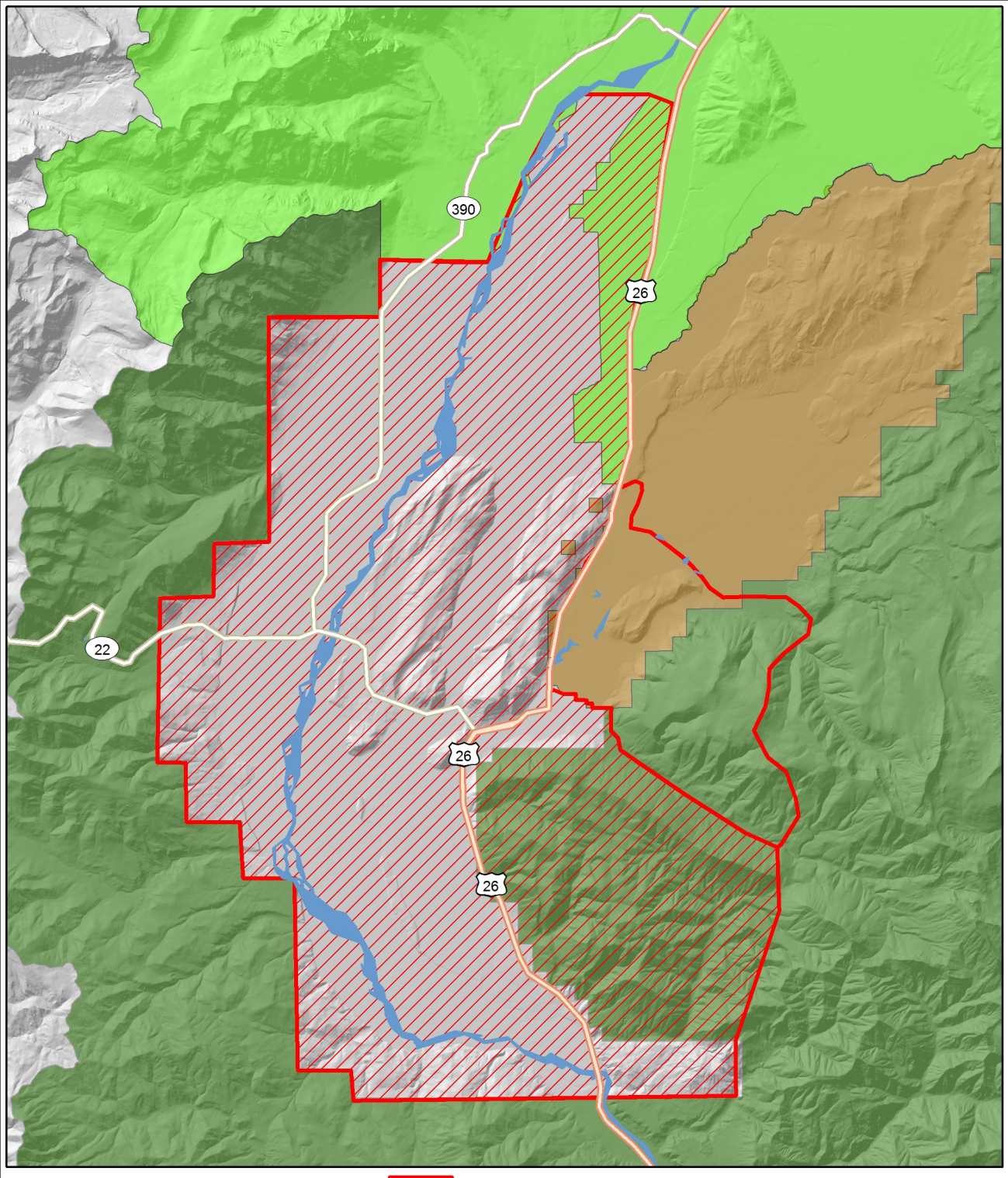
Take care,

Steve Kallin
Project Leader
National Elk Refuge
PO Box 510
675 East Broadway
Jackson, WY 83001
Phone: (307) 201-5409
Fax: (307) 733-9729
steve_kallin@fws.gov

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Anna Muñoz

Assistant Regional Director - External Affairs
U.S. Fish and Wildlife Service, Mountain-Prairie Region
Office: 303-236-4510
Cell: 720-648-2542


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Highways
Major Roads
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Bridger-Teton National Forest
National Elk Refuge
Bison
Elk and Bison
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