Draft 2016 Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Ecosystem

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Executive Summary
2016 Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Ecosystem

Chapter 1 Introduction and Background

The future management of the Yellowstone grizzly bear population is envisioned as one in which the grizzly bear (*Ursus arctos*) and its habitat are conserved as integral parts of the Greater Yellowstone Ecosystem.

Within the Greater Yellowstone Ecosystem (GYE), the grizzly bear population and its habitat will be managed utilizing a management approach that identifies a Primary Conservation Area (PCA) and adjacent areas where occupancy by grizzly bears is anticipated and acceptable. The PCA is the existing Yellowstone grizzly bear recovery zone as identified in the 1993 *Grizzly Bear Recovery Plan (Recovery Plan)* (USFWS 1993). The PCA boundary will replace the recovery zone boundary to reflect the paradigm shift from managing for recovery to one of conservation.

In the Conservation Strategy, management direction is described for both the PCA and adjacent areas within the GYE (i.e., the Demographic Monitoring Area (DMA)). State grizzly bear management plans, forest plans, and other appropriate planning documents will provide specific management direction for the adjacent areas outside the PCA.

This Conservation Strategy was developed to be the document guiding management and monitoring of the Yellowstone grizzly bear population and its habitat upon recovery and delisting. This approach will remain in place beyond recovery and delisting. Ongoing review and evaluation of the effectiveness of this Conservation Strategy is the responsibility of the state, tribal, and federal managers in the GYE. This Conservation Strategy will be evaluated by the management agencies every five years or as necessary, allowing public comment in the updating process.

Upon implementation of the Conservation Strategy, the Yellowstone Grizzly Bear Coordinating Committee (YGCC) will replace the Yellowstone Ecosystem Subcommittee.

The Conservation Strategy and the State Management Plans

The purpose of this Conservation Strategy (Strategy) and the state plans is to:

- Describe and summarize the coordinated efforts to manage the grizzly bear population and its habitat to ensure continued conservation in the GYE.
- Specify the population, habitat, and nuisance bear standards[1] to maintain a recovered grizzly bear population for the foreseeable future.
- Document the regulatory mechanisms and legal authorities, policies, management, and monitoring programs that exist to maintain the recovered grizzly bear population.
- Document the commitment of the participating agencies.

Implementation of the management strategies requires continued cooperation between federal and state agencies.

The GYE is a dynamic environment; monitoring systems in the Strategy allow for dynamic management as environmental issues change. The agencies are committed to be responsive to the needs of the grizzly bear by dynamic management actions based on the results of detailed annual population and habitat monitoring.

The vision of the Strategy can be summarized as follows:

- The PCA will be a secure area for grizzly bears, with population and habitat conditions maintained to ensure a recovered population is maintained for the foreseeable future and to allow bears to continue to expand outside the PCA.

[1] Standards are management actions that are required in this Conservation Strategy. A deviation from a standard would occur only with a revision or amendment to the Conservation Strategy.

- Outside of the PCA, grizzly bears will be allowed to expand into biologically suitable and socially acceptable areas.
- Outside of the PCA, the objective is to maintain existing resource management and recreational uses and to allow agencies to respond to demonstrated problems with appropriate management actions.
- Outside of the PCA, the key to successful management of grizzly bears lies in bears utilizing lands that are not managed solely for bears but in which their needs are considered along with other uses.
- Manage the GYE grizzly bear population within the area called the Demographic Monitoring Area (DMA), to ensure a recovered population in accordance with the established Recovery Criteria.
- Expand public information and education efforts.
- Provide quick responsive management to address grizzly bear conflicts.
- Manage grizzly bears as a game animal; including allowing regulated hunting when and where appropriate.

Relationship to Other Plans

By integrating state plans into the Strategy, it was ensured that the plans and the Strategy are consistent where necessary and complementary. The state plans are formally incorporated in the Conservation Strategy as Appendices I, J, and K.

Relationships with national forest and national park plans are also mentioned throughout the Strategy. Land and resource management plans for national forests and national parks in the GYE have incorporated the habitat standards and other relevant provisions of the Conservation Strategy. For those standards and provisions not yet incorporated into management plans, the agencies will implement the habitat standards and monitoring requirements in this conservation strategy through their established planning processes, subject to NEPA or other legal requirements.

Chapter 2 Population Standards and Monitoring

To maintain a healthy (recovered) grizzly bear population in the GYE, it is necessary to have adequate numbers of bears that are widely distributed with a balance between reproduction and mortality. This section details the population criteria in the *Recovery Plan* that were necessary to achieve recovery, and the population standards necessary to maintain it (USFWS 2016). The Strategy will continue to assess demographic recovery criteria within the Demographic Monitoring Area (DMA) created by the *Recovery Plan*. Because grizzly bears are a difficult species to monitor and manage, multiple standards with additional monitoring items are identified to provide sufficient information upon which to base management decisions. It is the goal of the agencies implementing this Conservation Strategy to manage the Yellowstone grizzly bear population within the area called the Demographic Monitoring Area (DMA), to ensure a recovered population in accordance with the established Recovery Criteria.

Population standards and monitoring items include:

- Monitoring unduplicated females with cubs-of-the-year inside the GYE DMA.
- Calculating a total population estimate for the GYE DMA using the model-averaged Chao2 estimate of females with cubs-of-the-year (*see* Appendix C).
- Maintaining at least 500 bears in the GYE to assure the genetic health of the population.
- Monitoring the distribution of females with young of all ages and having a target of at least 16 of 18 BMUs (Bear Management Units) within the PCA occupied at least one year in every six, and no two adjacent BMUs can be unoccupied over any six-year period.
- Monitoring all sources of mortality for independent females and males ($\geq$ 2 years old) and dependent young (<2 years old) within the GYE DMA and limiting mortality to annual mortality percentages on a sliding scale depending on the annual population size estimate using model-averaged Chao2.

- Monitoring population trend using female survivorship and reproductive rate data from radio-collared bears.
- Ensure meeting defined genetic management objectives.

Chapter 3 Habitat Standards and Monitoring

The habitat standards identified in this document will be maintained at identified levels inside the PCA. In addition to the habitat standards, several other habitat factors will be monitored and evaluated to determine the overall condition of habitat for bears. It is the goal of the habitat management agencies to maintain or improve habitat conditions existing as of 1998, as measured within each subunit within the PCA, while maintaining options for management of resource activities at approximately the same level as existed in 1998. The habitat standards in this document are subject to revision based on the best available science and will be reviewed and updated as necessary.

Habitat standards include:

- Maintenance of secure habitat at 1998 levels in each BMU subunit through management of motorized access route building and density, with short-term deviations allowed under specific conditions. Secure habitat is defined as more than 500 meters from an open or gated motorized access route or recurring helicopter flight line and must be greater than or equal to 10 acres in size.
- The number and acreage of commercial livestock allotments and number of permitted domestic sheep animal months will not exceed 1998 levels inside the PCA. Existing sheep allotments will be phased out as the opportunity arises with willing permittees.
- Management of developed sites at 1998 levels within each BMU subunit, with some exceptions for administrative and maintenance needs.

Habitat criteria that will be monitored and reported include:

- Monitoring open and total motorized access route density in each BMU subunit inside the PCA.
- Monitoring of four high-calorie food items throughout the Yellowstone area: winter ungulate carcasses, cutthroat trout (*Oncorhynchus clarki*) spawning numbers, bear use of army cutworm moth (*Euxoa auxiliaris*) sites, and whitebark pine (*Pinus albicaulis*) cone production. The incidence of white pine blister rust (*Cronartium ribicola*) and whitebark pine mortality in sampled areas will also be monitored.
- Monitoring the number of elk hunters inside the PCA.
- Land managers will ensure that habitat connectivity is addressed throughout the Yellowstone area as part of any new road construction or reconstruction and that food storage orders are in place.

Chapter 4 Management and Monitoring of Grizzly Bear-Human Conflicts

The management of grizzly bear-human conflicts inside the PCA is based upon the existing laws and authorities of the state wildlife agencies and federal land management agencies. Outside the PCA, state management plans will direct the management of nuisance bears. Management of nuisance bears usually falls into one or more of the following categories:

- Removing or securing the attractant.
- Deterring the bear from the site through the use of aversive conditioning techniques.
- Capturing and relocating the nuisance bear.
- Removing the bear from the wild, including lethal control.

The focus and intent of nuisance grizzly bear management will be predicated on strategies and actions to prevent grizzly bear-human conflicts. It is recognized that active management aimed at individual nuisance bears will be required. Management actions outside the PCA will be implemented according to state and tribal management plans. These actions will be compatible with grizzly bear population management objectives for each state for the areas outside the PCA.

In circumstances that result in a nuisance bear situation outside the PCA, more consideration will be given to existing human uses. Site-specific conflict areas within and outside the PCA will be documented and prioritized to focus proactive management actions to minimize grizzly bear-human conflicts and address existing and potential human activities that may cause future conflicts. Past conflict management has demonstrated that grizzly bears can coexist with most human activities.

Management of all nuisance bear situations will emphasize resolving the human cause of the conflict. Relocation and removal of grizzly bears may occur if other management actions are not successful. Before any removal, except in cases of human safety, management authorities will consult with each other prior to judging the adequacy of the reason for removal.

Captured grizzly bears identified for removal may be given to public research institutions or public zoological parks for appropriate non-release educational or scientific purposes as per regulations of states and national parks. Grizzly bears not suitable for release, research, or educational purposes will be removed as described in appropriate state management plans or in compliance with national park management plans.

All grizzly bear relocations and removals will be documented and reported annually in the Interagency Grizzly Bear Study Team (IGBST) Annual Report.

Chapter 5 Information and Education

The purposes of the information and education aspects of this cooperative effort are to support the development, implementation, and dissemination of a coordinated information and education program. This program should be understandable and useful for the people who visit, live, work, and recreate in bear habitat to minimize grizzly bear-human conflicts and to provide for the safety of people while building support for viable bear populations.

Information made available to the public will be open and responsive to public concerns. Open discussions with the public will increase credibility of the grizzly bear management program.

These efforts will be reviewed periodically and program adjustments will be made as necessary. In addition, efforts will be expanded as the bear population expands and additional efforts will be needed in areas that could become occupied in the near future.

The current information and education (I & E) working group within the Greater Yellowstone Ecosystem will continue. Members of this I & E team include public affairs personnel from Forest Service Regions 1, 2, and 4; Grand Teton and Yellowstone National Parks; the BLM; representatives from each state wildlife agency; and the I & E specialist from the Interagency Grizzly Bear Committee (IGBC). This team will continue to work with all affected interests to ensure consistency of information, efficient funding strategies, identifying and targeting audiences, developing partnerships, and identifying new tools for implementation.

Chapter 6 Implementation and Evaluation

A new committee, the Yellowstone Grizzly Bear Coordinating Committee (YGCC), will replace the Yellowstone Ecosystem Subcommittee. YGCC meetings will be open to the public.

Some primary activities of the YGCC are:

- Coordinate implementation of this Conservation Strategy.
- Ensure that population and habitat data are collected annually by the IGBST, as specified in this Conservation Strategy, and evaluated to assess current status of the grizzly bear population.
- Share information and implement management actions in a coordinated fashion.
- Identify management, research, and financial needs to successfully implement the coordinated Conservation Strategy.

- Implement a Biology and Monitoring Review as necessary and submit a petition for relisting as appropriate to ensure agency responsiveness to changing circumstances of the grizzly bear or its habitat in the GYE.
- Appoint a chairperson and members of the Information and Education Team, and coordinate information and education efforts.

This committee does not supersede the authority of the management agencies beyond the specific actions agreed to as signatories of this Conservation Strategy.

YGCC membership consists of representatives of the following:

Federal	National parks: Yellowstone and Grand Teton
	National forests: Beaverhead-Deerlodge, Bridger-Teton, Caribou-Targhee, Custer-Gallatin, and Shoshone
	One Bureau of Land Management representative
	The Biological Resources Division of the U.S. Geological Survey
State wildlife agencies	Idaho, Montana, and Wyoming
Local government	One representative from each state
Tribal	One representative from each Native American tribe with sovereign powers over reservation lands within the GYE

The IGBST and the I & E will perform necessary tasks and report to the YGCC.

As detailed in the monitoring portion of this Strategy, the IGBST will take the lead in preparing an annual monitoring report with staff support from the YGCC. Agencies responsible for monitoring major demographic and habitat parameters are listed in Appendix G Monitoring results and analysis will be presented to the YGCC by the IGBST.

If there are deviations from any of the population and/or habitat standards stipulated in this Conservation Strategy, a Biology and Monitoring Review will be initiated.

Biology and Monitoring Review

Under this Conservation Strategy, a Biology and Monitoring Review is a process carried out by the IGBST. A Biology and Monitoring Review examines management of habitat, populations, or efforts of participating agencies to complete their required monitoring. Biology and Monitoring Reviews would normally be undertaken after the annual summary of monitoring information presented to the YGCC and in response to deviations from required population or habitat standards. Any YGCC member agency can request that a Biology and Monitoring Review be considered. Such consideration would be a topic for discussion by the YGCC and the review would be initiated based on the decision of the YGCC. The Biology and Monitoring Review process will be completed within six months and the resulting written report presented to the YGCC and made available to the public. The IGBST is not responsible for completing impact analyses for projects proposed by any agency; such analyses are the responsibility of the agency making the proposal.

The purposes of a Biology and Monitoring Review are:

- To identify the reasons why particular demographic or habitat objectives have not been achieved and to modify management as necessary, or
- To consider potential impacts of a proposed action of concern to one or more members of the YGCC, or
- To consider departures by one or more agencies from the monitoring effort required under this Conservation Strategy and to develop plans to ensure that monitoring efforts be maintained as per the standards in this document, or
- To consider and establish a scientific basis for possible changes in management due to changed conditions in the ecosystem.

Biology and Monitoring Reviews will be submitted as written reports by the IGBST to the YGCC and made available to the public.

The YGCC will respond to the Biology and Monitoring Review with actions to address the deviations from the population or habitat standards. If the situation, after completion of the Biology and Monitoring Review, is such that some or all of the desired population and habitat standards specified in this Conservation Strategy are not being met, and cannot be met in the opinion of the YGCC, then the YGCC will petition the Fish and Wildlife Service (Service) for relisting. In the case of a vote on this issue, a simple majority is necessary.

Petition for Relisting

The YGCC can petition for relisting and a resulting status review from the U.S. Fish and Wildlife Service. A status review is a process that requires the Service to review the status of the GYE grizzly bear population and is triggered by a petition to list a species. This petition from the YGCC will be accompanied by the available specific biological data on the population and its habitat sufficient to judge its status as a recovered population as per the requirements of this Conservation Strategy. A status review will evaluate all factors affecting the population and result in a finding that summarizes the current status of the population. For purposes of a status review, the status of the entire GYE grizzly bear population will be considered.

Additionally, the Service can initiate a status review to determine if the grizzly bear in the GYE should be added to the list of candidate species for listing independent of the YGCC based on concerns about the population and/or its habitat. Under Section 4 of the Endangered Species Act, a petition from an individual or organization can also initiate a status review, as long as the petition is deemed to be warranted. To be warranted, such a petition must present credible scientific information to support the petition.

If, as the result of the status review for candidate status or the petition for relisting, the population is found to be warranted for listing, as per the criteria of the Endangered Species Act in Section 4(a)(1), then the species could be immediately considered for relisting and could relisted under emergency regulations, per Section 4(b)(7) if the threat were severe and

immediate.

The Service will initiate a status review with possible emergency relisting if necessary if there are changes to Federal, State, or Tribal laws, rules, regulations, or management plans that depart significantly from the specifics in the Conservation Strategy, thereby compromising implementation of the Strategy.

Chapter 7 Existing Authorities

The existence of adequate regulatory mechanisms that serve to maintain the GYE grizzly bear population as recovered is one of the five factors required to change the status of the population to delisted and to assure a healthy grizzly bear population.

This chapter lists applicable federal, state (Idaho, Montana, and Wyoming) and tribal acts, statutes, regulations, rules, plans, and guidelines[2].

[2] Guidelines are management actions that are highly recommended in this Conservation Strategy. A deviation from a guideline would not require a revision or amendment to the Conservation Strategy. A deviation from a guideline requires written rationale as to why the guideline is not being followed.

Memorandum of Understanding Detailing Agency Agreement to Implement this Conservation Strategy

The agencies signing this Conservation Strategy agree to use their authorities to maintain and enhance the recovered status of the grizzly bear in the Greater Yellowstone Ecosystem (GYE) by implementing the regulatory mechanisms, interagency cooperation, population and habitat management and monitoring, and other provisions of the Conservation Strategy as per the details and responsibilities described in this document. All signatories recognize that each has statutory responsibilities that cannot be delegated and that this agreement does not and is not considered to abrogate any of their statutory responsibilities. This agreement is subject to and is intended to be consistent with all appropriate federal and state laws. Funding of this MOU is subject to approval and appropriations by approved state and federal entities. All agencies will take appropriate steps to seek funding to implement this document. The adequacy of the regulatory mechanisms demonstrated by this Conservation Strategy are dependent upon funding being available to fully implement the management and monitoring actions detailed in this document. This Conservation Strategy does not go into effect until all agencies have signed this document and the final rule delisting the GYE grizzly bear DPS has been published in the Federal Register.

Regional Forester — Date
U.S. Forest Service, Northern Region

Regional Forester — Date
U.S. Forest Service, Rocky Mountain Region

Regional Forester — Date
U.S. Forest Service, Intermountain Region

Director — Date
Idaho Department of Fish and Game

Director Date
Montana Fish, Wildlife & Parks

Director Date
Wyoming Game and Fish Department

Director Date
National Park Service, Intermountain Region

Regional Chief Biologist Date
Central Region, USGS Biological Resources Division

State Director Date
Bureau of Land Management Idaho

State Director Date
Bureau of Land Management Montana

State Director Date
Bureau of Land Management Wyoming

Regional Director Date
U.S. Fish and Wildlife Service, Region 1

Regional Director Date
U.S. Fish and Wildlife Service, Region 6

Chapter 1 Introduction and Background

Introduction

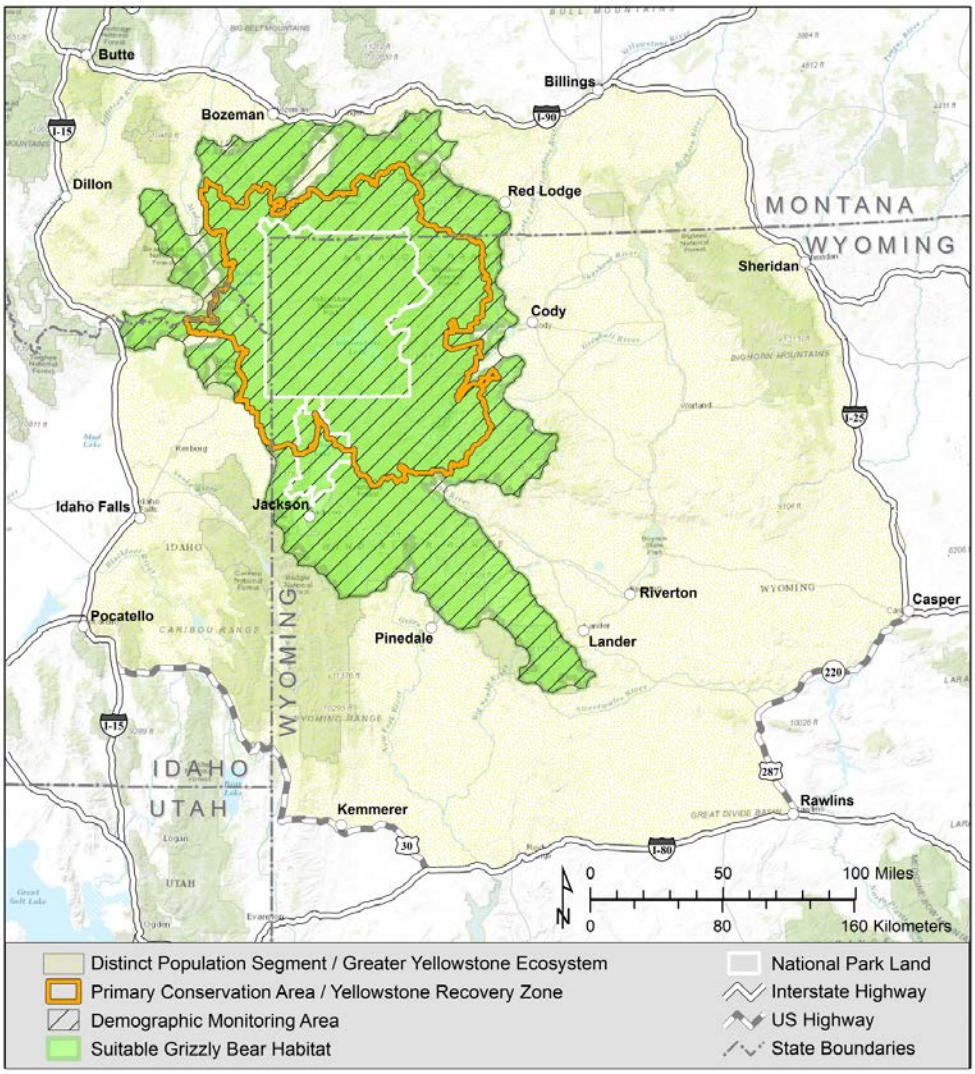
The future management of the Yellowstone grizzly bear population is envisioned as one in which the grizzly bear and its habitat are conserved as integral parts of the Greater Yellowstone Ecosystem (GYE).

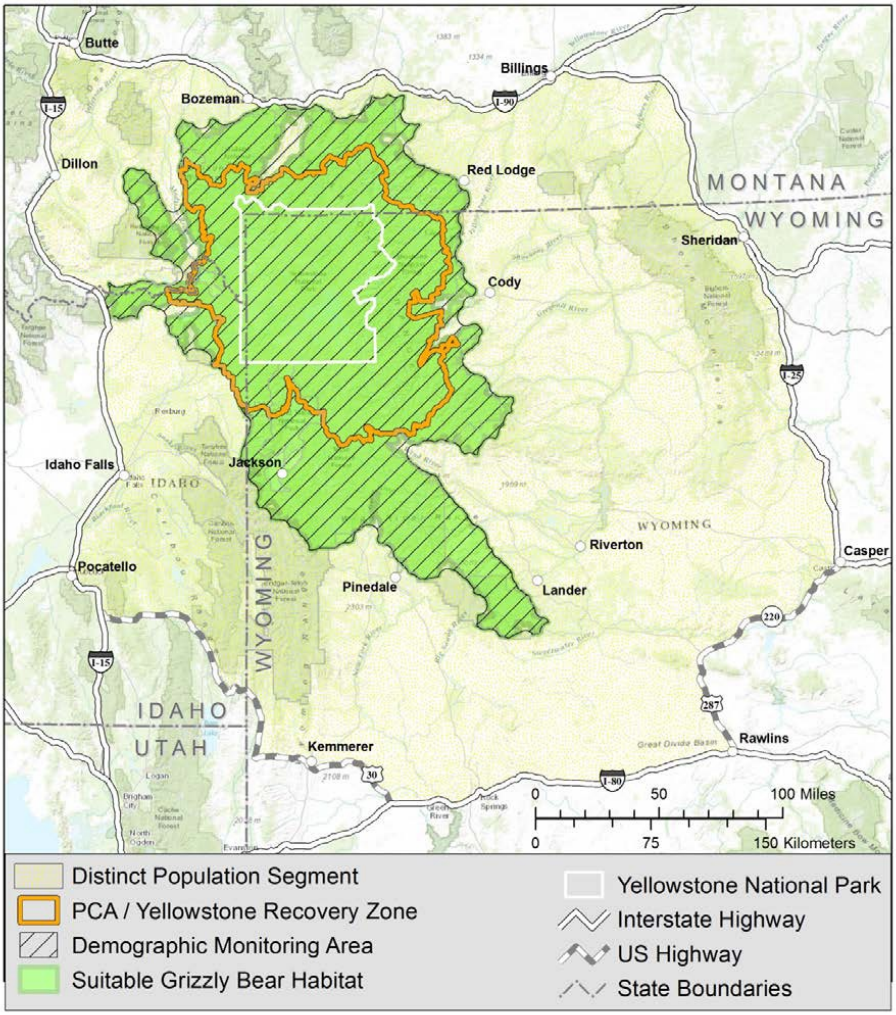
Within the GYE, the grizzly bear population and its habitat will be managed utilizing a management approach that identifies a Primary Conservation Area (PCA) and adjacent areas where occupancy by grizzly bears is anticipated and acceptable. The PCA is the existing Yellowstone grizzly bear recovery zone as identified in the 1993 *Grizzly Bear Recovery Plan* (Recovery Plan) (USFWS 1993). The size of the recovery zone is not being expanded in this approach. The PCA boundary will replace the recovery zone boundary to reflect the paradigm shift from managing for recovery to one of conservation (Figure 1).

In this Conservation Strategy (Strategy), management direction is described for both the PCA and adjacent areas within the GYE. State grizzly bear management plans, forest plans, and other appropriate planning documents provide additional management direction for the adjacent areas outside the PCA.

This Strategy was developed to be the document guiding management and monitoring of the GYE grizzly bear population and its habitat upon recovery and delisting. This Strategy will remain in effect beyond recovery and delisting, and the five year monitoring period required by the Act. Therefore, the need to coordinate management of the population across multiple land ownerships and jurisdictions will always remain.

Figure 1. Map of the Greater Yellowstone Ecosystem (GYE). Boundaries are shown for: (1) the GYE grizzly bear Distinct Population Segment Area (the legal boundary where grizzly bears would be delisted); (2) the Primary Conservation Area (PCA); (3) Suitable Habitat; and (4) the Demographic Monitoring Area (DMA).




Butte
Billings
Bozeman
Dillon
Red Lodge
MONTANA
WYOMING
Sheridan
Cody
Idaho Falls
Jackson
IDAHO
WYOMING
Riverton
Casper
Pocatello
Pinedale
Lander
WYOMING
IDAHO
UTAH
Kemmerer
Rawlins
0 50 100 Miles
0 75 150 Kilometers
Distinct Population Segment
PCA / Yellowstone Recovery Zone
Demographic Monitoring Area
Suitable Grizzly Bear Habitat
Yellowstone National Park
Interstate Highway
US Highway
State Boundaries

Ongoing review and evaluation of the effectiveness of this Strategy is the responsibility of the state and federal managers in the GYE. This Strategy will be evaluated by the management agencies every five years, or as necessary, allowing public comment in the updating process.

Upon implementation of this Strategy, the Yellowstone Grizzly Bear Coordinating Committee (YGCC) replaces the Yellowstone Ecosystem Subcommittee. (*See* Chapter 6 for more information about the activities of the YGCC.)

The Conservation Strategy

The purpose of this Strategy, which includes the state plans, is to:

- Describe and summarize the coordinated efforts to manage the grizzly bear population and its habitat to ensure continued conservation in the GYE.
- Specify the population, habitat, and nuisance bear standards to maintain a recovered grizzly bear population.
- Document the regulatory mechanisms and legal authorities, policies, and management and monitoring programs that exist to maintain the recovered grizzly bear population.
- Document the commitment of the participating agencies.

Implementation of the management strategies requires continued cooperation between federal and state agencies.

The GYE is a dynamic environment; monitoring systems in the Strategy allow for dynamic management as environmental issues change. The agencies are committed to be responsive to the needs of the grizzly bear by dynamic management actions based on the results of detailed annual population and habitat monitoring.

Development of the Conservation Strategy and State Plans

Development of the Strategy began in 1993, when biologists representing the National Park Service, U. S. Forest Service, U. S. Fish and Wildlife Service, Interagency Grizzly Bear Study Team, Idaho Department of Fish and Game, Montana Fish, Wildlife & Parks, and the Wyoming Department of Game and Fish were appointed to the Interagency Conservation Strategy Team. In March 2000, a draft Conservation Strategy was released to the public for review and comment. Later the same year, a Governors' Roundtable was organized to provide recommendations from the perspectives of the three states that would be involved with management of grizzly bears after delisting. The Governors' Roundtable recognized the need to have state management plans that would give direction for grizzly bear management outside the PCA. The state management plans apply to management of grizzly bears outside the PCA, and describe the general areas that grizzly bears are likely to occupy in the foreseeable future.

In 2002, the 2007 Conservation Strategy was developed and the state plans were completed. Although this 2016 version of the Conservation Strategy updates sections of the Strategy, the vision remains the same.

The vision of the Strategy can be summarized as follows:

- The PCA will be a secure area for grizzly bears, with population and habitat conditions maintained that have allowed the grizzly bear population to achieve recovery and expand outside the PCA.
- Outside of the PCA, grizzly bears will be allowed to expand into biologically suitable and socially acceptable areas.
- Manage the GYA grizzly bear population within the DMA to ensure a recovered population in accordance with the established Recovery Criteria.
- Outside of the PCA, the objective is to maintain existing resource management and recreational uses and to allow agencies to respond to demonstrated problems with appropriate management actions.

- Outside of the PCA, the key to successful management of grizzly bears lies in bears utilizing lands that are not managed solely for bears but in which their needs are considered along with other uses.
- Expand public information and education efforts.
- Provide responsive management to deal with nuisance grizzly bears.
- Manage grizzly bears as a game animal, including allowing regulated hunting when and where appropriate.

Relationship to Other Plans

The state of Idaho, Montana, and Wyoming and the Tribes of the Wind River Reservation all developed grizzly bear management plans. The three states also entered into a memorandum of agreement memorializing how the states will coordinate with each other regarding bear management and allocation of mortality[3]. The individual state plans and three-state memorandum of agreement are complementary to this Strategy. The state and tribal management plans are formally incorporated in the Conservation Strategy as Appendices I, J, K, O, and P.

National Forest and National Park plans are also complimentary to this Strategy. Land and resource management plans for National Forests and National Parks in the GYE have incorporated the habitat standards and other relevant provisions of the Conservation Strategy. Those standards and provisions not yet incorporated into management plans will be integrated into future land management plan amendments or revisions.

Background

The Grizzly Bear Population

[3] The states have provided a draft MOA that will be finalized by commission approvals in 2016.

The grizzly bear population in the lower 48 states was listed as threatened in 1975 pursuant to the Endangered Species Act of 1973.

The Recovery Plan established several demographic (population) recovery targets that must be achieved for a recovered grizzly bear population. All recovery targets are currently being met. When grizzly bears were listed in 1975, "indiscriminate illegal killing" and management removals were identified as threats to the population. In response, the Service and signatories to this Strategy implemented demographic recovery criteria to maintain a minimum population size, a well-distributed population, and establish mortality limits based on scientific data and direct monitoring of the population. Since implementing these criteria, the GYE grizzly bear population has tripled in size and range (Eberhardt *et al.* 1994; Knight and Blanchard 1995; Boyce *et al.* 2001*a*; Schwartz *et al.* 2006; Pyare *et al.* 2004; Schwartz *et al.* 2006a; IGBST 2012; Bjornlie *et al.* 2014).

Counts of females with cubs-of-the-year have increased. In 2013, the estimate of unique females with cubs-of-the-year within the entire GYE was 58 (Haroldson *et al.* 2014). This is the highest count ever recorded. The Recovery Plan target for the number of females with cubs-of-the-year has been exceeded since 1988. Calculations of population trajectory derived from radio-monitored female bears show an increasing population trend at a rate of 4 to 7 percent per year between 1983 and 2002 (Eberhardt *et al.* 1994; Knight and Blanchard 1995; Schwartz *et al.* 2006) and 0.3 to 2.2 percent between 2002 and 2011 (IGBST 2012). Grizzly bear range and distribution has more than tripled since 1975 (Basile 1982; Blanchard *et al.* 1992; Schwartz *et al.* 2002; Pyare *et al.* 2004; Schwartz *et al.* 2006a; Bjornlie *et al.* 2014). Independent female survival rates, the single most important cohort to population trajectory, are high (IGBST 2012). In total, this population has increased from estimates ranging between 230 and 312 bears when listed in 1975 (Cowan *et al.* 1974; Craighead *et al.* 1974; McCullough 1981) to at least 714 animals as of 2014 (van Manen 2015, *in litt.*).

The Primary Conservation Area and the Demographic Monitoring Area

The Strategy identifies and provides a framework for managing habitat within a Primary Conservation Area (PCA) and managing demographic parameters within a Demographic Monitoring Area (DMA) (Figure 1). The PCA boundaries (containing 23,853 sq km (9,210 sq mi)) correspond to those of the Yellowstone Recovery Zone (U.S. Fish and Wildlife Service 1993) and will replace the Recovery Zone boundary (Figure 1). The PCA contains adequate seasonal habitat components needed to support the recovered GYE grizzly bear population for the foreseeable future and to allow bears to continue to expand outside the PCA. The National Park Service and the U. S. Forest Service manage the majority of lands within the PCA; a small percentage of land is privately owned or managed by the states or the Bureau of Land Management (BLM) (Table 1).

Table 1. Area of lands within the Primary Conservation Area by management type.

Management Type	Area (square miles)	Percent of the PCA
National Park Service	3,632	39.4
U. S. Forest Service	5,383	58.5
Private and Other Ownerships	195	2.1
TOTAL	9,210	100

To facilitate habitat management and ensure habitat was well distributed, the PCA was divided into 18 bear management units (BMUs) and 40 subunits (Figure 2). BMUs are used to measure the distribution of females with ~~offspring~~ young while subunits allow better resolution of habitat measurement. Habitat protections inside the PCA that allowed the recovery of the grizzly bear population will be maintained.

Figure 2. The Primary Conservation Area showing bear management unit and subunit boundaries.



Characterization of Grizzly Bear Habitat

Background on the Area Necessary for a Recovered Population

Grizzly bears are one of the subspecies of brown bears, which range throughout diverse areas and habitats in Europe, Asia, and North America. Brown bears have the most widespread distribution of any bear species and live in the widest range of habitats of any bear species including deserts, boreal forests, arctic tundra, coniferous forests, deciduous forests, alpine areas, and coastal rainforests. At minimum, grizzly bears need food, seasonal foraging habitat, denning habitat, and security in an area of sufficient size for survival. Bears overlap in home ranges and change densities based on a variety of social and environmental factors. However, the precise mixture of these diverse elements and the precise size of the area necessary to support a population of grizzly bears are impossible to specify. To a great degree, the difficulty lies in the fact that grizzly bears are long-lived opportunistic omnivores whose needs for foods and space vary depending on a multitude of environmental and behavioral factors and on variation in the experience and knowledge of each individual bear. The key to establishing habitat criteria that will maintain a healthy population is to look to the habitat factors in the past that produced a grizzly bear population in the Yellowstone area that is increasing in numbers and expanding in range. Habitat factors that produced a healthy population in the past were used to establish the habitat criteria for the future that must be maintained if a healthy population continues to be preserved.

The available habitat for bears is largely determined by human activities. Human activities are the primary factor impacting habitat security. Human activities and the social structure and relationships among resident bears are the two major influences on the accessibility of available foods for bears. The issue of how many grizzly bears can live in any specific area is a function of overall habitat productivity, annual production, availability of important foods, and the levels and types of human activities. There is no known way to calculate the number of grizzly bears that can live in an area in relation to ongoing changes in habitat values or to fully understand the social system of the grizzly bear and how it is influenced by changes in bear density and related

social interactions at various densities. As food availability fluctuates, there are corresponding changes in bear density in important use areas and changes in social tolerance within the bear population. This in turn will affect age-specific survivorship. Additional numbers of bears in many areas will result in the expansion of bear range, increasing grizzly bear-human conflicts, and erosion of public support for bears. All these factors interact.

A viable and therefore recovered population is one that has high long-term prospects for survival within acceptable levels of risk. Population size is an important factor in understanding population survival (Boyce 1992, Caughley 1994). However, there is no quantitative way to estimate precisely the number of animals required for a viable population of any species (Boyce 1992, 1993). From the mid-1980s, the Yellowstone grizzly bear population has grown at approximately 3 to 4% or more per year (Eberhardt *et al.* 1994, Boyce 1995, Boyce *et al.* 2001*b*). Boyce (1995) has calculated that the Yellowstone population currently has a probability of extinction of 0.0004 (4/10,000)—a very low probability. Nevertheless, as Boyce *et al.* (2001*b*) points out, "*population size alone is not a sufficient criterion for evaluating population viability*," and "*even though a population may have increased or decreased over the past 10 to 20 years, this offers no indication that the population will continue on the same trajectory in the future*." The best way to ensure a healthy population of grizzly bears is to monitor both population and habitat parameters closely and respond when necessary with adaptive management (Walters and Holling 1990) addressing the problems of the population in a dynamic way. That is what this Conservation Strategy is designed to accomplish.

The PCA has provided the vast majority of habitat for the currently increasing population in the Greater Yellowstone Ecosystem. This area will continue to be managed and monitored carefully to maintain habitat security, and to limit access-related disturbances and developed sites on public lands at or below 1998 levels. The GYE grizzly bear population was increasing at a rate of 3 to 4% per year as of 1998 (Boyce *et al.* 2001*b*). Due to this ongoing bear population increase, 1998 was chosen as the baseline year for measurement of levels of human activities. The 1998 habitat baseline values for secure, developed sites on public lands, and livestock grazing are shown in Appendix E.

Food

The broad historic distribution of grizzly bears suggests adaptability in food habits of different populations. Although the digestive system of bears is essentially that of a carnivore, bears are successful omnivores, and in some areas may be almost entirely herbivorous. Bears feed on animal matter or vegetable matter that is highly digestible and high in starch, sugars, protein, and stored fat.

Grizzly bears must avail themselves of foods rich in protein or carbohydrates in excess of maintenance requirements in order to survive denning and post-denning periods. Other plant materials are eaten as they emerge, when crude protein levels are highest.

Grizzly bears are opportunistic feeders and will prey or scavenge on almost any available food including ground squirrels, ungulates, carrion, and garbage. In areas where animal matter is less available, roots, bulbs, tubers, fungi, and tree cambium may be important in meeting nutrient requirements. High quality foods such as berries, nuts, and fish are important in some areas.

The search for food has a prime influence on grizzly bear movements. Upon emergence from the den, they seek lower elevations, drainage bottoms, avalanche chutes, and ungulate winter ranges where their food requirements can be met. Throughout late spring and early summer, they follow plant maturity back to higher elevations. In late summer and fall, there is a transition to fruit and nut sources, as well as other plant materials. This is a generalized pattern, however, and it should be kept in mind that bears are individuals trying to survive and will go where they can best meet their food requirements.

Specific to the GYE, four seasonal foods have been identified for monitoring. These are: winter-killed ungulates (primarily elk (*Cervus elaphus*) and bison (*Bison bison*), but also deer (*Odocoileus* species) and moose (*Alces alces*)), spawning cutthroat trout, whitebark pine seeds, and army cutworm moths. The High-Calorie Foods section in Chapter 3 provides more detail about the components of grizzly bear diet.

Cover

The relative importance of cover to grizzly bears was documented by Blanchard (1978) in a four-year study in the GYE. The importance of an interspersion of open parks as feeding sites associated with cover is also recorded in Blanchard's study.

Changes in the distribution and quantity and quality of cover are not necessarily detrimental to grizzly bears. The IGBST studied the effects of the large 1988 wildfires on grizzly bears. "*On the average, grizzly bears used burned habitats in proportion to their availability within individual annual ranges during 1989 to1992. Seasonal indices of movement and annual range sizes of cohorts are not statistically different from the 1975 to 1987 averages*" (Blanchard and Knight 1996).

Denning

Grizzly bears excavate dens. Dens are usually dug on steep slopes in forest cover where wind and topography cause an accumulation of deep snow and where the snow is unlikely to melt during warm periods. Elevations of dens vary geographically; generally, they are found at higher elevations well away from development or human activity. Abundant denning habitat is available and is not considered a limiting factor for grizzly bears (Podruzny and Gunther 2002).

Secure Habitat

History has demonstrated that grizzly bear populations survived where frequencies of contact with humans were very low. Populations of grizzly bears persisted in those areas where large expanses of relatively secure habitat were retained and where human-caused mortality was low. In the Yellowstone area, this is primarily associated with national parks, wilderness areas, and large blocks of public lands (IGBC 1998). Habitat security requires minimizing mortality risk and displacement from human activities in a sufficient amount of habitat to allow the population to benefit from this secure habitat and respond with increasing numbers and distribution. Habitat security allows a population to increase in numbers and distribution as lowered mortality results in more reproduction and cub recruitment into the adult population. This results in an increasing population. As the population increases, it begins to expand in range and distribution. Both of these responses to habitat security are currently ongoing in the Yellowstone population as the population is increasing at 3 to 4% per year (Boyce *et al*. 2001*b*), and increasing in distribution (Schwartz *et al*. 2002). Maintaining habitat security is a major goal of this conservation strategy.

By managing motorized access, the following grizzly bear management objectives can be met (IGBC 1998):

- Minimize human interaction and potential grizzly bear mortality.
- Minimize displacement from important habitats.
- Minimize habituation to humans.
- Provide relatively secure habitat where energetic requirements can be met.

Historically, management of motorized use has been primarily accomplished through restriction of certain types of motorized use on established access routes, i.e., management of open motorized route densities. Recent research has shown that secure habitat (areas that are free of motorized traffic, also referred to as core areas) is an important component of grizzly bear habitat (IGBC 1998).

The management of human use levels through access route management is one of the most powerful tools available to balance the needs of grizzly bears with the needs and activities of humans. It has been documented in several research projects, completed and ongoing, that

unregulated human access and development within grizzly bear habitat can contribute to increased bear mortality and affect bear use of existing habitat (IGBC 1998).

Management Improvements and Mortality Reduction Efforts

Since listing of the grizzly bear under the Endangered Species Act (ESA), government agencies (federal, tribal, state, county, and city), organizations, and individuals have worked to improve management coordination and habitat conditions, minimize grizzly bear-human conflicts and bear mortality, and increase public awareness and appreciation for the grizzly bear in the GYE.

Summary of Management Improvements Related to Habitat

- The Interagency Grizzly Bear Committee (IGBC) was created to coordinate management efforts across multiple federal lands and different states. The Yellowstone Ecosystem Subcommittee was also created to coordinate efforts specific to the GYE grizzly bear. These committees cooperated in developing the *Interagency Grizzly Bear Guidelines* (IGBC 1986) and the *Interagency Grizzly Bear Committee Taskforce Report on Grizzly Bear/Motorized Access Management* (IGBC 1998). These guidelines were instrumental in changing land management practices on federal lands to provide security and to maintain or improve habitat conditions for the grizzly bear.
- The IGBST was created to provide scientific information for the management and recovery of the grizzly bear in the GYE. Scientific protocols have been developed to monitor the grizzly bear population and important habitat parameters.
- Federal and state agencies developed nuisance bear guidelines to manage bears that become habituated to human foods and refuse. The overall objective of these guidelines is to provide a quick response to grizzly bear-human confrontations.
- Miles of open motorized access routes have been reduced through restrictions (such as gates and signs on motorized routes) and decommissioning (the route is no longer available for motorized use), thereby reducing open motorized access route densities and increasing secure habitat for the grizzly bear.

- Highway design changes have been implemented, including changed guardrail heights to allow cub crossings; minimized cut-slope barrier walls to facilitate movement; revegetation planting to provide cover, minimize exotic plants, and discourage planting of palatable foods; and narrower rights of way and road widths.
- Federal land management agencies have closed areas to cross-country motorized travel to provide more security for grizzly bears.
- Federal land management agencies have closed some areas to all human entry during certain seasons to increase human safety and provide security for grizzly bears.
- Many areas in the GYE have been closed to oil and gas leasing, or have restrictions (such as no surface occupancy) on oil and gas leasing to protect grizzly bear habitat.

Mortality Reduction Efforts Related to Habitat

Significant reductions in the human-caused bear mortality rate have been the primary reason the bear population is now meeting the demographic sub-goals established in the *Recovery Plan*. In addition to the above management improvements, the following actions have been found to be effective in limiting grizzly bear mortality and grizzly bear-human conflicts. These actions have been ongoing and will continue inside the PCA.

- Federal land management agencies have implemented and monitored compliance with food storage orders that require people using grizzly bear habitat to store food and refuse properly on public lands so bears will not become habituated to unnatural foods. This also reduces grizzly bear-human encounters.
- Bear-resistant garbage containers have been installed in campgrounds, picnic areas, and other public use areas on federal lands. Garbage collection schedules have been improved to collect garbage before it becomes an attractant to grizzly bears.
- Some counties and communities have improved their landfills and garbage collection systems to reduce or prevent conflicts with grizzly bears.
- Numerous education and information materials and programs have been developed by federal and state agencies and various organizations, to teach those living, working, and

recreating in grizzly bear country how to be safe, to reduce grizzly bear-human encounters, and minimize grizzly bear mortality. Non-agency participation is encouraged.

- The state wildlife agencies have developed active management/conflict resolution programs to help minimize conflicts between people and bears.
- To provide increased protection for grizzly bears, Montana does not allow baiting or hound hunting for bears. Wyoming prohibits hound hunting within the state, and baiting is not allowed within the PCA. Baiting and use of hounds are not allowed within the PCA in Idaho.
- The number of domestic sheep allotments and the number of domestic sheep grazing within the PCA has been reduced; the remaining domestic sheep allotments are to be phased out as opportunities arise. Sheep grazing permittees and herders must follow strict requirements in their grazing permits to protect grizzly bears and reduce grizzly bear/grazing conflicts.
- Individuals and organizations with special use permits on federal lands must follow strict requirements in their special use permits to protect grizzly bears and reduce grizzly bear-human conflicts.
- Adjustments have been made on cattle grazing allotments within the PCA, and cattle permittees must follow strict requirements in their grazing permits to protect grizzly bears and reduce grizzly bear-grazing conflicts.
- The IGBST coordinates an annual analysis of the causes of conflicts and known and probable mortalities, and proposed management solutions. Reports were reviewed by the Yellowstone Ecosystem Subcommittee and appropriate actions initiated. The Yellowstone Grizzly Bear Coordinating Committee will continue this review process.
- Federal and non-federal landowners have cooperated in limiting grizzly bear mortality and grizzly bear-human conflicts.
- Livestock and road-killed carcasses are managed to minimize grizzly bear-human conflict. Hunters are encouraged to quickly care for and remove hunter-killed carcasses to minimize grizzly bear-human conflicts.
- State and federal law enforcement agents have cooperated to ensure consistent enforcement of laws protecting grizzly bears. A task force of state and federal prosecutors

and enforcement personnel from each state and federal jurisdiction will work together to make recommendations to all jurisdictions, counties, and states, on uniform enforcement, prosecution, and sentencing relating to illegal grizzly bear kills.

- When reclaiming or obliterating motorized access routes or restricting motorized or non-motorized access, priority has been and will be given to areas with historical grizzly bear-human conflicts or areas of probable grizzly bear-human conflicts
- Appropriate actions to reduce mortality will be implemented as described in the state plans outside the PCA where grizzly bears occur or can reasonably be expected to occur when and where possible to improve public safety and minimize grizzly bear mortality.

Recovery of the grizzly bear in the GYE is the result of partnerships between federal and state agencies, the governors of three states, county and city governments, educational institutions, numerous organizations, private landowners, and the public who live, work, and recreate in the GYE. Maintenance of a recovered grizzly bear population depends on these partnerships.

Chapter 2 Population Standards and Monitoring

Introduction

To maintain a healthy (recovered) grizzly bear population in the GYE, it is necessary to have adequate numbers of bears that are widely distributed with a balance between reproduction and mortality. This section details the demographic criteria in the *1993 Recovery Plan* that were necessary to achieve recovery, and the criteria necessary to maintain it in the *2016 Recovery Plan Supplement: Revised Demographic Criteria for the Greater Yellowstone Ecosystem*. The *1993 Recovery Plan* criteria focused on the PCA and a 10-mile perimeter, whereas criteria in the Strategy, the *2016 Recovery Plan Supplement: Revised Demographic Criteria for the Yellowstone Ecosystem*, and the appended state plans encompass the Demographic Monitoring Area (DMA) of the GYE. Because grizzly bears are a difficult species to monitor and manage, multiple criteria are identified to provide sufficient information upon which to base management decisions.

The IGBST has generated extensive information useful to determine the status of the GYE grizzly bear population. Few populations have benefited from the amount of effort in data collection, as has the Yellowstone population. Agencies responsible for management will continue their commitment to data collection so population status can be determined and all designated standards maintained.

Under this Conservation Strategy and the *2016 Recovery Plan Supplement: Revised Demographic Criteria for the Greater Yellowstone Ecosystem*, all mortalities and all reports of unduplicated females with cubs-of-the-year (*see* Appendix C) will be monitored within the DMA (Figure 1). This will result in the management and monitoring of the grizzly bear population in the entire GYE DMA, as opposed to the system in the *1993 Recovery Plan*, which managed and monitored only the population inside the recovery zone and within 10 miles outside the recovery zone. This wider monitoring of mortalities and accounting for mortality limits is more stringent than the system under the *1993 Recovery Plan*. Conservation Strategy demographic standards are

tied to the DMA, shown in Figure 1. The criteria and objectives in the existing *1993 Recovery Plan* have modified, as described below.

Population Monitoring

Demographic monitoring protocols for the GYE population will focus on the area within the DMA and monitoring and documenting population size, distribution of females with young, and all forms of mortality. Additional monitoring or research may be conducted as determined by the IGBST.

Demographic Recovery Criteria from the 2016 Recovery Plan Supplement: Revised Demographic Criteria for the Greater Yellowstone Ecosystem

The *1993 Recovery Plan* defined a recovered grizzly bear population as one that could sustain a defined level of mortality and is well distributed throughout the recovery zone. The *1993 Recovery Plan* outlined a monitoring scheme that employed three demographic sub-goals to measure and monitor recovery of the Yellowstone grizzly bear population. The second criterion pertaining to the distribution of females with ~~offspring~~ young remains unchanged. However, the first and third criteria pertaining to the minimum allowable number of females with cubs ~~-~~ of ~~-~~ the ~~-~~ year and sustainable mortality limits were revised and updated to reflect current methods based on the best available science. The current demographic recovery criteria in the 2016 *Recovery Plan Supplement: Revised Demographic Criteria for the Greater Yellowstone Ecosystem* are:

Demographic Recovery Criterion 1: Maintain a minimum population size of 500 animals and at least 48 females with cubs-of-the-year, as indicated by methods established in published, peer-reviewed scientific literature and calculated by the IGBST using the most updated Protocol, as posted on their website. The estimate of total population size cannot drop below 500 in ~~two~~ three consecutive years or 48 females with cubs-of-the-year in ~~two~~ three consecutive years. This estimate will be calculated using data obtained within the DMA shown in Figure 1. The 48

females with cubs-of-the-year metric is a model-averaged number of documented unduplicated females with cubs-of-the-year (*see* Monitoring Protocol section).

Demographic Recovery Criterion 2—Sixteen of 18 bear management units within the PCA (Figure 2) must be occupied by females with young, with no two adjacent bear management units unoccupied, during a 6-year sum of observations. This criterion is important as it ensures that reproductive females occupy the majority of the PCA and are not concentrated in one portion of the ecosystem.

Demographic Recovery Criterion 3— Maintain the population within the DMA around the 2002–2014 model-averaged Chao 2 estimate ($\overline{X}$ = 674; 95% CI = 600-~~757~~747; 90% CI = 612-735) by maintaining annual mortality limits for independent females, independent males, and dependent young as shown in Table 2. These adjustable mortality rates were calculated as those necessary to manage the population to the model average of 674 bears which occurred during the time period that this population's growth stabilized. If mortality limits are exceeded for any sex/age class for three consecutive years and any annual population estimate falls below 612 (the lower bound of the 90% confidence interval), the IGBST will produce a Biology and Monitoring Review to inform the appropriate management response. If any annual population estimate falls below 600 (the lower bound of the 95% confidence interval), this criterion will not be met and there will be no discretionary mortality, except as necessary for human safety.

Table 2. Total mortality rates used to establish annual total mortality limits for independent females, independent males, and dependent young inside the DMA. For populations less than 600, there will be no discretionary mortality unless necessary for public safety or management of bear-human conflicts.

	Total Grizzly Bear Population Estimate		
	≤674	675-747	>747
Total mortality rate for independent FEMALES.	≤7.6%	9%	10%
Total mortality rate for independent MALES.	15%	20%	22%
Total mortality rate for dependent young.	≤7.6%	9%	10%

Process for Determining Annual Mortality Limits

Each year the IGBST will calculate the model-averaged Chao2 population estimate for the DMA. This population estimate will be used to set the mortality limits for the following year. These mortality rates will be on a sliding scale to ensure a recovered population in accordance with the established recovery criteria. The mortality rate that resulted in population stability 2002–2011 was 7.6% for independent females, 7.6% for dependent young, and 15% for independent males (IGBST 2012). The higher rate for independent males is biologically sound since population growth is less sensitive to independent male mortality than to independent female mortality. In order to ensure that the grizzly bear population remains recovered in accordance with the Recovery Criteria, inside the DMA, a sliding scale of mortality rates will be applied to the model-averaged Chao2 population estimate from the year before as per Table 2. Mortalities are tracked and reported annually using data obtained within the DMA shown in Figure 1.

Conservation Strategy Population Standards

This Conservation Strategy and the state management plans set an objective of maintaining a recovered grizzly bear population in the Yellowstone area sufficient to meet management objectives inside and outside the PCA in biologically suitable and socially acceptable habitats. The demographic standards in this Conservation Strategy are designed to meet these goals.

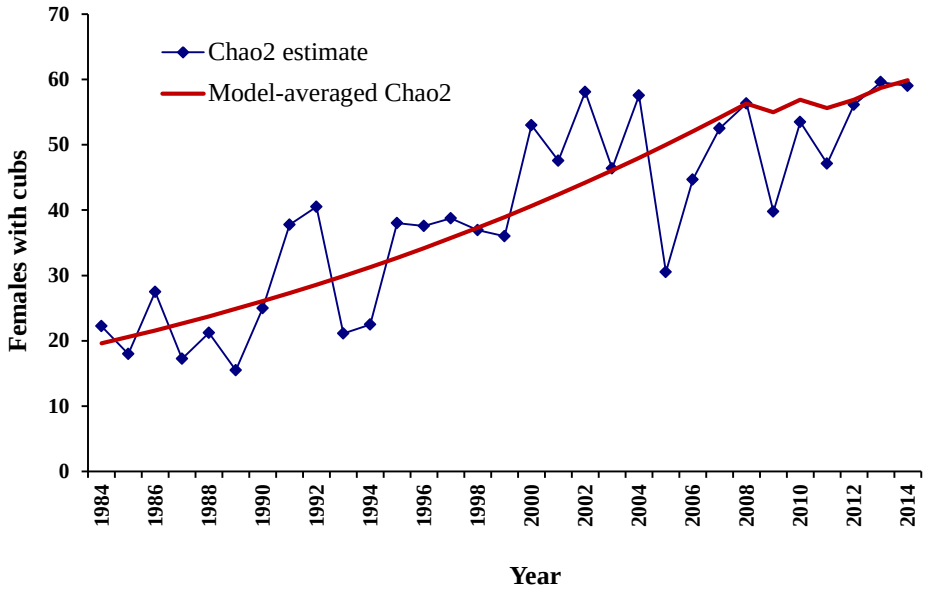
The GYE grizzly bear population exceeds 500 total bears as of 2006 (Appendix M). The intent of the Conservation Strategy is to allow grizzly bears to occupy all biologically suitable and socially acceptable habitats. It is the goal of the agencies of the YGCC implementing this Conservation Strategy to ensure a recovered population in accordance with the established Recovery Criteria. This Conservation Strategy requires continued monitoring of the standards in the 2016 Recovery Plan Supplement to the *1993 Recovery Plan* and some additional standards. These specific population standards, will be applied to the population within the DMA.

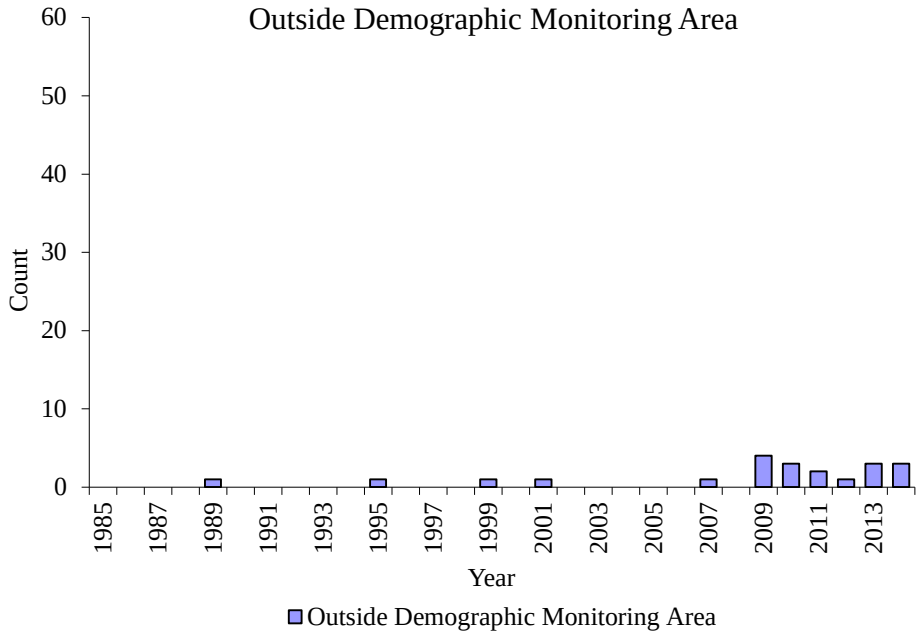
Unduplicated Females with Cubs-of-the-Year

Background

Females with ~~COY~~ cubs-of-the-year occupy all of the existing bear management units within the PCA as well as areas outside the PCA and DMA (Figure 3).

Figure 3. The ~~number of~~Chao2 estimate and model-averaged Chao2 of unduplicated females with cubs-of-the-year inside ~~and outside~~ the Demographic Monitoring Area, as per the Recovery Plan, 198~~4~~5–2014. Estimates of grizzly bear population size in the Greater Yellowstone Ecosystem are based on the Chao2 estimator. Model-averaged Chao2 estimates were implemented starting in 2007. Estimates for 1984–2007 were model-averaged once, and were annually updated after 2007. Model-averaging is not retroactively applied to update entire time series each year. Starting in 2012, only observations from within the Demographic Monitoring Area (DMA) contribute to population estimates.


Chao2 estimate
Model-averaged Chao2
Females with cubs
Year
0
10
20
30
40
50
60
70
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014



Monitoring Protocol

Monitoring unduplicated females with ~~COY~~ cubs-of-the-year will provide information to demonstrate adequate reproduction and to estimate *total* population size. *Total* population size will be estimated using the model-averaged Chao2 method, as described in Appendices B, C, L, and M using the sightings and resightings of unduplicated females with cubs-of-the-year from within the DMA shown in Figure 1. The IGBST has been calculating population size on an annual basis using the model- averaged Chao2 estimate since 2002. As the grizzly bear population has increased, model-averaged Chao2 estimates have become increasingly conservative (i.e., prone to underestimation). As a conservative approach to population estimation, the model-averaged Chao2 method will continue to be the method used to assess population status and the demographic criteria (*see* Appendix C for the application protocol for annual population estimation using the model-averaged Chao2 method). The IGBST will continue to investigate new methods for population estimation as appropriate. If new methods

become available, these will be considered for application in the GYE as long as they represent the best available science. However, until possible new methods are developed, the model-averaged Chao2 method will continue to be used. This is a departure from the way the population estimate was done per the *1993 Recovery Plan*. In the *1993 Recovery Plan*, a *minimum* population estimate was made based on the most recent three years of sightings of unduplicated females with cubs-of-the-year, using only unduplicated sights from the recovery zone and 10 miles outside the recovery zone. The revised and improved methodology used in this document allows an estimate of the *total* population using the model-averaged Chao2 method rather than the *minimum* population size. This allows the calculation of mortality limits based on the total population size for each age and sex class (i.e., independent females, independent males, and dependent young) within the DMA (Figure 1). This method allows mortality management and population monitoring of the grizzly bear population in the DMA, as opposed to the method used in the *Recovery Plan*, which focused mortality management and population monitoring on only a portion of the Yellowstone grizzly bear population inside the PCA (the former Recovery Zone) and within 10 miles of the outer boundary of the PCA. The number and distribution of females with cubs-of-the-year can also be used to demonstrate that a sufficient number of adult females are alive within the population to reproduce and offset existing levels of human-caused mortality.

The numbers of unduplicated sightings and resightings of females with cubs-of-the-year inside the DMA will be reported by the IGBST. Using these data, the IGBST will produce the model-averaged Chao2 estimate of the total number of independent females in the population inside the DMA, which will then be used to estimate the total population size in the DMA. This total population estimate will be used to apply the mortality limits as per Table 2 within the DMA for independent females (> 2 years old) and independent males (> 2 years old) from all causes as well as mortality limits for dependent young (≤ 2 years old) from human-caused mortality. For a more detailed description of this methodology, see Appendix C.

Sightings and resightings of females with ~~COY~~ cubs-of-the-year inside the DMA will be obtained from numerous sources, including radio tracking flights, confirmed sightings, and

observation flights.

Observation flights are primarily designed to survey the DMA and the number of flights conducted is standardized to ensure equal effort in obtaining data. The IGBST will verify the reliability of all sightings. The IGBST will plot all sightings and summarize data for unduplicated females and numbers of cubs-of-the-year seen for the entire population. Methodology developed by Knight *et al*. (1995) will be used to separate duplicated from unduplicated sightings (*see* Appendix C for more information).

Distribution of Females with Young

Background

The distribution of females with young of all ages, based on the most recent six years of observations in the ecosystem, is presented in Figure 4. The recovery criterion of having 16 of 18 BMUs occupied with no two adjacent units vacant continues to be met (Table 3). This criterion is important as it ensures that reproducing females occupy the majority of the PCA and that successful reproductive females are not concentrated in one portion of the ecosystem.

Monitoring Protocol

This effort will provide information to assess distribution of the reproductive cohort in all occupied habitats, although the specific distribution standard for reproducing females will apply only to the PCA. A recovered population should be well distributed throughout grizzly bear range. Successful reproduction is one indicator of habitat sufficiency, thus distribution of family groups of grizzly bears is one indicator of suitable habitat in areas where such sightings occur. Since sub-adult females usually establish home ranges adjacent to that of their mothers, the distribution of family groups is also an indication of future occupancy of these areas by grizzly bears. Radio tracking flights, observation flights, agency personnel sightings, and verified reports from other individuals will be the primary methods employed to collect female

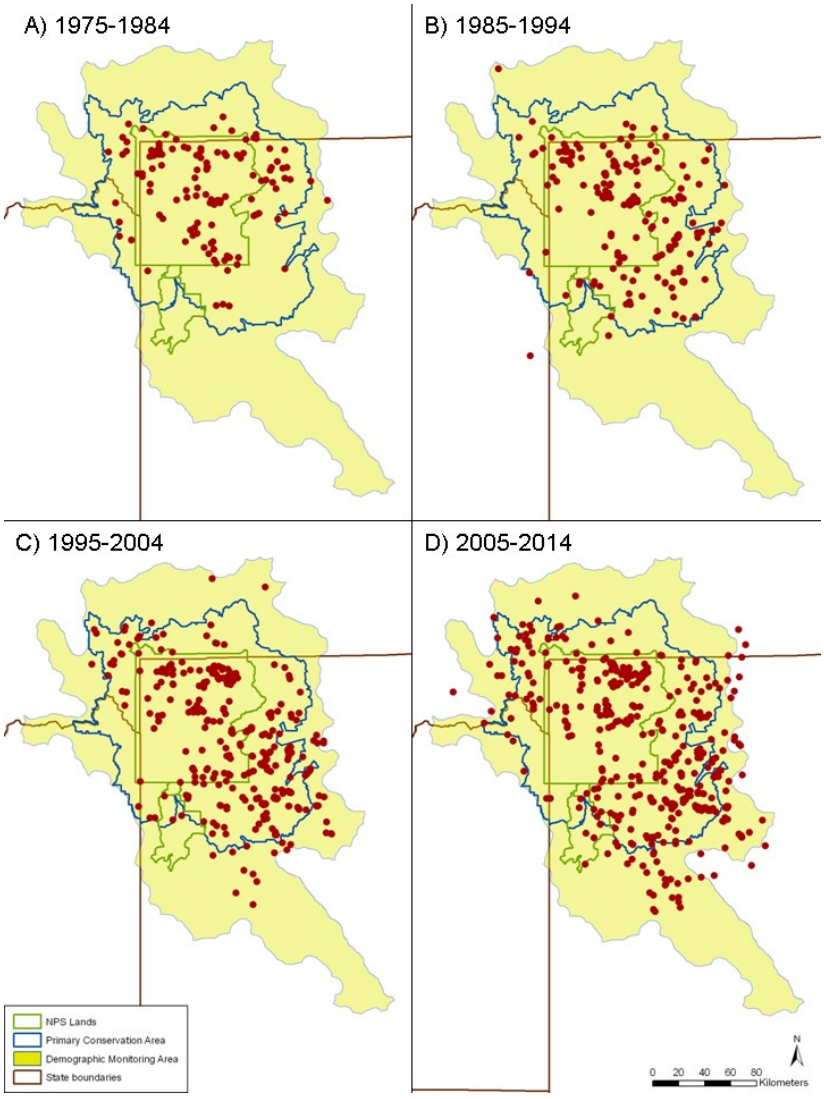
distribution data. The IGBST will verify all reports and keep a record of locations. Data will be maintained by the IGBST.

The number of BMUs occupied by females with young will be reported for the most recent six years. Females with young outside the PCA will also be reported, but only those females with young within the PCA will be used to document achievement of this distribution standard.

Table 3. Bear management units occupied by females with young based on verified reports, 2009–2014.

Bear Management Unit	2009	2010	2011	2012	2013	2014	Years occupied
1) Hilgard	X	X	X	X	X	X	6
2) Gallatin	X	X	X	X	X	X	6
3) Hellroaring/Bear	X	X	X	X	X	X	6
4) Boulder/Slough	X	X	X	X	X	X	6
5) Lamar	X	X	X	X	X	X	6
6) Crandall/Sunlight	X	X	X	X	X	X	6
7) Shoshone	X	X	X	X	X	X	6
8) Pelican/Clear	X	X	X	X	X	X	6
9) Washburn	X	X		X	X	X	5
10) Firehole/Hayden	X	X	X	X	X	X	6
11) Madison	X	X	X		X	X	5
12) Henry's Lake	X	X	X	X	X	X	6
13) Plateau	X	X			X	X	4
14) Two Ocean/Lake	X	X	X	X	X	X	6
15) Thorofare	X	X	X	X	X	X	6
16) South Absaroka	X	X	X	X	X	X	6
17) Buffalo/Spread Creek	X	X	X	X	X	X	6
18) Bechler/Teton	X	X	X		X	X	5
Totals	18	18	16	15	18	18	

Figure 4. Initial sightings of unduplicated females with cubs-of-the-year in the Greater Yellowstone Ecosystem, by decade from 1975–2014 (IGBST Data).



Mortality

Background

Agencies have invested significant effort aimed at limiting human-caused deaths for grizzly bears. To date, these efforts have been very successful at limiting mortality and allowing the population to increase since it was listed in 1975.

The distribution of known and probably human-caused mortalities 1975–2014 is shown in Figure. As the population continues to expand, the percentage of known and probable mortalities occurring outside the PCA and outside the DMA is increasing however this is expected.

Monitoring Protocol

The management of human-caused mortality of grizzly bears is key to successful maintenance of the grizzly bear population in the GYE. Mortality limits are a necessary tool for managers in regulating human impacts to any wildlife population, including grizzly bears. Managing mortality is necessary to avoid the unregulated killing that occurred as the Yellowstone area was settled and to build support for long-term survival of the population. Higher numbers of mortalities can be expected in areas outside the DMA as the grizzly bear population expands, particularly in areas on the edge of the range when bears move on to private lands or in areas with higher levels of human development. Mortality management recognizes the need for some bears to be removed to address recurring conflicts to meet management needs for nuisance bears, human safety issues, etc.

The state wildlife agencies (Montana, Wyoming, and Idaho) have signed a Memorandum of Agreement setting forth how they will coordinate bear management actions and limit discretionary mortality to ensure it will not jeopardize the recovery and survival of the GYE grizzly bear population (Appendix P). This document also summarizes each state's regulatory mechanisms for regulating discretionary mortality, including harvest. The states may use

regulated harvest as a management tool when and where appropriate. All known and probable mortalities will be limited by the overall mortality limits within the DMA as described in Table 2 and Table 4.

The States' Memorandum of Agreement establishes the conduct of an annual meeting to evaluate the status of the population and develop allowable discretionary mortality by state. The Parties will confer with the NPS, the USFS, and the BLM annually and will invite representatives of both GYE National Parks, the NPS regional office, the GYE USFS Forest Supervisors, and a representative from the BLM to attend the annual meeting.

Figure 5. Distribution of known and probable mortalities, from all causes, in the Greater Yellowstone Ecosystem, by decade from 1975–2014 (IGBST Data).

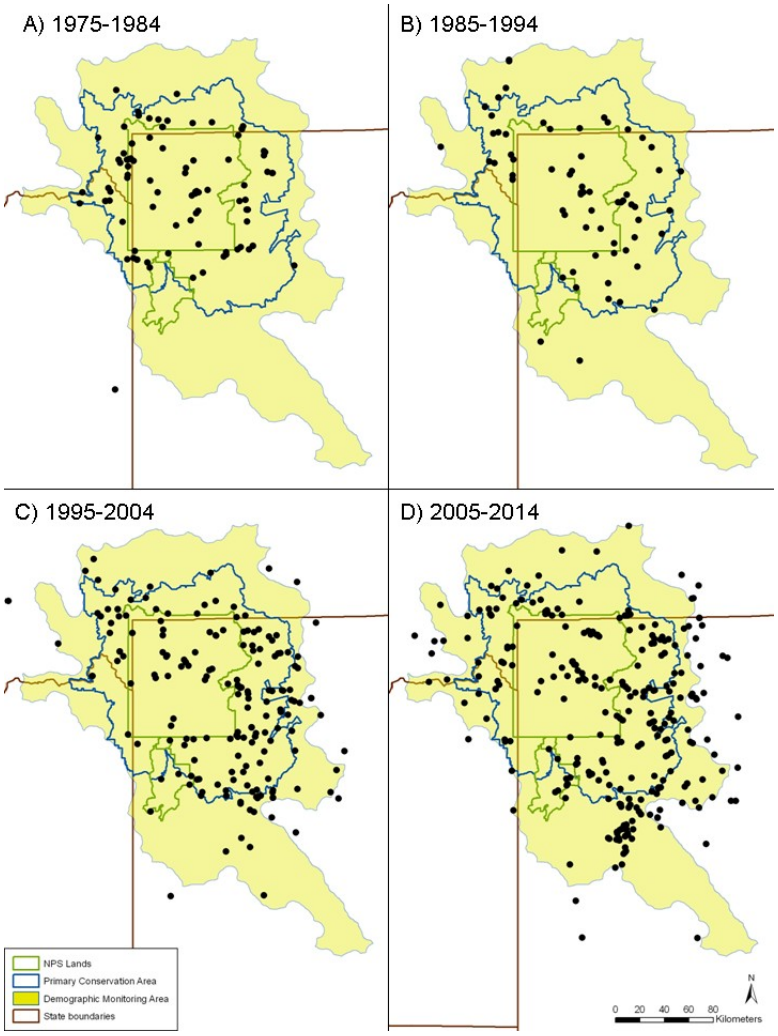


Table 4. Framework to manage mortality inside the DMA.

Management Framework	Background and Application Protocol			
1. Area within which mortality limits apply	49,928 sq km (19,279 sq mi) Demographic Monitoring Area (DMA) (Figure 1).			
2. Conservation Strategy Goal/Recovery Criteria	To ensure the continuation of a recovered grizzly bear population in accordance with the established Recovery Criteria: Criteria 1 (p. X) Criteria 2 (p. X) Criteria 3 (p. X)			
3. Population estimator	The model-averaged Chao2 population estimator will be used as the population measurement tool. An alternative method will be considered if an alternative scientifically sound method becomes available. The model-averaged Chao2 population estimate for 2002–2014 was 674 (average lower 95% CI = 600; average upper 95% CI = 747).			
4. Mortality limit setting protocol	Each fall the IGBST will annually produce a model-averaged Chao2 population estimate for the DMA. That population estimate will be used to establish the mortality limit percentages for each age/sex class for the following year as per #7, #8, and #9 (below).			
5. Allocation process for managed mortalities	Per Appendix P, the States will meet annually in the month of January to review population monitoring data supplied by IGBST and collectively establish discretionary mortality within mortality limits per age/sex class available for regulated harvest for each jurisdiction (MT, ID, WY) in the DMA, so DMA thresholds are not exceeded. If requested, the WRR will receive a portion of the available mortality limit based on the % of the WRR geographic area within the DMA. Mortalities outside the DMA are the responsibility of each State and do not count against mortality limits.			
6. State Regulatory Mechanisms specific to discretionary sport take	For specific state regulatory mechanisms, please reference the ~~three~~ Tri-s~~S~~tate ~~MOU~~ MOA found in Appendix P.			
7. Management review by the IGBST	A management review will be conducted by the IGBST every 5-10 years at the direction of the YGCC. This management review will assess if the management system is achieving the desired goal of ensuring a recovered grizzly bear population in accordance with Recovery Criteria (reference page they appear from CS). The management review is a science-based process that will be led by the IGBST (which includes all State and Federal agencies and the WRR Tribes) using all recent available scientific data to assess population numbers and trend against recovery criteria. Age/sex-specific survival and reproductive rates will also be reevaluated using the most recent data to adjust mortality levels as necessary.			
8. Mortality limit % for independent FEMALES	Pop. size	≤674	675–747	>747
	Mort. %	≤7.6%	9%	10%
9. Mortality limit % for independent MALES	Pop. size	≤674	675–747	>747
	Mort. %	15%	20%	22%
10. Mortality limit for % of dependent young	Pop. size	≤674	675–747	>747
	Mort. %	≤7.6%	9%	10%

Known and probable human-caused mortalities are defined as follows:

Known. Carcass recovered or evidence to indicate known status due to radio telemetry. Known deaths require a carcass, management removal, or a cut radio collar. Found collars having the appearance of being cut should receive additional forensic review for definitive proof.

Probable. Strong evidence to indicate mortality, reported by highly reliable sources, no carcass recovered. Probable deaths include those cases where there is supportive evidence that a bear was wounded. Circumstances of each reported instance should be considered. Probable includes those cases where evidence of blood, hair, or other tissues clearly indicates wounding serious enough to result in death. The literature is unclear on the likelihood of survival for orphaned cubs, therefore, any cub(s) orphaned during its first year of life because of a known mortality of its mother is considered a probable mortality.

Because probable mortalities will be counted against the mortality quota, and because there is a female quota, each probable mortality must be assigned a sex. Sex will be assigned in the following manner:

- Probable deaths of adult bears where cubs-of-the-year are reported present will be classified as sex = female.
- Lone bears classified as probable deaths will be assigned sex based upon statistics available from known deaths in the ecosystem. The percentage of known male and female deaths in the GYE between 1975 and 1998 is 59% and 41% respectively. These estimates exclude natural mortalities, management removals, and females with young. Therefore, sex will be assigned to probable adult mortalities in the GYE at a ratio of 59:41, male: female.
- Cubs-of-the-year that are orphaned and counted as mortalities will be assigned sex based a 50:50 sex ratio at birth (Eberhardt *et al*. 1994). For each cub, a random number will be drawn between 1 and 100. If the number is 1 through 50, the sex will be assigned as male; if the number is 51 to 100, the sex will be assigned as female.

State agencies will manage mortalities within the limits described in Table 2, Table 4, and

Appendix P, by implementing specific regulatory mechanisms in state law and regulation.

It is recognized that established mortality limits might be exceeded in any given year. Any mortality threshold will not affect the immediate management of bears for human safety concerns or for management of nuisance grizzly bears. Appendix P describes agency responsibilities and actions to reduce mortality should this occur. State plans provide for the take of nuisance bears regardless of the current mortality quota upon consultation among all involved agencies.

Mortality will be monitored by the IGBST reports from all sources. The IGBST will estimate the annual unknown and unreported mortality as per Appendix C and these mortalities will be added to the known and probably mortalities to produce a total annual mortality estimate by age and sex class. Each State wildlife agency, Tribe, and National Park will provide mortality information to the IGBST, who will update and report ongoing mortalities within the DMA to all agencies so that the states may adjust management actions under their purview if a mortality limit is approached or exceeded. The IGBST will annually summarize all mortality information as to location, type, date, sex, and age for the GYE and produce this information in their annual reports.

Mortality standards and grizzly bear vital rates will be reviewed and reported by the IGBST every 5 years. This information may be used to revise mortality management as necessary as long as any such revisions ensure a recovered population in accordance with the established Recovery Criteria and use the best available science. All management of and information on mortality management will be open to full public review.

Population Trend

Background

The population of grizzly bears was increasing at approximately 4% to 7% annually between

1983 and 2001 (Eberhardt *et al*. 1994, Boyce 1995, Boyce *et al*. 2001*b*, Harris *et al*. 2006). While there is some debate related to the actual level of increase since the bear was listed in 1975, all information, number of unduplicated females (Figure 3), distribution of reproducing females (Figure 4), distribution of bears, informal sightings by agency personnel, and areas where nuisance bears are being managed indicate this population has increased in both numbers of bears (Figure 5) and the geographic area they occupy (Schwartz *et al*. 2002).

Schwartz *et al.* (2006*b*) used data from 1983 through 2001, while the 2012 IGBST report examined a more recent time period, 2002 through 2011 (IGBST 2012). The 2012 report (IGBST 2012) reported that population growth had slowed since the previous time period, but was still stable to slightly increasing, and had not declined. Because the fates of some radio-collared bears are unknown, Schwartz *et al.* (2006*b*) and the IGBST (2012) calculated two separate estimates of population growth rate: one based on the assumption that every bear with an unknown fate had died (a conservative estimate); and the other simply removing bears with an unknown fate from the sample. The true population growth rate is assumed to be somewhere in between these two estimates because we know from 30 years of tracking grizzly bears with radio-collars that every lost collar does not indicate a dead bear. While Schwartz *et al.* (2006*b*) found the GYE grizzly bear population increased at a rate between 4.2 and 7.6 percent per year between 1983 and 2002, the IGBST (2012) found this growth had slowed and leveled off and was between 0.3 percent and 2.2 percent per year during 2002–2011.

Schwartz *et al.* (2006*b*) analyzed survivorship of cubs-of-the-year, yearlings, and independent bears based on whether they lived inside Yellowstone National Park, outside the Park but inside the Recovery Zone or Primary Conservation Area (PCA), or outside the PCA entirely. The PCA boundaries (containing 23,853 sq km (9,210 sq mi) correspond to those of the Yellowstone Recovery Zone (U.S. Fish and Wildlife Service 1993) and will replace the Recovery Zone boundary (Figure 1). They concluded that grizzly bears were approaching carrying capacity inside Yellowstone National Park. Consistent with this conclusion, the IGBST (2012) documented lower cub and yearling survival than in the previous time period. Importantly, annual survival of independent females (the most influential age-sex cohort on population trend)

remained the same while independent male survival increased (IGBST 2012). Collectively, these two studies indicate that the growth rate of the grizzly bear population inside the DMA had slowed as bear densities have approached carrying capacity, particularly in the core area of occupied range. Recent work by van Manen *et al*. (2015) confirms that population growth has slowed and the population is showing density dependent population regulation as the population occupies almost all suitable habitat in the DMA.

Monitoring Protocol

This Strategy recognizes that any one factor cannot provide the needed information to assess population size and trend. Ultimately, population assessments will require multiple sources of information.

Population trend, using the Lotka equation as calculated from adult female survivorship and reproductive rate data for the appropriate period (Eberhardt *et al*. 1994, Eberhardt and Knight 1996), will be used as supportive information to evaluate population trend. This method will be applied to the population inside the DMA.

The agencies will strive to maintain a minimum of 25 adult female grizzly bears fitted with mortality-sensing radio collars and monitored at all times. To adequately sample survival, these 25 adult females will be spatially distributed throughout the ecosystem. The target distribution of these 25 radio-collared adult females will be determined by the IGBST; the expected distribution of collared females by agency will be assigned. Each female will be monitored using aerial telemetry flights during the non-denning period. These data will be collected in conjunction with other regularly scheduled relocation flights. When a radio collar indicates that a bear may have died, a field crew will evaluate the actual status of the female and determine cause of death. The IGBST will coordinate field crew collection of mortality data on each bear.

Data to calculate reproduction and survival are collected annually in all areas occupied by grizzly bears throughout the DMA. These data sets will be maintained by the IGBST and used

periodically to evaluate population trend.

Genetic Management

The GYE supports the southernmost population of grizzly bears remaining in North America. The question of concern is whether genetic factors, now or in the future, would compromise the long-term viability of the Yellowstone grizzly bear population.

DNA analyses conducted on museum specimens by Miller and Waits (2003) indicated a slight decline in genetic variability in the Yellowstone population since the early 20th century; however, this loss of variability was less severe than previously hypothesized. Indeed, a recent study by Kamath *et al*. (2015) using recent advances in genetic analysis techniques with molecular markers (Luikart *et al*. 2010) indicated that despite isolation, genetic diversity in the contemporary population has stabilized. Kamath *et al*. (2015) found that the current rate of inbreeding in the Yellowstone grizzly bear population is very low (0.2%). Likewise, the effective population size (N_e), which reflects the number of reproducing individuals in a population, has increased from 102 to 469 during the 25-year period of 1982–2007.

This positive trend is important because N_e serves as a surrogate measure for a population's evolutionary potential and risk of inbreeding (Franklin and Frankham 1998). The most current N_e estimate of 469 (Kamath *et al.* 2015) approaches the minimum threshold criterion of 500 required for a threatened population to retain long-term evolutionary potential and maintain adequate genetic variation necessary for adaptation to environmental change as defined by Franklin (1980). It also exceeds the requisite minimum threshold ($N_e > 50$ individuals) needed to avoid risk of inbreeding (Franklin 1980), reducing concerns regarding genetic factors affecting the viability of Yellowstone grizzly bears (Kamath *et al*. 2015). In summary, Kamath *et al.* (2015) concluded that 1) genetic diversity has shown no decline over recent decades, 2) rate of inbreeding since 1985 is very low, and 3) effective population size has increased nearly 4-fold since 1982. These results collectively indicate that, at current population levels and under the current environmental conditions, genetic factors do not pose a substantial risk to the viability of

the Yellowstone grizzly bear population. Kamath *et al*. (2015; page 5517) conclude that nonetheless, the historically small N_e, relatively low diversity, and isolation over many generations suggest the grizzly population could benefit from increased fitness following the restoration of gene flow, particularly given the unpredictability of future climate and habitat changes.

The State of Montana, in their Grizzly Bear Management Plan for Southwestern Montana (Appendix I) indicates Montana's belief that, as documented from sightings, captures, and mortalities in the past decade, grizzly bears from the GYA and the NCDE are expanding their distribution and there is considerable potential for these populations to connect. Moreover, Montana states in this plan a long-term goal to allow the grizzly bear populations in southwest and western Montana to reconnect through the maintenance of non-conflict grizzly bears in areas between the ecosystems.

Management of non-conflict grizzly bears in areas between the NCDE management area and the DMA of the GYA (Figure 7 of the 2013 Grizzly Bear Management Plan for Southwestern Montana) will be compatible with maintaining some grizzly occupancy. Maintaining presence of non-conflict grizzly bears in areas between the NCDE management area and the demographic monitoring area of the GYA, such as the Tobacco Root and Highland Mountains, would likely facilitate periodic grizzly movements between the NCDE and GYA. The Montana Grizzly Bear Management Plan indicates that the state of Montana will retain a priority around conflict management and removal of problem grizzly bears in this area, similar to the rest of Montana. Human safety will always be prioritized over facilitation of grizzly movement for genetic connection between the ecosystems. However, the state of Montana has indicated that while discretionary mortality may occur here as needed, they will manage discretionary mortality in this area in order to retain the opportunity for natural movements of bears between ecosystems. Additionally, it is FWP's opinion that expanding the current level of habitat restriction and programs to bear-occupied areas outside the PCA would not generate social acceptance for the bear nor is expansion of habitat restrictions necessary for population recovery. Incorporating the grizzly as another component of FWP's ongoing programs for all wildlife is a more productive

approach. The level of social acceptance of grizzlies in historical habitat changes based on how the issues are approached, the density of the bear population and how much faith people have in wildlife managers.

Montana Fish Wildlife and Parks (FWP) anticipates that successful implementation of this plan, along with adequate local involvement, can allow this to occur, and FWP commits to continue to address land-use patterns that promote or hinder bear movement.

Genetic Monitoring Protocol

Genetic samples will be collected from all grizzly bear captures and mortalities in the GYE for analysis via cooperative efforts between the IGBST and recognized genetic experts. Genetic analyses of these samples will be conducted and evaluated for potential evidence of grizzly bears from other populations immigrating into the Yellowstone population and producing offspring. Monitoring of radio-collared grizzly bears will be used to document potential movements between other ecosystems and the GYE.

Chapter 3 Habitat Standards and Monitoring

Background

Habitat standards and monitoring protocol in this Conservation Strategy identify provisions that Federal and State land managers throughout the Greater Yellowstone Ecosystem (GYE) are committed to for habitat preservation of a recovered Yellowstone grizzly bear population. Between 1986 and the initial 2007 delisting of the Yellowstone grizzly bear population, grizzly bear habitat in the GYE was managed under standards and guidelines established by the Interagency Grizzly Bear Committee (IGBC 1986) and specified in national forest and national park management plans. Acknowledging that humans are the primary agent of grizzly bear mortalities, a principal objective of the IGBC was to improve survival rates by implementing management strategies that minimized anthropogenic influences and grizzly bear-human conflicts. IGBC measures implemented inside the Grizzly Bear Recovery Zone (GBRZ) led to improved management of garbage and food attractants, reduced sheep grazing, and restrictions on motorized access and human development. These standards and guidelines that were imposed upon public lands were instrumental in the recovery of the grizzly bear in the GYE throughout the mid-1980s and into the 1990s.

The subsequent1993 *Grizzly Bear Recovery Plan* (USFWS 1993) required the preservation and monitoring of habitat necessary to support a recovered population. This led to the development of more explicit and measureable habitat criteria to be applied inside the GBRZ, as per the *Recovery Plan Supplement: Habitat-based Recovery Criteria for the Greater Yellowstone Ecosystem* (USFWS 2007*c*). To satisfy this requirement, measureable habitat criteria were established that called for no net loss of secure habitat with respect to 1998 conditions. These criteria were embraced and incorporated into the draft Conservation Strategy and released for public comment in 2000. Analysis of public comments and new information was used to establish the final habitat standards for a recovered ~~Yellowstone~~ GYE population as identified in the 2007 Conservation Strategy (USFWS 2007*a*) and appended in a supplement to the Recovery Plan (USFWS 2007*b*). This 2016 revision of the Conservation Strategy includes some changes to

the 2007 document that help clarify habitat standards as they pertain to the 1998 baseline.

Clarifying language to the application rules has been inserted where necessary to provide better direction for application of these standards on a local project level. No substantive changes in the content of habitat standards have been made under this revision. However, some modifications in habitat monitoring protocols have been made and are documented in this chapter. Upon delisting of the Yellowstone population, the GBRZ will be referred to as the Primary Conservation Area (PCA) to reflect the shift from managing for recovery to one of conservation.

Introduction

Habitat standards apply to Federal lands inside the PCA and identify three factors that must be maintained at, or improved upon with respect to conditions existing in 1998: 1) secure habitat, 2) number and capacity of developed sites, and 3) number and acreage of active commercial livestock grazing allotments. All three of these factors are linked to human activities that affect grizzly bear mortality and displacement. These three standards apply to public lands within the PCA, the area where past recovery efforts and present habitat conservation measures are primarily focused. The PCA ~~serves as a relatively safe haven located at the core of the ecosystem and~~ accounts for approximately 41% of the ~~Yellowstone~~ GYE grizzly bear's occupied range as estimated from methods of Bjornlie *et al*. 2014 (Figure 6). The 1998 baseline for habitat standards was selected because studies showed (and recently affirmed) that the ~~Yellowstone~~ GYE grizzly bear population was increasing annually at a robust rate of 4 to 7 percent between 1983 and 2001 (Boyce *et al.* 2001*b*, Harris *et al*. 2006, 2007, IGBST 2012). Habitat conditions in 1998 were considered representative of this time period since levels of secure habitat and developed sites inside the PCA had remained relatively constant in the 10 years preceding 1998 and beyond (USDA 2004). Hence, conditions in 1998 are believed to have supported and contributed to the population growth observed during 1983–2001. Habitat standards, as they apply to the 1998 baseline, impose measureable side boards on allowed levels of human activity inside the PCA and establish a clear benchmark against which future improvements and impacts of habitat can be measured.

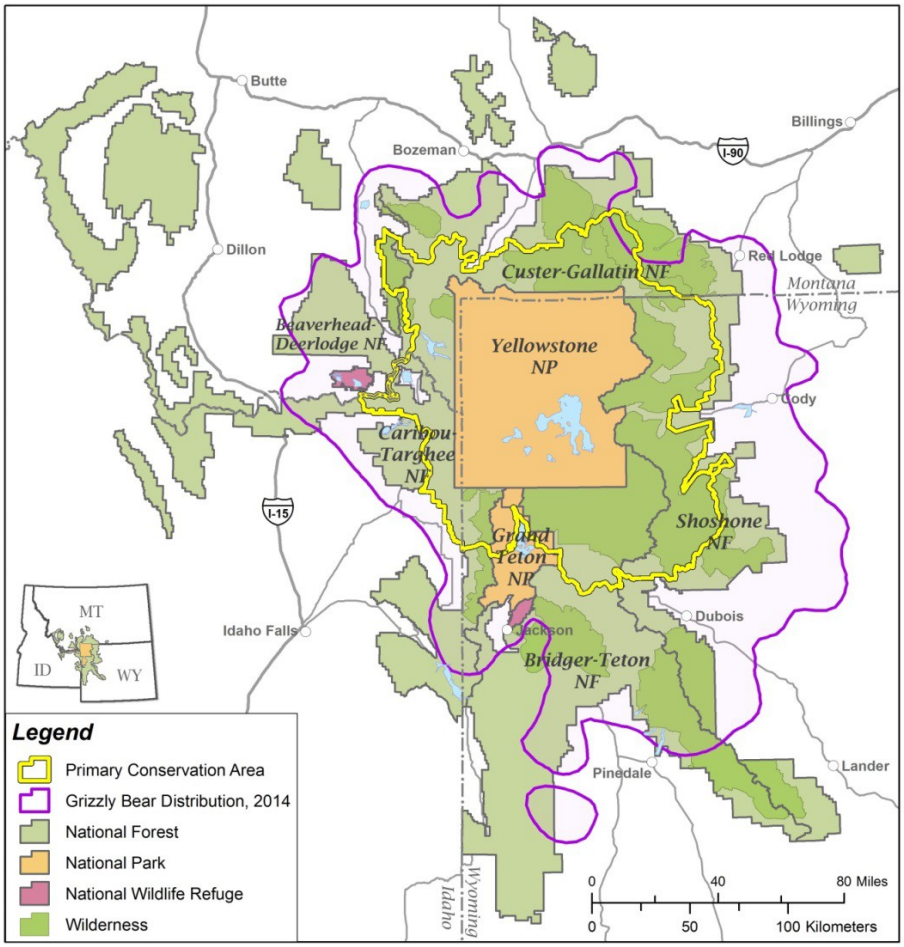
To facilitate management of habitat throughout the PCA, the area inside the PCA is divided into 18 distinct bear management units (BMUs) and 40 subunits (Figure 2). BMU boundaries were delineated to approximate the average *lifetime* range of an adult female grizzly bear in the GYE. Each BMU was further subdivided into one or more subunits comparable in size to the average *annual* home range of an adult female grizzly bear. Monitoring habitat at a subunit scale provides greater spatial resolution and proved to be better suited for analyzing habitat use patterns and ensuring good distribution of bear habitat throughout the PCA (USDA 1985). Hence, conditions pertaining to secure habitat and developed site standards are measured and compared against 1998 levels for each of the 40 bear management subunits within the PCA. To date, habitat-based criteria throughout the PCA have been successfully maintained at, or improved upon, 1998 levels for all 40 subunits. Adherence to these standards ensures that sufficient habitat for the Yellowstone grizzly bear will continue to be available into the foreseeable future. Habitat standards in this document are subject to revision based on the best available science and will be reviewed and updated as necessary.

In addition to mandatory habitat standards, several other habitat parameters will be monitored and evaluated to determine the overall condition of habitat for grizzly bears in the PCA. These additional monitoring items include ~~habitat connectivity~~transportation planning~~, hunter numbers,~~ and productivity or grizzly bear use of the following ~~four high-calorie~~ foods: 1) ~~winter-killed~~ ungulates, 2) cutthroat trout, 3) army cutworm moths, and 4) whitebark pine seeds. Information on monitoring protocols for these items is found in subsequent sections of this chapter.

Agencies responsible for management of grizzly bear habitat in the GYE are committed to continue collecting the necessary information to evaluate adherence to habitat standards and monitoring protocols throughout the PCA. The overall objective for habitat management inside the PCA is to ~~reduce human-caused grizzly bear mortalities by~~ maintain~~ing~~ or improv~~eing~~ habitat with respect to 1998 conditions while maintaining options for resource management activities at approximately the same level as existed in 1998. The habitat standards and monitoring requirements in this Conservation Strategy will be incorporated into National Forest

plans, National Park compendiums, and BLM plans.

Figure 6. Federal lands comprising the Greater Yellowstone Ecosystem (GYE), the Primary Conservation Area (PCA), and estimated Grizzly Bear Occupied Range as of 2014.



Outside the PCA, grizzly bears ~~are allowed to expand~~have expanded into adjacent areas considered biologically suitable and socially acceptable, as per direction in the State and Tribal management plans (Appendices I, J, ~~and~~ K, and O). The key to successful management of grizzly bears outside the PCA is a sustainable balance that accommodates the needs of grizzly bears along with the competing demands of human use. As such, an important management objective for areas outside the PCA is to maintain existing resource management and recreational uses and allow agencies to respond to demonstrated problems with appropriate management actions. Approximately 83 percent of suitable habitat outside the PCA occurs on federally owned land and about 82.6 percent of that suitable habitat is occupied by grizzly bears (Figure 6). A flexible management strategy is crucial for promoting acceptance and tolerance for grizzly bears as they continue to expand into suitable habitat outside the PCA. Standards and guidelines for other wildlife species identified in National Forest and Park management plans indirectly provide additional habitat management direction for bears outside the PCA.

State grizzly bear management plans for Idaho, Montana, and Wyoming recommend and encourage land management agencies to maintain or improve habitats important to grizzly bears and to monitor habitat conditions outside the PCA. These three states acknowledge the importance of secure habitat *(see* secure habitat definition below), motorized access management, and road density issues related to the survival of grizzly bears and other wildlife. Consequently, levels of secure habitat ~~and motorized route density~~ are monitored on federal lands outside the PCA ~~to identify and prevent potential habitat threats from negatively impacting the long-term viability of the Yellowstone grizzly bear population~~. Land management agencies work cooperatively with state wildlife agencies to meet identified population and habitat goals for grizzly bears in the GYE. The process of implementing state and federal grizzly bear management is coordinated by the Yellowstone Grizzly Bear Coordinating Committee (YGCC) representing all respective land management agencies in the GYE (*see* Chapter 6 Implementation and Evaluation).

Immediately upon ESA delisting of the species, regional foresters in Regions 1, 2, and 4 of the U.S. Forest Service agree to add the grizzly bear to their Sensitive Species lists for the five

National Forests in the GYE. Forest Service sensitive species direction requires that any project "*must not result in loss of species viability or create significant trends toward federal listing*" (USDA 2005). Sensitive species direction also requires the Forest Service to "*assist states in achieving their goals for conservation of endemic species*" (USDA 2005). A biological evaluation will be completed for all Forest Service projects potentially affecting the GYE grizzly bear. These evaluations will be completed for all Forest Service projects potentially affecting the grizzly bear. These evaluations will determine whether projects do or do not meet the habitat standards in this Conservation Strategy. If the biological evaluation demonstrates that a project does not meet the habitat standards as well as other relevant habitat and population criteria, the project will be modified as necessary to ensure complete adherence with all required measures.

Habitat Standards Inside the Primary Conservation Area

Human activity is the primary factor negatively impacting availability and security of grizzly bear habitat in the GYE. The relationship between bears and habitat is extremely complex and difficult to quantify. However, unfettered human activity is known to result in displacement and mortality of grizzly bears and was a significant contributing factor leading to listing the grizzly bear in the conterminous U.S. as a Threatened species in 1975. Restrictions in human activities due to management practices implemented by the IGBC in the mid-1980s correlate strongly with the steady increase in the Yellowstone grizzly bear population that was observed between 1983 and 2001. Habitat standards formalized in this document impose measurable sideboards on levels of human activity allowed on Federal lands inside the PCA, thereby reducing opportunities for grizzly bear-human conflicts, habitat disturbance, and displacement of grizzly bears from valuable habitat.

Habitat standards identified in this document address three key factors related to human activity (motorized access, site development, and commercial livestock grazing) and specifically call for no net loss in secure habitat inside the PCA from what existed in 1998 (Appendix E). Adequate secure habitat is essential to the survival and reproductive success of grizzly bears, particularly adult females.

It is the goal of habitat management agencies to maintain or improve habitat conditions throughout the PCA at or above 1998 levels, as measured per bear management subunit. These levels of secure habitat have been maintained and will continue to be maintained, and improved on where possible, ~~long into the future~~for the foreseeable future.

Potential impacts to grizzly bears and their habitat will be evaluated and mitigated using the criteria and standards in this Conservation Strategy in coordination with state wildlife agencies.

Omissions to the 1998 habitat measurements comprising the baseline (Appendix E) may be corrected for when based on new and well documented information substantiating the existence and status of anthropomorphic features (i.e., motorized routes, developed sites, or livestock allotments) that were not properly accounted for in the 1998 baseline. When verified, legitimate corrections to the baseline will be tracked and reported and will constitute new baseline habitat levels against which future change will be measured.

Application rules specific to each habitat standard provide additional direction on how these standards are to be implemented at a Federal project level. The following habitat standards and application rules apply to all Federal lands inside the PCA.

Secure Habitat Standard

The Secure Habitat Standard requires that inside the PCA, the percentage of secure habitat within each bear management subunit must be maintained at or above levels that existed in 1998 (Appendix E). The sole exception to the 1998 secure habitat baseline applies to the three subunits identified in the 2007 Conservation strategy as in need of improvement above 1998 levels (Gallatin #3, Henrys Lake #2, and Madison #2). These three subunits must be maintained at or above levels attained from the full implementation of the 2006 Gallatin National Forest Travel Management Plan (Appendix E). Authorized Federal projects that result in temporary or permanent changes to secure habitat must follow the Application Rules identified below.

Secure habitat is defined as any contiguous area ≥ 10 acres in size and more than 500 m from an open or gated motorized access route (road or trail) or recurring low level helicopter line during the non-denning period (March 1 – November 30). Gated routes that are closed year-round to public motorized use but remain accessible to administrative personnel are still considered motorized access routes, and hence, detract from secure grizzly bear habitat. There are activities allowed in secure habitat (*see below*) that do not violate standards or count as motorized access routes. Decommissioned routes that are permanently and effectively closed to the public and administrative staff do not count against this standard. Lakes larger than 1.6 sq km (1 sq mi) in spatial extent are excluded from secure habitat calculations.

Application Rules for Permanent Changes in Secure Habitat

Permanent changes to secure habitat are allowed inside the PCA when associated with an authorized Federal project involving construction of new motorized routes (i.e., roads or trails), reconstruction of existing motorized routes, or opening of a previously decommissioned route if, and only if, the following conditions are met:

- Any loss in secure habitat below baseline levels is replaced by restoring secure habitat of equivalent quality and quantity (e.g., through decommissioning) in the same bear management subunit. Habitat quality must be assessed based on the best collective scientific understanding of grizzly bear habitat ecology and the rationale for all mitigation measures must be fully documented.
- Replacement habitat must be in place before project implementation or concurrent with project development as an integral part of the project plan. Replacement habitat must remain in place for a minimum of 10 years before it can be subsequently replaced and mitigated for per application rules (this duration is based ~~up~~on the generation time ~~for~~ of a female grizzly bear, or the time it takes to replace herself in the population).
- For those subunits identified as in need of improvement above 1998 levels (*Gallatin #3, Madison #2,* and *Henry's Lake #2*), secure habitat will be maintained at or above levels associated with full implementation of the 2006 Gallatin National Forest Travel

Management Plan (*see* Appendix E).

- For activities based on statutory rights, such as access to private lands under the *Alaska National Interest Lands Conservation* (ANILCA) or the *1872 General Mining Law*, where permanent reductions in secure habitat cannot be replaced within the affected subunit, then secure habitat will be compensated at a commensurate level at or above the baseline in the nearest possible subunit. In these rare situations, subsequent changes to secure habitat in the two affected subunits constitute permanent changes to the baseline.
- Honor existing oil and gas or other mineral leases. Proposed *Applications for Permit to Drill* (APDs) and operating plans within those leases would strive to meet the application rules for changes to secure habitat. New leases, APDs, and operating plans must meet the secure habitat and developed site standards.
- Motorized routes on private land that post-date 1998 are not counted against this standard. However, for motorized roads or trails acquired through land exchanges or acquisition that are desirable to maintain for public use, mitigation is strongly recommended.

Application Rules for Temporary Changes in Secure Habitat

Temporary reductions in secure habitat below baseline levels inside the PCA are allowed when associated with authorized Federal projects. Project activities should be concentrated in space and time to minimize disturbance**.** The following conditions must be met for temporary projects:

- Only one project affecting secure habitat may be active within a given bear management subunit at any one time.
- Total acreage of secure habitat affected within a given BMU does not exceed 1 percent of the acreage in the largest subunit within that BMU. The acreage of a project that counts against the 1 percent limit (i.e., the amount of secure habitat affected) is measured as the acreage within the 500-meter buffer around any temporary motorized access route or low-level helicopter flight line that intrudes into existing secure habitat.
- Use of project roads will be limited to administrative purposes associated with project activities. Project implementation shall not reduce secure habitat below baseline levels

for more than 4 consecutive years. The collective set of project roads that affect secure habitat below baseline levels shall be closed to all motorized travel after 3 years. Project roads shall be decommissioned such that secure habitat is restored within 1 year after road closure.

Activities Allowed in Secure Habitat

The following activities are allowed in secure habitat inside the PCA without violating the standard:

- Activities that do not require route construction or reconstruction, re-opening of a permanently closed road, or recurring low-level helicopter flight lines.
- Helicopter use for short term (no more than 2 days in the duration of a project), or at higher elevations (> 500 m above ground level with no landing). Aircraft used in emergency firefighting are allowed.
- Non-wheeled, over-the-snow use (i.e., snow machines) is allowed unless new research identifies a concern. Conflicts associated with winter-use activities that develop either during denning or after den emergence in the spring can be addressed with local area restrictions.
- Access to power lines and/or utility corridors for occasional and necessary maintenance service that does not require new route construction and is used only for administrative purposes related to power line/utility maintenance.
- Project activities (e.g., temporary road construction and maintenance, or use of recurring low-level helicopter flights) that occur during the grizzly bear denning season between December 1 and February 28.

Developed Site Standard

The Developed Site Standard requires that on Federal lands inside the PCA, the number and capacity for human use of developed sites must be maintained at or below the 1998 levels (Appendix E). Projects that propose a change in the number or capacity of developed sites must

follow the Application Rules specified below.

Developed sites refer to those sites or facilities on public land with features intended to accommodate administrative needs and public recreational use. Such sites typically are identified or advertised via visitor maps, information displays, or administrative personnel as discernable destination sites promoted by the agency. Developed sites are often associated with human activities that may disrupt grizzly bear use of habitat, or have attractants that potentially lead to increased human-bear conflicts. Examples of developed sites include, but are not limited to: campgrounds, picnic areas, trailheads, boat launches, rental cabins, summer homes, lodges, service stations, restaurants, visitor centers, and administrative sites. **Administrative sites** are those sites or facilities constructed for use primarily by government employees to facilitate the administrations and management of public lands. Administrative sites are counted towards developed sites. Examples include: administrative headquarters, ranger stations, patrol cabins, park entrances, federal employee housing, and other facilities supporting government operations. **Dispersed sites**, in contrast to developed or administrative sites, are those not associated with a developed site, such as a front-country campground. These sites are typically characterized as having no permanent agency-constructed features, have minimal to no site modifications, and may include primitive road access. Dispersed sites are not counted toward developed sites.

Application Rules ~~for Developed Sites~~

On Federal lands inside the PCA, changes to developed sites or construction of new developed sites are allowed if the following conditions are met:

- Construction of new sites will be mitigated for within that subunit to offset any increase in the number of developed sites and/or capacity for human use, habitat loss, and increased access to surrounding habitats.
- Mitigation of detrimental impacts will occur within the affected subunit and adequately compensate for the type and extent of impacts. Mitigation measures will be in place before implementation of the project or included as an integral part of completion of the project.

- Consolidation and/or elimination of dispersed campsites is considered adequate mitigation for increases in human capacity at developed campgrounds if the new campsite capacity is less than or equivalent to that of the dispersed camping eliminated and if future overnight use of the dispersed site(s) is definitively curtailed.
- Conversion of uncontrolled dispersed campsites to a minor day-use site is allowed if there is a net benefit to both human and bear safety and if the dispersed site(s) can be modified in such a way that future over-night use of the site is definitively curtailed. Such modification of site-use would not contribute to an increase in baseline developed sites.
- Expansion (in capacity and acreage) of existing administrative sites is exempt from mitigation if such developments are deemed necessary for enhancement of public land management and other viable alternatives are not available. Temporary construction of work camps for highway construction or other major maintenance projects are exempt from human capacity mitigation if other viable alternatives are not available. Food storage structures and management must be in place and all other factors resulting in potential detrimental impacts to grizzly bears will be mitigated as identified for other developed sites.
- Modifications to existing developed sites that reduce resource damage, detrimental environmental impacts, and/or the potential for grizzly bear conflicts are allowed (e.g., installing a vaulted toilet to avoid damage to water resources or installing bear-resistant storage structures to reduce conflict).
- Modifications to dispersed campsites that reduce resource damage, detrimental environmental impacts, and/or the potential for grizzly bear conflicts are allowed (e.g., installing bear-resistant storage structures and limiting parking expansion). Such modifications do not require mitigations as long as they are not permanent or irretreviable.
- For activities based in statutory rights (e.g., *1872 General Mining Law, Americans with Disability Act*, ANILCA, etc.), if the number of developed sites exceeds the 1998 baseline, the Forest Service will, to the fullest extent of its regulatory authority, reduce developed sites to commensurate levels and mitigate to offset any increases in human capacity, habitat loss, and increased access to surrounding habitat within the affected subunit if possible. In those rare cases

where mitigation cannot be accomplished within that subunit, commensurate compensation will be accomplished in the nearest subunit and changes in the two affected subunits become permanent changes to the baseline.

- Honor existing oil and gas and other mineral leases. For proposed *Applications for Permit to Drill* (APDs) and operating plans within those leases, the Forest Service should, to the fullest extent of their regulatory authority, strive to meet the developed site standard and satisfy application rules for changes in secure habitat. New leases, APDs, and operating plans must meet the developed site standard and satisfy application rules for changes in secure habitat.
- Developments on private land are not counted against this standard. However, for developed sites acquired through land exchanges or acquisitions that are desirable to maintain, mitigation is strongly encouraged but not required. The rationale behind this is to encourage acquisition and transformation of private land to public ownership since this negates the potential for future development and results in better management for grizzly bears.

Livestock Allotment Standard

The Livestock Allotment Standard requires that on Federal lands inside the PCA, there will be no increase in the number or acreage of active commercial livestock grazing allotments nor an increase in permitted sheep Animal Months (AMs) relative to that which existed in1998 (see Appendix E). Existing sheep allotments will be monitored, evaluated, and phased out as the opportunity arises with willing permittees.

Application Rules

Grazing allotments tracked for purposes of grizzly bear conservation include both vacant and active commercial livestock units for sheep, cattle, and/or horses on Federal lands inside the PCA. **Active** allotments are livestock units with active grazing permits. **Vacant** allotments are those without an active permit, but which may be restocked or grazed periodically by other permittees at the discretion of the land management agency to resolve resource issues or other

concerns. Changes in livestock allotments inside the PCA that satisfy the allotment standard may occur if the following conditions are met:

- A vacant allotment may be reissued an active permit resulting in an increase in the number of permitted cattle, but the number and net acreage of active allotments inside the PCA must not exceed the 1998 baseline. Appropriate analysis by the action agency must be conducted to evaluate impacts on grizzly bears.
- Combining or dividing existing allotments is allowed as long as the net acreage and number of active allotments does not exceed 1998 levels.
- Where chronic grizzly bear conflicts occur on livestock allotments inside the PCA, and an opportunity exists with a willing permittee, alternatives for resolving conflicts may include authorization of a non-use permit, moving livestock to a vacant allotment where there is less likelihood of conflict, or cattle grazing can be phased out on that allotment.

Habitat Monitoring

The primary objective of habitat monitoring is to track and assess the status of grizzly bear habitat throughout the ecosystem with an emphasis placed on habitat inside the PCA. Monitoring requirements presented in this section focus on evaluation of adherence to habitat standards identified such that secure habitat, developed sites, and commercial livestock grazing allotments are maintained at, or improved upon, 1998 levels. However, additional habitat parameters pertaining to four high-calorie foods of the grizzly bear diet are also monitored to assist in evaluating the status of grizzly bear habitat and its ability to support a recovered grizzly bear population.

Monitoring Secure Habitat and Motorized Access Route Density

Background

Humans are the primary agent influencing grizzly bear mortality and population trajectories in the GYE and elsewhere (McLellan and Shackleton 1988, Mattson and Knight 1991, Mace *et al*.

1996, Schwartz *et al*. 2010, Proctor *et al*. 2012). Motorized access has historically been used as a surrogate measure of human presence on the landscape, and consequently serves as the basis for differentiating secure and non-secure habitat throughout the ecosystem. Land managers throughout the GYE recognize that availability of secure habitat is crucial to the survival and long-term reproductive success of grizzly bears. Managing the landscape to reduce grizzly bear mortality risk requires that motorized roads and trails be considered when evaluating and maintaining secure habitat throughout the ecosystem.

Motorized access parameters, including: 1) percent secure habitat, 2) open motorized access route density (OMARD), and 3) total motorized access route density (TMARD), are measured and monitored against levels that existed in 1998. To date, no net decrease in secure habitat relative to 1998 levels has occurred on federal lands in any of the 40 bear management subunits within the PCA. Instead, reductions in motorized access implemented post-1998 have led to an increase of 1.4 percent in secure habitat inside the PCA; a gain approximate in size to the area of Yellowstone Lake.

Subunits with potential for improvement

Several subunits, Gallatin #3, Henrys Lake #2, and Madison #2, were targeted in the 2007 Conservation Strategy as needing improvement in secure habitat with respect to 1998 levels. The specific areas with potential for improvement identified in these three subunits fall within the Gallatin National Forest boundary and consequently, the quantity and timing of improvements was to be determined by the Gallatin National Forest Travel Management Plan (TMP). With implementation of the 2006 Gallatin TMP, many roads inherited from these exchanges have been permanently decommissioned. Non-system routes that are not maintained by the Forest Service have subsequently been closed, with a high priority given to road decommissions in the three subunits identified as in need of improvement. With full implementation of the Gallatin Travel Plan near completion, measureable increases in secure habitat with respect to 1998 baseline levels (Appendix E) and reductions in motorized route density have been realized in the three targeted subunits. The Gallatin National forest determine, via a Travel Plan Amendment, that all

gains in secure habitat resulting from full implementation of the TMP will effectively constitute new baseline levels for these three subunits. If and when approved, elevated secure levels for these three subunits will serve as a new measure against which future change will be made.

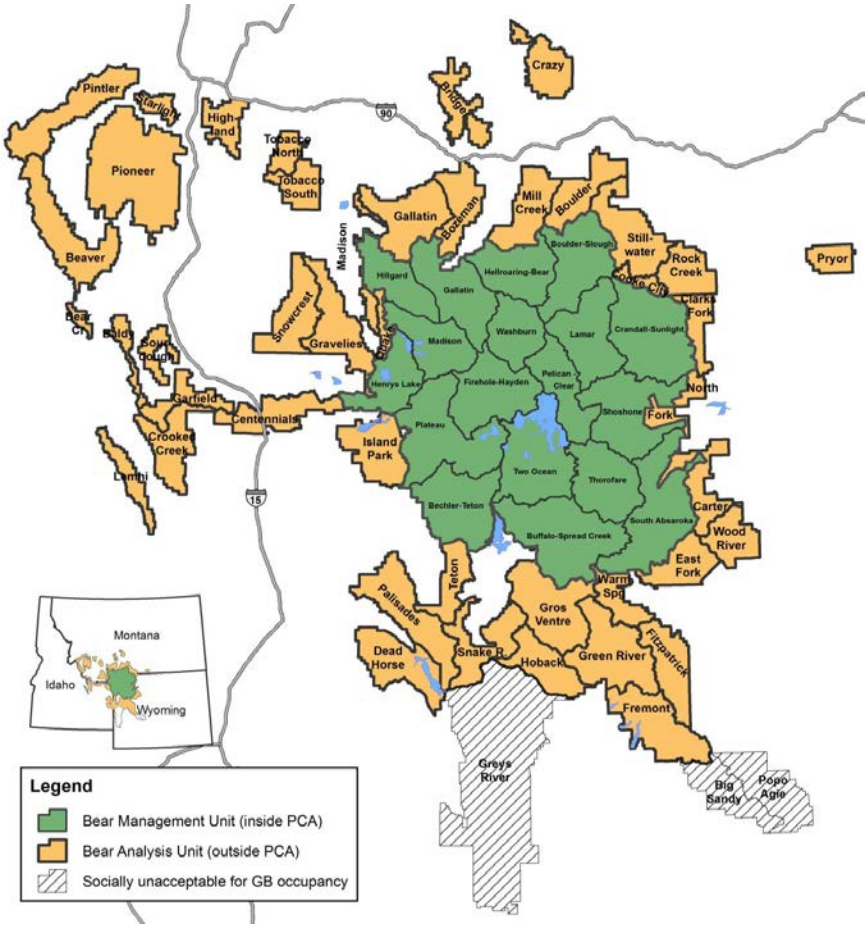
Monitoring Protocol

Secure habitat and motorized route density are monitored inside the PCA ~~and tracked throughout the ecosystem~~ to verify compliance with secure habitat standards ~~inside the PCA and to assist in balancing grizzly bear security and survival with human land use concerns outside the PCA~~. Motorized access parameters that are monitored and reported include levels of 1) secure habitat, 2) open motorized access route density (OMARD) greater than 1.6 km/sq km (1 mi/sq mi)), and 3) total motorized access route density (TMARD) greater than 3.2 km/sq km (2 mi/sq mi). Inside the PCA, these three parameters are measured and reported annually for each bear management subunit. Outside the PCA, secure habitat is measured and reported biennially (even numbered years) for each bear analysis unit (BAU, see Figure 7). Changes in configuration and status of motorized routes are submitted each year to the Grizzly Bear Habitat Database Coordinator by representatives from each National Forest and National Park in the ecosystem. Status and configuration of motorized access routes are inventoried and tracked by the Database Coordinator. This insures that reported measurements are based on the most current available information. Percent secure habitat, OMARD, and TMARD are calculated using the Motorized Access Model as described in Appendix E.

Secure habitat, as defined earlier, refers to those areas ≥ 10 acres in size and more than 500 m from an open or gated motorized route. Lakes greater than 1.6 sq km (1 sq mi) are excluded from secure habitat calculations. **OMARD** is a measure of the density of motorized routes that are open to the public for one or more days during the non-denning portion of the year when grizzly bears are active (March 1-November 30). **TMARD** measure the density of all motorized routes open to the public and/or administrative personnel for one or more days during the non-denning season. Roads that are closed year-round to the public but open to administrative personnel detract from secure habitat and count toward TMARD, but do not contribute to

OMARD. Motorized routes that have been permanently decommissioned such that there is no motorized use by either the public or administrative staff, do not contribute to OMARD or TMARD, and do not detract from secure habitat. For a more detailed discussion of OMARD and TMARD, as well as changes in monitoring protocol, please refer to Appendix E. Measurements are reported annually (inside the PCA) and biennially (outside the PCA) in the IGBST Annual Report~~, *Yellowstone Grizzly Bear Investigations* ~~ and are posted online for public access at the IGBST website (http://nrmsc.usgs.gov/products/IGBST).

Figure 7. Bear management units and subunits inside the Primary Conservation Area (PCA) and bear analysis units outside the PCA.



Monitoring Developed Sites

Background

Levels of human development on the landscape have been shown to be an important predictor of grizzly bear mortality in the GYE (Schwartz et al. 2010). Developed sites increase the spatial and temporal extent of human presence on the landscape and contribute to the displacement and mortality of grizzly bears. A significant concern related to developed sites is the increased potential for grizzly bear-human conflicts attributable to food conditioning and habituation. Past attempts at modeling grizzly bear mortality in the GYE have focused on levels of overnight human use as a primary factor related to grizzly bear mortality. Increased numbers of people using an area and potentially interacting with grizzly bears is an important issue in evaluating impacts of developed sites on grizzly bear survival.

Monitoring Protocol

Changes in developed sites on public lands inside the PCA are measured, tracked, and evaluated against 1998 levels (Appendix E). Information pertaining to changes in the number of developed sites inside the PCA is submitted annually to the Grizzly Bear Habitat Database Coordinator by representatives from each National Forest and National Park Ecosystem. Current and baseline numbers of developed sites are inventoried in a GIS database and reported annually in the IGBST Annual Report ~~*Yellowstone Grizzly Bear Investigations*~~.

Monitoring Livestock Grazing

Background

Conflicts between livestock and grizzly bears have historically led to the relocation or removal of grizzly bears in the GYE. Grizzly bears tend to prey on cattle and sheep regardless of the abundance of natural foods because livestock in occupied grizzly bear territory represent one of

many foraging opportunities (Gunther *et al*. 2004). Most grizzly bear-livestock conflicts tend to occur outside the PCA since all commercial allotments on National Park lands and many allotments on National Forest lands inside the PCA have been permanently closed. Consequently, monitoring grizzly bear-livestock conflicts on public lands is not limited to inside the PCA, but is conducted annually throughout the entire ecosystem. Currently, approximately 59 percent of the Yellowstone grizzly bear's occupied range falls outside the PCA. As commercial livestock grazing persists in areas where grizzly bears live, the number of conflicts will most likely continue to pose a challenge to grizzly bear managers. This is particularly true on domestic sheep allotments. Financial incentives offered through non-governmental organizations (NGOs) have proven to be a successful mechanism for retiring sheep grazing allotments on public land when willing participants were available (Gunther *et al*. 2004). These types of opportunistic partnerships between federal agencies, NGOs, and willing permittees may be considered an alternative for resolving chronic conflicts on grazing allotments within prime grizzly bear habitat.

Monitoring Protocol

On federal lands inside the PCA, the number and acreage of commercial livestock grazing allotments and the number of sheep animal months (AMs) is monitored and reported annually relative to 1998 levels. Inside and outside the PCA, grizzly bear conflicts associated with grazing of commercial livestock on federal lands is monitored and reported annually. Commercial livestock grazing and conflict information is submitted for publication in the IGBST Aannual Rreport~~, *Yellowstone Grizzly Bear Investigations*~~.

Monitoring ~~High Caloric~~Grizzly Bear Foods

Background

Grizzly bears are opportunistic omnivores who have evolved highly versatile foraging strategies allowing them to shift diets among numerous food sources, depending on what is available

spatially and temporally (Schwartz *et al*. 2003, 2013). The IGBST will continue to monitor four high-calorie foods, ~~Long-term management and conservation of grizzly bears in the GYE call for monitoring of four high-calorie foods. These four food types~~ listed by dry weight kilocalories per gram (kcal/g) include: 1) army cutworm moths (7.91 kcal/g), 2) ~~winter-killed~~ ungulates (6.80 kcal/g), 3) cutthroat trout (6.10 kcal/g), and 4) whitebark pine seeds (3.99 kcal/g). These four foods have varying distributions in the ecosystem and are subject to annual fluctuations and therefore do not necessarily serve as a major dietary component of every grizzly bear in the GYE. Natural annual fluctuations in abundance and distribution of these four calorie-rich foods make it very challenging to establish reliable thresholds. However, these four high-calorie foods are known to exert a positive influence on grizzly bear fecundity and survival and constitute some of the highest sources of digestible energy available to grizzly bears in the GYE (Mealey 1975, Servheen *et al*. 1986, Pritchard and Robbins 1990, Mattson *et al*. 1992, Haroldson *et al*. 2006, Schwartz *et al.* 2006).

Gunther *et al.* (2014*a*) exhaustively documented the diet of the GYE grizzly bears to include over 266 distinct plant and animal species ranging from grasses, fungi, berries and seeds, to fish and carrion. The trophic flexibility of grizzly bears, as documented by the variety of foods they consume, allow them to opportunistically forage across diverse habitats spanning the entire GYE. Their highly varied diet serves as an adaptive mechanism that enhances their ability to persist when faced with rapid and long-term changes in availability and abundance of any one food source. Compositional analysis of scats collected over a 37-year period (1943 to 2009) showed that grizzly bears within the GYE most frequently feed on foods that are consistently available and widely distributed, such as grasses, sedges, and ants (Gunther *et al.* 2014*a*). However, when opportunity arises, grizzly bears will shift their diet to maximize body mass gain by selecting calorie-rich foods such as ungulates, fish, whitebark pine seeds, clover, moths, and small mammals.

Human-induced environmental change, such as introduced organisms, habitat loss, climate change, and other anthropogenic factors, has the potential to affect availability and distribution of these calorie-rich foods in the future. However, despite a substantial decline of whitebark

pine and natural stochasticity of other food resources within the GYE, grizzly bears have shown notable resilience by adjusting habitat use (Costello *et al.* 2014) and shifting diets to maintain body mass and condition (Schwartz *et al.* 2014, Ebinger et al. 2016). In a comprehensive synthesis study conducted by the IGBST, findings did not indicate a strong dependence of GYE grizzly bears on whitebark pine seeds but rather, where and when available, the inclusion of this food as a component of a diverse and dynamic diet (IGBST 2013). Monitoring foods comprising such a diverse diet is challenging, which is why efforts have focused on four foods with relatively high energetic value and for which abundance (or use by bears) is relatively easey to measure: ~~Because of their high caloric value and use by grizzly bears,~~ whitebark pine, ungulates, cutthroat trout, and army cutworm moths ~~are currently monitored either directly or indirectly on an annual basis~~.

Monitoring Protocol

To monitor these four high-caloric foods and their importance to grizzly bears, the IGBST will survey and report on ~~each of~~ these foods and their availability (or use by bears) ~~groups~~ annually ~~d~~ per detailed ~~food~~ monitoring protocols identified in Appendix D, as budgetary constraints allow. IGBST scientists will analyze the relationship between abundance and availability of these four food types with the number of grizzly bear-human conflicts, grizzly bear management actions, known and probable grizzly bear mortalities, and changes in the distribution and trend of the GYE grizzly bear population. Results of these analyses will be presented, when available, in the annual reports prepared by the IGBST and relevant peer-reviewed publications. If detectable declines in certain foods occur and the IGBST concludes these declines are related to biologically significant changes in demographic parameters, the IGBST shall report these findings for consideration by the GYCC (*see* Chapter 6, Implementation and Evaluation, for details on this process). Annually monitoring results of whitebark pine, ungulates, cutthroat trout, and army cutworm moths, when available, are to be reported in the IGBST Annual Report.

~~Monitoring protocols of high-caloric foods identified in this Conservation Strategy will continue as long as budgets allow.~~ Monitoring and surveying methods may be modified when necessary

to incorporate new technological advances in monitoring techniques or new knowledge of bear foraging and habitat use within the GYE. For example, variation in body condition among bears is strongly associated with available food and provides insight into seasonal nutrition of individual bears, as well as different sex and age classes. Body condition may be derived through bioelectrical impedance analysis (BIA), which allows for direct estimation of fat content of captured grizzly bears (Farley and Robbins 1994). The IGBST collects this information on captured bears when feasible, but sample sizes are small and inference for some analyses (e.g., fall season analyses) is limited. An alternative method to BIA to measure body condition is the estimation of storage energy using measurements of mass and body length. Results of any investigations of alternative approaches will be reported by the IGBST in annual reports and peer-reviewed publications. ~~Existing monitoring programs may be expanded, as budget allows, to include occupied habitat beyond the PCA and areas predicted for future use by bears. Monitoring results of whitebark pine, winter-killed ungulates, cutthroat trout, and army cutworm moths, when available, are to be reported in the annual IGBST publication *Yellowstone Grizzly Bear Investigations*.~~

~~*Winter-killed*~~ *Ungulates*



Background—The GYE harbors one of the most carnivorous grizzly bear populations inhabiting the North American interior (Jacoby et al. 1999, Mowat and Heard 2006). Isotopic nitrogen ($\delta^{15}N$) levels measured in 221 grizzly bear hair samples collected between 2000 and 2010 indicate that on average, terrestrial meat accounted for 44.4% of the assimilated diet of Yellowstone grizzly bears (Schwartz et al. 2014). In contrast, in Glacier National Park and adjacent national forest lands, meat accounts for a smaller proportion of the grizzly bear diet; using stable isotope analysis for a small sample of grizzly bears, Jacoby et al. (1999) found that meat accounted for only 33%, 0%, and 6% of adult male, adult female and subadult diets, respectively. ~~Protein and fat from ungulate carcasses ranks as the second-highest food source of gross caloric value available to grizzly bears in the GYE (Gunther et al. 2014a, b).~~ Winter-killed ungulates, primarily elk and bison, historically provided

an important source of protein to bears, especially during early spring before most plant foods become available. Transects were historically surveyed each spring to estimate availability of winter-killed ungulates. However, the survey desing does not allow estimation of the amount of biomass available (Cherry 2006). Additionally, ungulate herd distribution has shifted as a result of the reintroduction of wolves, and it is unclear how much of the biomass was consumed by wolves before bears emerge from their dens. As an alternative to carcasses as a spring food, grizzly bears also consume earthworms, ants, and pocket gophers. Grizzly bears continue to opportunistically forage for animal matter and scavenge carrion throughout the active season and will seek out gut piles and other remains left by ungulate hunters in the fall (Haroldson et al. 2004).

Monitoring Protocol— ~~Relative abundance of ungulate carrion is often monitored by correlating the number of carcasses available to grizzly bears and other scavengers during the spring with measures of snow-water equivalency (depth, density, and moisture content) in snowpack (Podruzny *et al.* 2012). Availability of carrion for grizzly bears is potentially affected by increased competition from recently reintroduced wolves and changes in elk and bison management practices. For these and other reasons historic carcass transects will continue to be surveyed as long as budgetary allocations permit. There are currently 30 spring ungulate carcass survey routes in Yellowstone National Park (YNP) and 12 transect routes on Yellowstone's Northern Range in the Gallatin National Forest. Current survey methods and ungulate carcass survey routes may be redesigned or modified when appropriate.~~ Annual estimates of ungulate herds, both bison and elk, have been made since XXXX by the National Park Service and the States of Idaho, Montana, and Wyoming and will continue into the foreseeable future. These estimates occur by unit and provide a measure of availability and distribution across the landscape occupied by grizzly bears. When available~~, monitoring results of winter-killed ungulate carcass availability~~ ungulate herd estimates will be summarized and reported annually in the IGBST Annual Report~~publication *Yellowstone Grizzly Bear Investigations*~~.

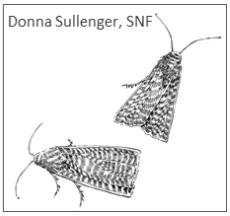
Cutthroat Trout



Background—Due to their high digestibility and protein and lipid content, spawning cutthroat trout are one of the highest sources of digestible energy available to bears ~~in~~ with home ranges in close proximity of Yellowstone Lake and its tributaries (Mealey 1975, Pritchard and Robbins 1990, Gunther et al. 2014a). Grizzly bears were once known to prey on cutthroat trout in at least 36 different streams tributary to Yellowstone Lake (Hoskins 1975, Reinhart and Mattson 1990). Haroldson et al. (2005) estimated that approximately 68 grizzly bears per year frequented and likely fished ten Yellowstone Lake spawning streams tributaries monitored during 1997-2000. Introduction of non-native lake trout (*Salvelinus namaycush*) and effects of drought and whirling disease (*Myxobolus cerebralis*) has led to a decline in native cutthroat trout populations and an associated decline in number of bears visiting spawning streams (Teisberg et al. 2014).

Monitoring Protocol—The Yellowstone Lake cutthroat trout population is monitored most years in the spring, depending on weather and spring snow melt, using stream surveys, ~~large mesh gillnets,~~ weirs with fish traps, and occasionally electronic fish counters. An electronic sonar fish counter was installed and calibrated in 2013 along Clear Creek on the east side of Yellowstone Lake to facilitate annual counting of spawning cutthroat trout ascending Clear Creek. Visual stream surveys are also conducted most years to identify trends in the number of cutthroat trout spawning Yellowstone Lake tributaries. ~~Visual surveys to measure the presence of cutthroat trout and rainbow hybrids are also typically conducted at the Trout Lake inlet creek.~~ Yellowstone NP biologists provide an annual summary of cutthroat trout monitoring results ~~to the IGBST~~ for publication in the IGBST Annual Report ~~*Yellowstone Grizzly Bear Investigations*~~. Current survey methods may be modified or redesigned as appropriate.

Moth Aggregation Sites

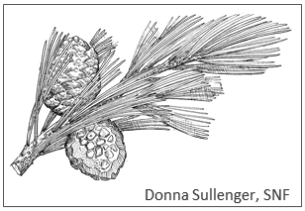


Background—Alpine moth aggregations are a calorie-dense and nutrient- rich food source found at remote, high-elevation alpine sites dominated by talus and scree slopes in the eastern half of the

ecosystem. Knowledge regarding the intricate relationship between army cutworm moths and grizzly bears has improved substantially since the late 1980s when grizzly bear use of moth aggregation sites was first discovered and such sites were included in observation flights (Bjornlie and Haroldson 2014). When available, moths are a valuable source of nutrition for grizzly bears because they have the highest reported gross caloric content per gram of any food available to grizzly bears in the GYE (7.91 kcal/g; Gunther et al. 2014a). Some bears may feed almost exclusively on moths for a period of over one month (French et al. 1994). A grizzly bear feeding extensively on moths over a 30-day period can consume 47%, or close to half, of its annual energy budget of 960,000 calories (White 1996). Grizzly bears whose home ranges include moth aggregation sites often visit these talus slopes during mid-to-late summer and early fall to accumulate fat reserves in preparation for the winter denning season. Although grizzly bear use of moth sites does not vary widely over time (1993 is one notable exception; low bear use due to late, extensive snow cover), annual monitoring provides important data regarding this high-calorie resource.

Monitoring Protocol—As of 2013, 37 confirmed and 16 possible moth sites have been identified in the GYE. However, size, location and moth abundance of sites fluctuate from year to year due to natural variation in environmental factors, such as snow cover (Bjornlie and Haroldson 2014). Aerial observations of bears feeding at moth sites are made from fixed-wing aircraft as part of on-going radio tracking and observation flights conducted by the IGBST. Although this monitoring protocol does not provide direct information regarding the abundance of moths, grizzly bear use of aggregation sites can provide an indirect measure of the relative abundance of this resource in a given year. Aerial surveys of all confirmed moth sites will be conducted annually and results will be summarized and presented in the ~~annual~~ IGBST Annual ~~r~~Report ~~Yellowstone Grizzly Bear Investigations~~.

Whitebark Pine Cone Production


Donna Sullenger, SNF

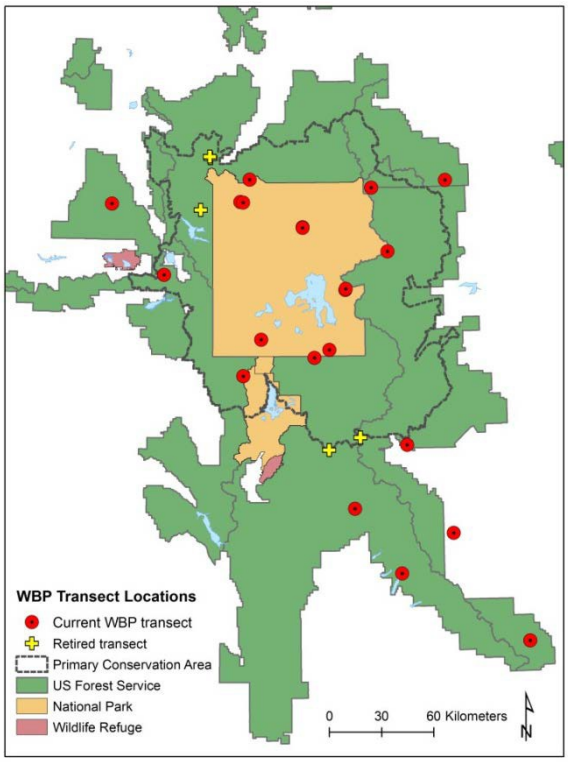
Background—Due to their high fat content and potential abundance, whitebark pine seeds are an important fall food for

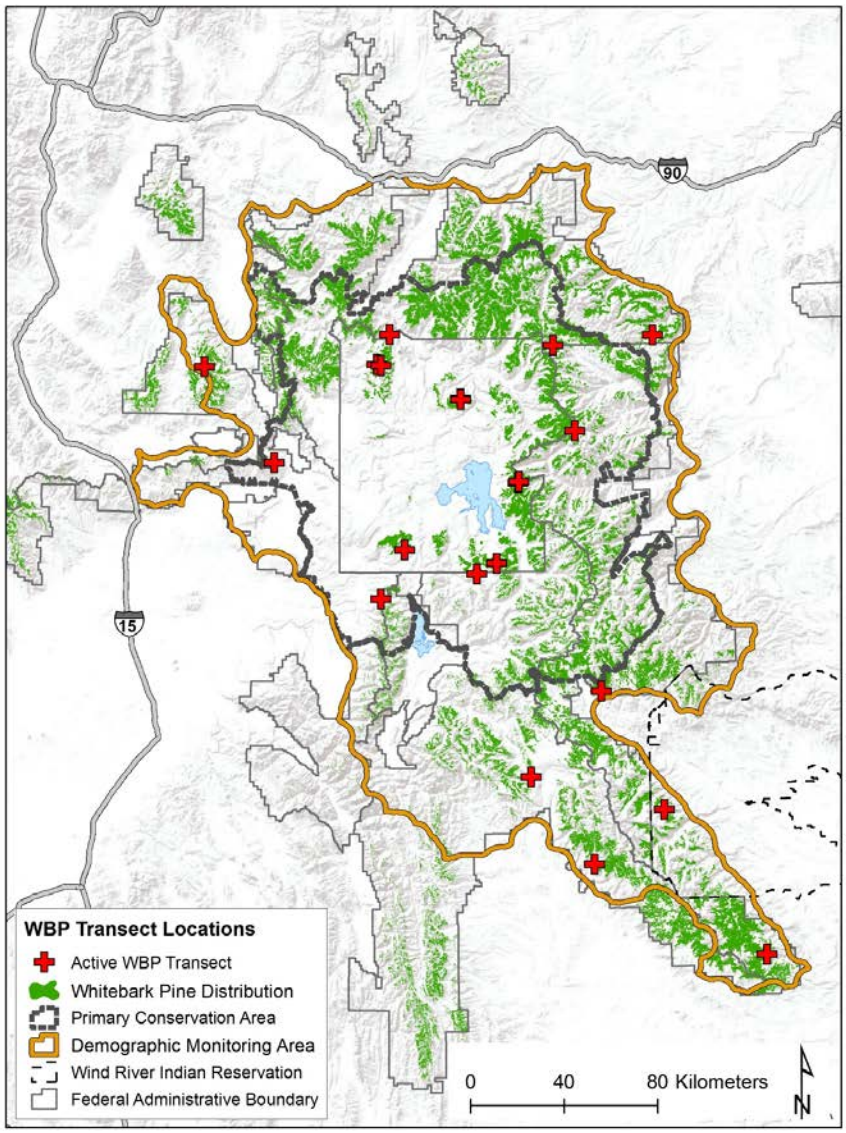
bears in the GYE (Mattson and Jonkel 1990). Yellowstone grizzly bears consume whitebark pine seeds extensively when whitebark cones are available. Bears may feed almost exclusively on whitebark pine seeds when production exceeds 22 cones per tree (Mattson et al. 1992). Because whitebark pine is a masting species, availability varies substantially from year to year. ~~During fall seasons of low whitebark pine seed availability, grizzly bears often seek alternate foods at lower elevations, leading to more frequent bear conflicts and human-caused grizzly bear mortalities (Mattson et al. 1992, Knight and Blanchard 1994, Gunther et al. 1997, Haroldson et al. 2006). Conversely, when whitebark pine nuts are abundant, there are generally very few grizzly bear-human conflicts during the fall season (Mattson et al. 1992, Gunther et al. 1997).~~ Studies have shown that during poor whitebark pine years grizzly bears selected less for whitebark pine stands (Costello et al. 2014) and consumed more animal matter, boosting their fat levels to match those measured in years of high cone production (Schwartz et al. 2014).

Although whitebark pine has experienced widespread declines in the GYE (see subsequent section), extensive studies by the IGBST showed no profound negative effects on grizzly bears at the individual or population level (IGBST 2013). In addition, Costello et al. (2014) reported that approximately one-third of Yellowstone grizzly bears in their study included little or no whitebark pine stands within their fall range.

Monitoring Protocol—Currently there are 21 whitebark pine cone production transects (Figure 8) within the GYE. Transects will maintain a representative sample of whitebark pine cone production and distribution (Figure 8). Annual transect surveys are typically conducted between July 15 and August 15 to count cones after maturation but before cones and seeds have been collected by red squirrels (*Tamiasciurus hudsonicus*) and Clark's nutcrackers (*Nucifraga columbiana*). The presence or absence of blister rust and beetle infestations as well as activity levels of grizzly bear, black bear, red squirrel, and Clark's nutcracker are also recorded during transect surveys. Monitoring of whitebark pine cone production using current or modified methods will continue under this Conservation Strategy and results will be summarized and reported in the IGBST Annual Report ~~publication *Yellowstone Grizzly Bear Investigations*~~.

Figure 8. Distribution of whitebark pine and ~~L~~location of whitebark pine cone production transect sites in the GYE, 2014.




WBP Transect Locations
Active WBP Transect
Whitebark Pine Distribution
Primary Conservation Area
Demographic Monitoring Area
Wind River Indian Reservation
Federal Administrative Boundary
0
40
80 Kilometers
N
90
15

~~Monitoring~~ Mountain Pine Beetle Infestation and White Pine Blister Rust Infection

Background—Since the early 2000s, whitebark pine has declined significantly throughout much of the species' historic range in the Northern Rockies due to the spread of mountain pine beetle (*Dendroctonus ponderosae*) and white pine blister rust (*Cronartium ribicola*). The greatest levels of whitebark mortality resulted from mountain pine beetle, a native insect that typically attacks large, mature trees with inner bark thick enough to support larvae (Larson 2011). Beetle infestations tend to occur episodically every 20-40 years resulting in high, widespread mortality across coniferous forests. The most recent outbreak began in the early 2000s and impacted millions of hectares in the Rocky Mountains (Raffa *et al.* 2008). The infestation was exacerbated by warmer winters at higher elevations allowing for increased brood development and survival of adult beetles, and greater opportunity for reproduction (Bentz *et al.* 1991, Perkins and Roberts 2003, Larson 2011, Dooley 2012).

White pine blister rust, an exotic invasive pathogen introduced to North America in 1910, affects whitebark pines of all age classes, although seedlings and saplings are especially susceptible to infection. This exotic fungal pathogen infects the cambium of whitebark pine and other five-needle pines, causing reproductive failure and tree mortality (McKinney *et al.* 2009, Bockino and Tinker 2012). However, some individual whitebark pines carry genetic traits that make them more resistant to the disease. Restoration programs launched by the Forest Service use a technique described by Mahalovich *et al.* (2006) to breed and plant rust-resistant whitebark pines as part of an on-going effort to restore and maintain the species in the GYE.

In 2000, under the auspices of the Greater Yellowstone Coordinating Committee (GYCC), the Whitebark Pine Subcommittee (WBPSC) was created and tasked with forging a comprehensive long-term strategy for monitoring whitebark pine throughout the ecosystem. Recognizing the persistent and pervasive threat that blister rust and pine beetle posed to the health of whitebark pine, the subcommittee reached out to other agency and non-governmental partners to avoid duplication of efforts. The result of these alliances is the Greater Yellowstone Whitebark Pine

Monitoring Working Group (GYWPMWG), which consists of partners from the National Park Service (NPS), U.S. Forest Service (USFS), U.S. Geological Survey (USGS), and Montana State University (MSU). Led by the NPS Greater Yellowstone Inventory and Monitoring Network (GRYN), a strategic and peer-reviewed monitoring protocol was established for detecting, tracking, assessing, and reporting the health, status, and trends of whitebark pine throughout the GYE (GYWPMWG 2011). This ground-based monitoring program was initiated in 2004 and will continue to assess the current status and long-term trends of whitebark pine into the foreseeable future.

Monitoring Protocol—Spearheaded by the GRYN, an interagency collaborative monitoring effort involving NPS, USFS, and USGS partners will measure the status and trends of whitebark pine throughout the GYE. Monitoring efforts will focus on collecting critical baseline information for assessing 1) infection rates and severity of white pine blister rust; 2) survival of whitebark pine, taking into account synergistic interactions of blister rust, mountain pine beetle, wildland fire, and other agents of change; and 3) recruitment of whitebark pine trees into cone-bearing age classes. Monitoring protocols will follow methods and procedures established in the *Interagency Whitebark Pine Monitoring Protocol for the Greater Yellowstone Ecosystem* (GYWPMWG 2011). Results of current whitebark pine status and trends will be made available at the GRYN Inventory and Monitoring website and referenced in the ~~annual~~ IGBST Annual Report ~~monitoring report *Yellowstone Grizzly Bear Investigations*~~.

~~Hunter Numbers~~

~~Background~~

~~The number of elk hunters in Wyoming, Idaho, and Montana who recreate in the PCA (Table 5) were estimated and compared with known and probable grizzly bear mortalities from 2005 to 2014 to determine if bear mortality is correlated with hunter numbers. Although total hunter numbers have declined over this time period, the data showed little evidence of a relationship between hunter numbers and hunting-related human-caused grizzly bear mortality (van Manen~~

2015, *in litt.*).

The greatest source of grizzly bear (≥2 years old) mortality during 2004–2014 in the GYE has been due to interactions with hunters. Nearly all known and probable bear mortalities occur as surprise encounters, at big game carcasses, or at hunter camps. The number of mistaken identity kills (i.e., mistaken for black bear) are small. Although the number of hunters using the PCA have decreased, the number of grizzly bear known and probable mortalities due to interactions with hunters increased in the last decade, primarily outside the PCA (Figure 5, Chapter 2). Potential explanations for why this occurred include bears learning to seek hunter-killed game, an increase in population size and concurrent expansion of occupied range, and greater use of ungulate resources (Haroldson *et al*. 2004, Schwartz *et al*. 2010, IGBST 2013).

Table 5. Estimated numbers of elk hunters within the GYE grizzly bear recovery zone plus a 10-mile perimeter in Idaho, Montana, and Wyoming, 2005–2014.

	Year								
State	20052006	2007	2008	2009	2010	2011	2012	2013	2014
Idaho[a] Montana[c]	12,36512,211	12,635	12,470	12,382	12,334	12,269	10,936	NA[b]	11,925
Wyoming[a,d]	9,8889,346	8,716	8,792	8,440	6,712	6,413	7,566	7,818	8,109
Total	25,87224,573	23,943	23,025	22,641	20,950	20,542	20,305	NA	22,805

[a] Idaho and Wyoming numbers include archery and gun hunters.

[b] NA = hunter number estimates not currently available.

[c] Gun-only season.

[d] A percentage of total hunter numbers was used in hunt areas 61 to 63, 67, 68, 73, and 83 because a portion of the hunt area falls outside the designated area.

~~State and federal wildlife agencies have attempted to reduce the loss of bears to hunters by expanding information and education programs. "Living in Bear Country" workshops are conducted regularly in many GYE communities, and licensed outfitters and guides have increased training for their members and clients.~~

~~*Monitoring Protocol*~~

~~Data from state wildlife agencies on big game herd units or hunting districts will be used as an index to backcountry use during the hunting season. Hunter use levels combined with numbers of grizzly bear-human conflicts will be used to identify when and where to increase public education efforts and develop appropriate management actions to minimize grizzly bear-human conflicts that result in bear mortality.~~

~~**Monitoring Habitat Connectivity**~~**Transportation Planning**

Background

Habitat connectivity is the degree to which the landscape promotes natural movement of wildlife as they seek important resources for survival and successful procreation. Potential effects of highway improvements, such as increased motorized access, higher traffic volume, and higher speed limits, are known to increase grizzly bear mortality, reduce habitat connectivity, and potentially inhibit gene flow among nearby populations (Mace 2004, Summerfield *et al.* 2004, Proctor *et al.* 2012). Certain road designs and road improvements potentially discourage bear crossings, may lead to increased mortality from vehicle collisions, and may cause habitat fragmentation. The potential impact of highways on demographic and genetic connectivity of grizzly bears in the GYE is a key consideration in the transportation planning process.

Monitoring Protocol

To prevent habitat fragmentation and loss of connectivity within the GYE, existing road survey information will be compiled and evaluated by the appropriate land management agency as an integral part of the planning stage of any proposed road improvement and/or construction project in suitable grizzly bear habitat within the GYE (both inside and outside the PCA). During the NEPA analysis stage of such projects, analyses of road survey information will be conducted to evaluate potential impacts of the project on grizzly bear habitat connectivity. More specifically, federal agencies will identify important crossing areas by collecting and/or assessing existing information about known grizzly bear sightings, ungulate road mortalities, locations of game trails, and bear home ranges and habitat use within and near the road corridor. By identifying crossing areas used by grizzly bears, federal officials can recommend mitigation measures to reduce potential impacts from road construction both during and after a project. For example, during construction, work camps should be placed in areas with lower risk of displacing grizzly bears and use of bear-proof food and garbage storage containers should be implemented. Highway planners are encouraged to place warning signs at points of high mortality risk and implement wildlife crossing infrastructure such as culverts or underpasses to enhance safe passage. Road construction in areas of relatively high value for potential grizzly bear habitat linkage should be designed to mitigate potential negative impacts on habitat connectivity, including the consideration of installing crossing structures.

Chapter 4 Management and Monitoring of Grizzly Bear-Human Conflicts

Introduction

~~Humans and g~~Grizzly bears occasionally come into conflict with humans and livestock ~~in areas~~ where they encounter one another. ~~The~~ One objective of the signatory agencies to the Conservation Strategy ~~nuisance management~~ is to minimize grizzly bear ~~human~~ conflicts with humans and livestock. In the Greater Yellowstone Ecosystem, ~~nuisance~~ conflict bear management is essential to successful grizzly bear conservation and is often necessary to prevent property damage, livestock losses, and human injury or death.

~~Grizzly bears cannot be totally protected. Like other species, grizzly bears develop individual traits, and some of those traits are not compatible with coexistence with humans. Management emphasis will shift from protecting every individual grizzly bear in the population to assessing an individual's importance to the entire population before instituting management actions. Females will continue to receive a higher level of protection than males.~~

Management of ~~nuisance~~ conflict bears requires rapid responses by state and federal agencies to address conflict situations. ~~This a~~Agency responses will address the sources of the conflict through public education, removal of attractants, ~~or~~ aversive conditioning, hazing, or preventive sanitation of human use areas. Agencies will also capture, relocate, or ~~destroy repeat offender~~remove conflict grizzly bears when necessary ~~and when other options have been exhausted~~.

~~Analysis of grizzly bear-human incidents indicates that most property damage incidents are the result of bears attempting to gain access to garbage, human foods, livestock or pet foods, or other human-related foods in areas of human presence.~~ Conflict bears often result from bears seeking and finding human related foods and garbage, pets, pet foods, bird feeders, and livestock. Occasionally, bears damage buildings, vehicles, tents, and campers to access food and garbage. ~~will prey on domestic swine, fowl, or goats, or will damage apiaries. They have rarely injured horses.~~

Although aggression toward~~s~~ people and human injury or death is~~are~~ rare, bears will occasionally harm people. Incidents of injury are usually the result of a surprise encounter, protection of cubs, defense of a food cache, ~~harassment,~~ or when bears have become accustomed to obtaining food from humans.

~~The m~~Management of grizzly bear-human conflicts is based upon the existing laws and authorities of ~~the~~ state, tribal, and federal ~~land management~~ agencies as detailed in Chapter 7. ~~Management of nuisance bears usually falls into one or more of the following categories~~ Strategies to respond to conflict bears usually falls into one or more of the following categories:

- Removing or securing the attractant and providing education to modify human behavior/practices that contributed to the conflict,
- Deterring the bear from the site through the use of aversive conditioning or hazing techniques,
- ~~Capturing and relocating the nuisance bear~~Relocation of the conflict bear, and/or
- ~~Removing the bear from the wild~~Removal of the conflict bear, including lethal control.

Definitions:

- ~~**Unnatural aggression** by a grizzly bear is defined as behavior that includes active predation on humans, approaching humans or human use areas, such as camps, in an aggressive way, or aggressive behavior when the bear is unprovoked by self-defense, defense of cubs, defense of foods, or in a surprise encounter.~~
- **Grizzly bear-human conflicts** are incidents in ~~which~~ where bears kill or injure ~~people~~humans or livestock, damage property, ~~kill or injure livestock~~obtain anthropogenic foods, ~~damage beehives, obtain anthropogenic foods,~~ or damage or obtain garden and orchard fruits, ~~and~~ vegetables, or beehives.
- ~~**Natural aggression** by a grizzly bear is defined as defense of young, food, during a surprise encounter, or self-defense.~~
- A bear is classified as **food conditioned** when it has received a significant food reward of human foods such as garbage, camp food, pet food, or processed livestock food, and ~~persistently~~ seeks these foods.
- A bear is classified as **habituated** when it does not display avoidance behavior around humans or in human use areas such as camps or town sites ~~or within 100 meters of open roads~~.
- **Relocation** is the capture and movement by management authorities of a bear involved in a grizzly bear-human ~~conflict with humans or human-related foods, to a remote area~~

~~away from the conflict site, usually after fitting the bear with a radio collar~~to a pre-approved release site.

- **Repeat offense** is the involvement of a bear that has been previously relocated in a ~~nuisance~~ conflict situation or, if not relocated, is a bear that continues to repeat a behavior that constitutes a grizzly bear-human conflict.
- **Removal** is the capture and lethal removal or placement of a bear in an authorized public zoological or research facility~~ or destruction of that bear~~. ~~Removal can also involve killing the bear through active measures in the wild when it is not otherwise possible to capture the bear.~~
- **Management authorities** are the designated representatives of the agencies in the GYE including: Yellowstone National Park; Grand Teton National Park (GTNP); Wyoming Game and Fish Department; Montana Fish, Wildlife & Parks; Idaho Department of Fish and Game; ~~Interagency Grizzly Bear Study Team; each of the GYE national forests –~~ Custer-Gallatin, Shoshone, Bridger-Teton, Caribou-Targhee, and Beaverhead-Deerlodge National Forests; the BLM; and USDA Wildlife Services. These authorities will employ one or more of the four agencies listed above to manage conflict.~~make the decision to classify a bear as nuisance inside the GYE in compliance with the nuisance bear criteria (discussed below)~~. Outside Yellowstone and Grand Teton National Parks and the John D. Rockefeller Parkway (JDRP), ~~within the PCA, subsequent~~ management actions will be coordinated and completed by state wildlife agencies that have responsibility for management actions~~, after coordination with other appropriate agencies. Nuisance grizzly bear conflict management is under the authority of the states, who will have primary responsibility for the management action.~~ When ~~nuisance~~ conflict bears are in YNP~~, or~~ GTNP, or JDRP, decisions will be made by park representatives~~,~~ and coordinated with state and Forest Service representatives when necessary, e.g., for bear relocations. Management of ~~nuisance~~ conflict bears outside the PCA and outside National Parklands will be conducted as described in~~ the~~ state and tribal grizzly bear management plans~~ or appropriate park management plans~~.

Management of ~~nuisance~~ conflict grizzly bears in the ~~Greater Yellowstone Ecosystem~~GYE will

vary depending on whether they are inside or outside the PCA, or inside National Parklands. This system will provide increased security for grizzly bears inside the PCA and inside National Parklands, as bears will be given greater consideration in most conflicts inside the PCA and inside National Parklands. ~~Minimization of grizzly bear-human conflicts and management of individual nuisance bears is the primary direction for management within the PCA.~~

In circumstances that result in a ~~nuisance~~ conflict bear situation outside the PCA and the National Parklands, more consideration will be given to existing human uses. Outside YNP, GTNP, JDPR, and the PCR, tribal plans on tribal lands or state management plans will govern how conflict grizzly bears are handled. Site-specific conflict areas within and outside the PCA and National Parks will be documented routinely and prioritized to focus proactive management actions to minimize grizzly bear--human conflicts and address existing and potential human activities that may cause future conflicts. ~~Past conflict management has demonstrated that grizzly bears can coexist with most human activities.~~

All grizzly bear conflicts that occur ~~O~~outside the PCA and National Parklands will be managed in according to guidelines in each of the tribal and state management plans (Appendices I, J, K, and O). ~~, state management plans will govern how nuisance grizzly bears are handled. Site-specific conflict areas within and outside the PCA will be documented routinely and prioritized to focus proactive management actions to minimize grizzly bear-human conflicts and address existing and potential human activities that may cause future conflicts.~~ The following ~~nuisance~~ conflict grizzly bear standards apply only to the PCA and National Parklands. ~~All nuisance grizzly bear conflicts that occur outside the PCA will be managed according to guidelines in each of the state management plans (Appendices I, J, and K).~~

~~Nuisance~~ Conflict Bear Standards

~~The focus and intent of nuisance grizzly bear management~~Conflict grizzly bear management is focused on appropriate responses and strategies to address and prevent grizzly bear-human conflicts inside and outside the PCA. ~~are predicated on strategies and actions to prevent grizzly~~

~~bear-human conflicts.~~ It is recognized that active management aimed at individual ~~nuisance~~ conflict bears will be required in both areas.

Management actions ~~outside the PCA~~ will be implemented according to state, federal, and tribal management plans in coordination with landowners and land management agencies. These actions will be compatible with grizzly bear population management objectives for each state ~~for the areas outside the PCA~~and agency.

General Criteria

Location, cause of incident, severity of incident, history of bear, health/age/sex of bear, and demographic characteristics of animals involved will all be considered in any relocation or~~f~~ removal. Removal of ~~nuisance~~ conflict bears will be carefully considered and ~~consistent with~~counted against the mortality limits for the GYE as described in the Conservation Strategy. Recognizing that conservation of female bears is essential to maintenance of a grizzly bear population, removal of ~~nuisance~~ conflict females will be minimized.

Within the Primary Conservation Area

Within the PCA, but outside of YNP, GTNP, and JDRP, management of ~~nuisance~~ conflict bears will be addressed according to the following standards:

- Bears displaying food conditioning and/or habituation may be ~~either~~ relocated or removed based on specific details of the incident. State wildlife agencies~~, following consultation with other appropriate management authorities, and national parks~~ will make this judgment after considering the cause, location, and severity of the incident or incidents.
- Bears may be relocated when and as many times as judged prudent by ~~management authorities~~the state wildlife agency. ~~No bear may be removed for any offense, other than unnatural aggression, without at least one relocation unless representatives of affected agencies document the reason in writing.~~ All relocations outside the PCA and National

Parklands will be governed by state management plans.

Within the PCA, management of conflict bears will be addressed according to the following standards:

- ~~Bears may be preemptively moved when they are in areas where they are likely to come into conflicts with site-specific human activities, but only as a last resort. Such preemptive moves will not count against the bear as nuisance moves.~~
- ~~Bears preying on lawfully present livestock (cows, domestic sheep, horses, goats, llamas, etc.) on public lands will be managed according to the following criteria: No grizzly bear involved in livestock depredations inside the PCA shall be removed unless it has been relocated at least one time and continues to cause livestock depredations.~~
- ~~Before any removal, except in cases of human safety, management authorities will consult by telephone or in person to judge the adequacy of the reason for removal.~~
- ~~Bears displaying natural aggression are not to be removed, even if the aggression results in human injury or death, unless it is the judgment of management authorities that the particular circumstances warrant removal.~~
- ~~Bears displaying unnatural aggression will be removed from the population.~~
- ~~Decisions will be based on criteria for relocation and removal inside the PCA for management of nuisance bears in the Conservation Strategy and best biological judgment of authorities.~~
- ~~Authorized~~ National Park Service authorities will implement trapping, removals, and relocations within YNP, ~~and~~ GTNP, and JDRP.
- ~~Authorized~~ Outside National Parklands, state wildlife agencies shall coordinate with and notify the appropriate land management agency when trapping and/or relocating conflict bears. ~~or tribal authorities outside YNP and GTNP will implement other removals and relocations~~.
- State and tribal wildlife agencies in coordination with the appropriate federal agency~~ies~~ will predetermine adequate and available sites for relocations outside YNP, GTNP, and the JDRP. Relocation sites should be agreed upon before the need for relocation occurs. ~~In order to deal with problem bears more efficiently, managers should have full access~~

~~to relocation sites without having to conduct individual consultation for each relocation.~~

~~o Livestock damage prevention and compensation are addressed in individual state management plans.~~

~~• Management of nuisance bear situations will emphasize removal of the human cause of the conflict, when possible, or management and education actions to limit such conflicts. Relocation and removal of grizzly bears may occur if the above actions are not successful.~~

Specific Criteria for Removals

Captured grizzly bears identified for removal may be given to public research institutions or public zoological parks for appropriate non-release educational or scientific purposes as per regulations of states and national parks. Grizzly bears not suitable for release, research, or educational purposes will be removed as described in appropriate state management plans or in compliance with national park rules and regulations.

Outside of Nn~~n~~ational Pp~~p~~arks, ~~individual nuisance~~conflict bears deemed appropriate for removal may be taken by a legal hunter in compliance with rules and regulations promulgated by the appropriate state wildlife agency commission, as long as such taking is in compliance with existing state and federal laws.~~,~~ The removal will be counted against the ~~and as long as~~ mortality limits specified for the GYE as described in this Conservation Strategy ~~are not exceeded~~. This could include licensed hunters or property owners or their agents who have obtained appropriate permits from the state. Licensed hunters will be allowed to possess bear parts for bears that are legally harvested under a state permit.

Monitoring Protocol

All ~~nuisance~~ conflict bear ~~control~~ management actions~~, and grizzly bear-human and grizzly bear-livestock conflicts~~ will be summarized annually in the Annual Report of the IGBST. ~~Most conflicts are due to availability of human foods, human developments, or livestock depredations~~

~~in occupied grizzly bear habitat.~~ This report will detail the cause and location of each conflict and management action and display an annual spatial distribution of conflicts that can be used by managers to identify where problems occur and to compare trends in locations, sources, land ownership, and types of conflicts.

Chapter 5 Information and Education

Introduction

The future of the Yellowstone grizzly bear lies in our ability to learn to coexist with the grizzly bear and to accept this animal as a cohabitant of the land. Historically, excessive human-caused mortality and loss of habitat are the major factors in grizzly bear population decline. Addressing the source of grizzly bear-human conflicts is critical to an effective public outreach plan. Public attitudes in large part determine the success of efforts to manage a recovered grizzly bear population in the Greater Yellowstone Ecosystem. For the good of the bear and to develop positive public attitudes, a coordinated information and education campaign is essential.

The purposes of the information and education aspects of this cooperative effort are to support the development, implementation, and dissemination of a coordinated information and education program. This program should be understandable and useful for the people who visit, live, work, and recreate in bear habitat to minimize grizzly bear-human conflicts and to provide for the safety of people while building support for viable bear populations.

Other management strategies outlined in this plan are unlikely to succeed without useful, state-of-the-art public information and education programs. A partnership information and education approach involving state and federal agencies, tribes, local communities, and private interests can result in minimizing grizzly bear-human conflicts while building support for bears and bear management.

Successful long-term community involvement in future grizzly bear management efforts requires continued use of current effective methods and tools that have contributed to the success story of the recovered population we have today. In addition, to meet the needs of an ever-growing human population and expanding bear population, it will be necessary to develop new processes and outreach tools to further enhance public involvement and appreciation of the grizzly bear and monitor social behavior and attitudes. Through close monitoring, we will be able to gauge our

success in reaching our diverse public and in minimizing grizzly bear-human conflicts, adjusting programs as needed.

Successful public education and involvement should result in the understanding that it is acceptable and expected human behavior to practice good stewardship, and this will in turn allow us to live with the grizzly bear as part of our valued wildlife resources.

The Information and Education Team

The information and education effort will continue to be coordinated between all agencies and private interests to ensure timely, accurate, and consistent messages to the public. The current information and education (I & E) working group within the Greater Yellowstone Ecosystem will continue. Members of this I & E Team include public affairs personnel from Forest Service Regions 1, 2, and 4; Grand Teton and Yellowstone National Parks; the BLM; representatives from each state wildlife agency; and the information and education specialist from the IGBC. This team will continue to work with all affected interests to ensure consistency of information, efficient funding strategies, identifying and targeting audiences, developing partnerships, and identifying new tools for implementation.

A coordinated information and education campaign will be most effective if it facilitates changing inappropriate human behaviors and helps people learn to coexist with bears. The benefits of grizzly bear management for a multitude of resources and species, including elk habitat management, black bear management, and water quality, recreation, and aesthetic values of access management, will be included in the information and education efforts. Long-term community engagement in grizzly bear issues is necessary to increase the awareness of bear behavior and biology and how these can be compatible with human needs and activities. Identification of sources of grizzly bear-human conflicts and the use of public education as a tool are essential. The responsibilities of the I & E Team include the following:

- Develop a coordinated information and education campaign to cultivate an appreciation of the value of the grizzly bear resource in this area. The grizzly bear will be presented as

a valuable wildlife resource, while still acknowledging the risks associated with them in publications and educational outreach.

- Continue and expand living-with-bears workshops or outreach with a similar message for citizens and teachers within the Greater Yellowstone Ecosystem. Similar seminars for other specific target groups such as hunters and other backcountry recreationists will be used as appropriate.
- Local citizen involvement groups and processes will be used to facilitate information exchange and identify other community interests regarding the grizzly bear.
- Updates and information will be provided to all affected interests through various media including news releases and mailings, television, etc.
- State and federal volunteer programs will be encouraged to identify and provide an opportunity for public participation in grizzly bear information outreach and management. This could include trailhead demonstrations on bear resistant containers, distribution of brochures, school education programs, etc.
- Proactive and preventative safety messages will be expanded.
- Citizens will be encouraged to participate in land management decisions at the project level on state and federal lands affecting grizzly bear habitat and management.
- Citizens will also be encouraged to be involved in private land issues associated with grizzly bear management. This may include sanitation ordinances, conservation easements, developing private land management plans, and supporting informational outreach campaigns to private landowners.
- Knowledge about bears and acceptance of grizzly bears by people and groups that live, work, and recreate in grizzly bear country are key to the long-term conservation of a healthy grizzly bear population. Continuing specific outreach messages and techniques tailored to the needs of these groups is essential. Some of these groups include landowners, mining industry, timber industry, firewood gatherers, ranchers, outfitters, anglers, hunters, front country visitors, backcountry visitors, summer home owners, local business owners, developers, county planners, and school children.

Finally, information made available to the public will be open and responsive to public concerns.

Open discussions with the public will increase credibility of the grizzly bear management program.

These efforts will be reviewed periodically and program adjustments will be made as necessary. In addition, efforts will be expanded as the bear population expands and additional efforts will be needed in areas that could become occupied in the near future.

Many brochures, videos, signs, articles, etc. are currently available and in use. Examples of these specific information and education tools are discussed in the state management plans.

Chapter 6 Implementation and Evaluation

Implementation

A new committee will replace the Yellowstone Ecosystem Subcommittee. The new committee, the Yellowstone Grizzly Bear Coordinating Committee (YGCC), is the body that will coordinate management and promote the exchange of information about the Yellowstone grizzly bear population. The YGCC will inform the IGBC about the Yellowstone grizzly bear population for the benefit of grizzly bear conservation and management.

The Yellowstone Grizzly Bear Coordinating Committee

Within 30 days of a final rule delisting the Greater Yellowstone Ecosystem grizzly bear population, the signatories of this Conservation Strategy will name their agency representatives to the YGCC. The three local government representatives will remain the same as on the YES committee. The person who was chairperson of the Yellowstone Ecosystem Subcommittee when the final rule changing status is published will call the first meeting of the GYCC. At this first meeting, the YGCC will elect a chairperson. At their first meeting the committee will develop and adopt, by a super-majority vote of the members present, a set of by-laws that will set forth rules and procedures used by the committee to make decisions and conduct business. At a minimu, by-laws will include: Future elections of chairmen or other officers and committee chairs as deemed appropriate, intervals of chairmen service, frequency of meetings, requirements for voting (in person versus attendance by proxy or by phone/video), definition of a quorum, the processes to make changes to the Conservation Strategy, threshold for changes that require re-signing of the Conservation Strategy, required vote to make changes (majority vs. super-majorty, and process to change by-laws. ~~Chairpersons will be elected at intervals determined by the members of the YGCC. The YGCC will meet at least two times each year; public notification of these meetings will be made by the chairperson or her/his representatives. The YGCC will strive for consensus, but when consensus cannot be achieved, decisions of the YGCC will be determined by majority vote. The details on locations and times of meetings and other business~~

~~issues associated with the functioning of the YGCC will be determined at the first meeting.~~

YGCC members' expenses will be paid by their respective agencies. YGCC authorities include:

- Revise or amend the Conservation Strategy based on the best biological data and the best available science. Any such amendments will be subject to public review and comment. ~~Amendments will be made by the YGCC with a majority vote.~~
- ~~Establish meeting rules and procedures, and chairperson election rules for the committee.~~
- Seek funding to further the conservation of the Yellowstone grizzly bear by implementing this Conservation Strategy. Each agency is responsible for seeking the necessary funding to carry out the tasks assigned in this Conservation Strategy.

Some primary activities of the YGCC are:

- Coordinate implementation of this Conservation Strategy.
- Ensure that population and habitat data are collected annually by the IGBST, as specified in this Conservation Strategy, and evaluated to assess current status of the grizzly bear population.
- Share information and ~~implement~~ coordinate management actions ~~in a coordinated fashion~~.
- Identify management, research, and financial needs to successfully implement the coordinated Conservation Strategy.
- Implement a Biology and Monitoring Review as necessary ~~and submit a petition for relisting as appropriate to ensure agency responsiveness to changing circumstances of the grizzly or its habitat in the Greater Yellowstone Ecosystem~~.
- ~~Appoint a chairperson and members of the Information and Education Team, and coordinate information and education efforts.~~

This committee does not supersede the authority of the management agencies beyond the specific actions agreed to as signatories of this Conservation Strategy.

YGCC membership will consist of representatives of the following, each having one vote:

Federal	National parks: Yellowstone and Grand Teton National forests: Beaverhead-Deerlodge, Bridger-Teton, Caribou-Targhee, Custer-Gallatin, and Shoshone One Bureau of Land Management representative The Biological Resources Division of the U.S. Geological Survey
State wildlife management agencies	Idaho, Montana, and Wyoming
Local government	One representative from each state
Tribal	One representative from each Native American tribe with sovereign powers over reservation lands within the ~~ecosystem~~DMA

Comment [FJK1]: BN: We need to discuss this. The first part of this establishes that signatories to the CS designate their respective representatives based on this list. The tribes are listed as signatories to the CS.

The Interagency Grizzly Bear Study Team (IGBST) and the Information and Education Team (I & E) will perform necessary tasks and report to the YGCC.

The Interagency Grizzly Bear Study Team

In order to understand the dynamics of grizzly bears throughout the GYE, a need for centralized responsibility to collect, manage, analyze, and distribute science-based information was identified. To meet this need, in 1973 agencies formed the Interagency Grizzly Bear Study Team, a cooperative effort between the U.S. Geological Survey, National Park Service, U.S. Forest Service, U.S. Fish and Wildlife Service, and the state wildlife agencies of Idaho, Montana, and Wyoming.

Since 1974, the IGBST has published more than 200 scientific papers on the grizzly bear. A complete list of these papers can be found at: http://nrmsc.usgs.gov/science/igbst/detailedpubs. Quantitative data on grizzly bear abundance, distribution, survival, mortality, nuisance activity, and bear foods are critical to formulating management strategies and decisions. The IGBST coordinates data collection and analysis on an ecosystem scale, prevents overlap of efforts, and pools limited economic and human resources.

The IGBST will continue to function under this Conservation Strategy after delisting.

The responsibilities of the IGBST are to:

- Conduct both short- and long-term research projects addressing information needs for bear management.
- Monitor the bear population, including status and trend, numbers, reproduction, and mortality.
- Monitor grizzly bear habitats, foods, and the impacts of humans.
- Provide technical support to agencies and other groups responsible for the immediate and long-term management of grizzly bears in the GYE.
- Take the lead in preparing a Biology and Monitoring Review with staff support from the YGCC in response to deviations from required population or habitat standards.
- Coordinate annual updates of the motorized access database.
- Coordinate annual evaluation of motorized access route density and secure habitat.
- Document annually any changes in developed sites, livestock allotments, or permitted sheep numbers and maintain associated databases.
- Ensure all units have the tools and the training to evaluate motorized access route density and secure habitat for projects.
- Evaluate the need for changes in ways to evaluate motorized access route density, secure habitat, and habitat effectiveness, and make recommendations to the YGCC on such changes, as necessary.
- Set and maintain standards, definitions, values, formats and processes for collecting and updating data and assessment models, and maintaining data consistency between units.
- Produce annual reports on population and habitat monitoring items.

The USGS employee who is the lead biologist for USGS on the Greater Yellowstone Ecosystem grizzly bear population chairs the IGBST and will call meetings at least twice each year. The majority of funding for the IGBST comes from USGS but additional funding and in-kind efforts are made by all agencies (*see* Appendix F). The IGBST will report its findings to the YGCC.

The Information and Education Team

Successful maintenance of a recovered grizzly bear population in the GYE requires joint understanding of issues, sharing of knowledge (including new science and results of monitoring), and open communication among agencies, tribes, elected officials, non-governmental groups and organizations, and the public. The goals of the Information and Education (I & E) Team are:

- Increase public support for and compliance with agency management actions to maintain a secure GYE grizzly bear population.
- Utilize all possible modern technology and media resources to help decrease grizzly bear-human conflicts while still maintaining maximum access to natural resources for both humans and grizzly bears.
- Increase an understanding of grizzly bears and their habitat.
- Foster information sharing to ensure maximum resource, policy, and scientific informational exchange among agencies, tribes, elected officials, interest groups, local residents, and the public.
- Provide for meaningful public involvement through use of open houses, direct mailings, and media campaigns to inform the public about agency decisions relating to grizzly bear habitat and population management activities and other management actions that may affect local residents, landowners, tribes, and users

Members of the Information and Education Team will include I & E specialists from the National Park Service, U.S. Forest Service, and the state wildlife agencies of Idaho, Montana, and Wyoming. The I & E Team will report to the YGCC.

Evaluation

The evaluation of the effectiveness of grizzly bear conservation measures detailed in this Conservation Strategy will be an ongoing process shared by all the members of the Yellowstone Grizzly Bear Coordinating Committee.

As detailed in the monitoring portion of this strategy, the IGBST will take the lead in preparing an annual monitoring report with staff support from the YGCC. Agencies responsible for monitoring major population and habitat parameters are listed in Appendix G. Monitoring results and analyses will be presented to the YGCC by the IGBST. A Biology and Monitoring Review would be triggered if any of the following conditions were met:

- Exceeding independent female mortality limits in 3 consecutive years, or
- Exceeding independent male mortality limits in 3 consecutive years, or
- Exceeding dependent young mortality limits in 3 consecutive years, or
- Failure to meet the distribution criterion.

Biology and Monitoring Review

Under this Conservation Strategy, a Biology and Monitoring Review is a process carried out by the IGBST. A Biology and Monitoring Review examines management of habitat, populations, or efforts of participating agencies to complete their required monitoring. Biology and Monitoring Reviews will be undertaken after the annual summary of monitoring information presented to the YGCC and in response to deviations from required population or habitat standards. Any YGCC member agency also can request that a Biology and Monitoring Review be considered. Such consideration would be a topic for discussion by the YGCC and the review would be initiated based on the decision of the YGCC. The Biology and Monitoring Review process will be completed within six months and the resulting written report presented to the YGCC and made available to the public. The IGBST is not responsible for completing impact analyses for projects proposed by any agency; such analyses are the responsibility of the agency making the proposal.

The purposes of a Biology and Monitoring Review are:

- To identify the reasons why particular demographic or habitat objectives have not been achieved and to recommend modifications to the YGCC for changes as necessary, or
- To consider potential impacts of a proposed action of concern to one or more members of

the YGCC, or

- To consider departures by one or more agencies from the monitoring effort required under this Conservation Strategy and to recommend plans to the YGCC to ensure that monitoring efforts be maintained as per the standards in this document, or
- To consider and establish a scientific basis for possible changes in management due to changed conditions in the ecosystem and make those recommendations to the YGCC, or
- Make recommendations as to whether ~~a petition for~~ relisting should ~~be submitted~~ be considered.

Biology and Monitoring Reviews will be based on the best available science. Biology and Monitoring Reviews will be submitted as written reports by the IGBST to the YGCC and made available to the public. The YGCC will respond to the Biology and Monitoring Review in a written form either through the minutes of the YGCC meeting or in specific Biology and Monitoring Review response documents, as necessary. The purpose of the YGCC response is to address the issues(s) raised in the Biology and Monitoring Review with an explanation or management changes as necessary. In the case of a deviation from monitoring efforts required under this Conservation Strategy, the response will identify the means to be implemented by the YGCC to ensure continued population and/or habitat monitoring efforts as required in this document.

A Biology and Monitoring Review is generally triggered by negative deviations from the desired conditions established in this Conservation Strategy for population, mortality management, and habitat parameters; however, the IGBST can recommend a Biology and Monitoring Review to the YGCC if they deem it necessary.

A Biology and Monitoring Review will make recommendations as to whether the delisting should be reevaluated ~~a petition~~ for relisting ~~should be made~~. This recommendation shall be based upon the magnitude of the threat that the deviation from the desired condition poses to the maintenance of a recovered population.

The YGCC has to formally agree with a recommendation from the IGBST ~~to petition~~ for relisting.

If the situation, after completion of the Biology and Monitoring Review, is such that some or all of the desired population and habitat conditions specified in this Conservation Strategy are not being met, and cannot be met in the opinion of the YGCC, then the YGCC will submit to the Fish and Wildlife Service ~~a petition~~recommendation to consider ~~for~~ relisting. In the case of a vote on this issue, a simple majority is necessary.

Fish and Wildlife Service Status Review

The Service may initiate a formal status review and may emergency relist the GYE grizzly population until the formal status review is complete under ~~two~~ three conditions: (1) if there are any changes in Federal, State, or Tribal laws, rules, regulations, or management plans that depart significantly from the specifics of population or habitat management detailed in this section and significantly increase the threat to the population.; (2) a total population estimate of less than 500 inside the DMA; and/or (3) if the Service determines a petition to relist from an individual or organization, including the YGCC, is warranted.

To be warranted, such a petition must present credible scientific information to support the petition. The YGCC can petition the Fish and Wildlife Service to relist the GYE grizzly bears. The Service is to perform a status review upon receipt of such a petition that contains sufficient information to demonstrate that the request to relist is warranted. A relisting petition from the YGCC should be accompanied by the available specific biological data on the population and its habitat sufficient to judge its status as a recovered population as per the requirements of this Conservation Strategy. A status review will evaluate the factors affecting the population and result in a finding that summarizes the status of the population and recommends listing or not. For purposes of a status review, the status of the entire Greater Yellowstone Ecosystem grizzly bear population would be considered.

Comment [JB2]: Need to fix language on petition language.

Comment [JB3]: Need to add the actual emergency listing criteria. Imminent threat of extinction…compare to FR

The Service can also unilaterally initiate a status review to determine if the GYE grizzly bears should be a candidate species and be added to the species to be listed. This could be accomplished independently of the YGCC based on Service concerns about the population and/or its habitat. Based on a review of a petition or a status review initiated by the Service, if the Service finds serious and imminent threats to the population as per the criteria of the Endangered Species Act in Section 4(a)(1), the species could be immediately considered for relisting or could be relisted under emergency regulations, per Section 4(b)(7).

Chapter 7 Existing Authorities

Introduction

The existence of adequate regulatory mechanisms that serve to maintain the Yellowstone grizzly bear population as recovered is one of the five factors required to change the status of the population to delisted and to ensure a healthy grizzly bear population.

The management of populations of grizzly bears and the habitats these bears require for survival is dependent upon the laws and regulations of the federal and state agencies in the Greater Yellowstone Ecosystem (GYE). These laws and regulations provide the legal basis for controlling mortality, providing secure habitats, managing grizzly bear-human conflicts, controlling hunters, limiting access where necessary, controlling livestock grazing, maintaining education and outreach programs to control conflicts, monitoring populations and habitats, and requesting management and petitions for relisting when necessary. Many of these laws provide authorities for a number of these actions and controls.

The following laws and regulations, or portions thereof, exist and are relevant to agency programs regarding management of the grizzly bear and its habitat in the GYE. These provisions, whether national or state, have application in terms of agency compliance, agency authority, or discretion to act.

The relationship between the existing authorities and the five factors in Section 4(a)(1) used to consider listing and delisting of a species is presented in Appendix H. These five factors are all relevant to maintain a recovered population.

Federal Lands

Acts of Congress[4]

[4] Federal legislation can be viewed at the Library of Congress web site: http://thomas.loc.gov

The Act of Congress March 1, 1872. Set Yellowstone apart as a public park for the benefit and enjoyment of the people" and "for the preservation, from injury or spoliation, of all timber, mineral deposits, natural curiosities or wonders...and their retention in their natural condition". 16 U.S.C. §§21-22.

National Park Service Organic Act, 1916. The National Park Service...shall promote and regulate the use...by such means... to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such a manner...as will leave them unimpaired for future generations. 16 U.S.C. §31 repealed June 25, 1948.

Lacey Act, Criminal Code Provisions, 18 U.S.C. 42-44. This Act makes it illegal to import, export, transport, sell, receive, acquire, or purchase any fish or wildlife or plant taken or possessed in violation of any law, treaty or regulation of the United States or in violation of any Indian tribal law; to import, export, transport, sell, receive, acquire, or purchase in interstate or foreign commerce any fish or wildlife taken, possessed, transported, or sold in violation of any law or regulation of any state or in violation of any foreign law. 18 U.S.C. §§42-43.

Fish and Wildlife Coordination Act, 16 U.S.C. §§661-666c. This Act relates to wildlife as associated with water resource development. This act also authorizes that lands and waters may be acquired by Federal construction agencies for wildlife conservation to mitigate water projects in order to preserve and assure for the public benefit the wildlife potential of the particular water project area.

The Act of Congress September 14, 1950. (Expansion of Grand Teton National Park to include Jackson Hole National Monument) "The national park so established shall, so far as consistent with the provisions of this Act, be administered in accordance with the general statutes governing national parks..." 16 U.S.C. § 406d-1

Sikes Act, 16 U.S.C. §670g. The Secretaries of Agriculture and Interior and the State agencies will cooperate under this act to plan, develop, maintain, and coordinate programs for the conservation and rehabilitation of wildlife, fish and game. These programs shall include, but not be limited to, specific habitat improvements projects and related activities and provide adequate protection for species considered threatened or endangered pursuant to Section 4 of the ESA. Multiple-Use Sustained-Yield Act, 16 U.S.C. §§528-531. It is the policy of the Congress that the National Forests are established and shall be administered for outdoor recreation, range, timber, watershed and wildlife and fish purposes. As used in this Act, "Multiple Use" means the management of all the various resources of the National Forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

National Environmental Policy Act, 42 U.S.C. §§ 4321-4331. The purposes of this Act are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment: to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality. The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall—

(A) Utilize a systematic, interdisciplinary approach that will insure the integrated use of the natural and social sciences and the environmental design arts in planning and decision making which may have an impact on man's environment; (B) Identify and develop methods and

procedures, in consultation with the Council on Environmental Quality established by Title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision making along with economic and technical considerations; (C) Include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on—

(i) The environmental impact of the proposed action

(ii) Any adverse environmental effects which cannot be avoided should the proposal be implemented

(iii) Alternatives to the proposed action.

(iv) The relationship between local short term uses of man's environment and the maintenance and enhancement of long term productivity, and

(v) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Prior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency that has jurisdiction by law or special expertise with respect to any environmental impact involved.

The Act of Congress August 25, 1972, PL. 94-404 86 §620. Authorization to establish John D. Rockefeller, Jr. Memorial Parkway "... to provide both a symbolic and desirable physical connection between... Yellowstone, and the Grand Teton National Park..." "The Secretary shall administer the parkway as a unit of the national park system in accordance with the authority contained in the Act of August 25, 1916..." Established by the Secretary of the Interior, September 30, 1977.

Endangered Species Act, 16 U.S.C. § 1533. ESA - Section 4 of the Act gives the criteria for determining a species' status as threatened or endangered. In order to delist a species, it must be shown that the opposite is true. It must be shown that: a) the species' habitat or range is not threatened with destruction, modification or curtailment, b) the species is not being over utilized

for commercial, recreational, scientific or educational purposes, c) disease and predation are not significant problems, d) there are adequate regulatory mechanisms in place, and e) there are no significant other natural or manmade factors affecting the continued existence of the species. The Secretary of Interior and States shall effectively monitor recovered species for not less than five years after the species is delisted and no longer protected under the ESA.

Forest and Rangeland Renewable Resources Planning Act, 1974. In recognition of the vital importance of America's renewable resources of the forest, range, and other associated lands to the Nation's social and economic well-being, and of the necessity for a long term perspective in planning and undertaking related national renewable resource programs administered by the Forest Service, the Secretary of Agriculture shall prepare a Renewable Resources Assessment. A strategic plan for all Forest Service activities shall be prepared every five years based on the assessment of renewable natural resources and on all land ownerships every 10 years. It provides direction that land management plans specify guidelines for land management plans, which provide for diversity of plant and animal communities. 16 U.S.C. §1600.

National Forest Management Act (NFMA) of 1976. NFMA provides the legal basis and direction for development of national forest plans. NFMA specifies that the National Forest System be managed to provide for diversity of plant and animal communities to meet multiple use objectives. Subsequent regulations for planning land and resource management (36 CFR 219), adopted in 1979 augmented the diversity policy by requiring management of habitats to maintain viable populations of vertebrates. 15 U.S.C. §1600.

Federal Land Policy and Management Act. Public lands will be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values...that will provide food and habitat for fish and wildlife and domestic animals, and that will provide for outdoor recreation and human occupancy and use. 43 U.S.C. §§ 1701-1777.

Fish and Wildlife Improvement Act, 16 U.S.C. § 742(a).

Fish and Wildlife Conservation Act, 16 U.S.C. §§ 2901-2911. Each State should be encouraged to develop, revise and implement, in consultation with appropriate other agencies, a plan for the conservation of fish and wildlife, particularly those species, which are indigenous to the State. The purpose of this act is to provide financial and technical assistance to the States for the development, revision and implementation of conservation plans and programs for nongame fish and wildlife and to conserve and promote conservation of nongame fish and wildlife and their habitats.

The National Parks Omnibus Management Act of 1998 (PL 105-391,112 Stat. 3497). Title I, Section 101 recognizes the ever increasing societal pressures being placed upon America's unique natural and cultural resources contained in the National Park System, the Secretary shall continually improve the ability of the National Park Service to provide state-of-the-art management, protection, and interpretation of and research on the resources of the National Park System. Title II, Section 201, National Park System Resource Inventory and Management identifies the need to enhance management and protection of national park resources by providing clear authority and direction for the conduct of scientific study in the National Park system and to use the information gathered for management purposes. 16 U.S.C. §5901.

Federal Regulations

36 CFR 1.5 (a)(1). Gives National Park Superintendents the authority to establish for all or a portion of a park area a reasonable schedule of visiting hours, impose public use limits, or close all or a portion of a park area to all public use or to a specific use or activity in order to protect natural resources or provide for human safety.

36 CFR 1.7(B). National Park Service Superintendents shall publish in writing all designations, closures, permit requirements and other restrictions imposed under discretionary authority.

36 CFR 1.7(B) 1.2 (d). Gives National Park Superintendents the ability to regulate activities

conducted by National Parks, or their agents, relative to the management and handling of grizzly bears (*Ursus arctos horribilis*). Specifics are described in Park Annual Bear Management Plans.

36 CFR 2.10 (d). Gives the National Park Superintendents authority to designate all or a portion of a park area where food, lawfully taken fish or wildlife, garbage and equipment used to cook or store food must be kept to avoid bear-human conflicts. This restriction does not apply to food that is being transported, consumed, or prepared for consumption.

36 CFR 219. Specifies that the National Forest System be managed to provide for diversity of plant and animal communities to meet multiple use objectives. Subsequent regulations for planning land and resource management and requiring management of habitats to maintain viable populations of vertebrates.

36 CFR 219.19. Requires that Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. A viable population shall be regarded as one, which has the estimated numbers, and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area.

36 CFR 219.26. Specifies that Forest planning shall provide for diversity of plant and animal communities to meet multiple use objectives.

36 CFR 219.27 (a) (6). States that (a) All management prescriptions shall – (6) Provide for adequate fish and wildlife habitat to maintain viable populations of existing native vertebrate species.

36 CFR 261.50 (a) and (b). Gives Forest Supervisors the authority to issue orders which close or restrict the use of described areas, or of any forest development road or trail within the area over which he has jurisdiction. This authority is used to close areas to minimize human/bear conflicts and to issue food storage, carcass storage and camping requirements.

36 CFR 261.53 (a) and (e). States that when provided for in an order authorized under 36 CFR 261.50 (a) and (b) it is prohibited to go into or be upon any area which is closed for the protection of: (a) threatened, endangered, rare, unique, or vanishing species of plants, animals, birds or fish; or (b) for public health or safety.

36 CFR 261.58 (e) and (s) and (cc). States that when provided for in an order authorized under 36 CFR 261.50 (a) and (b) the following are prohibited. (a) Camping; (s) Possessing, storing, or transporting any bird, fish, or other animal or parts thereof as specified in the order; (cc) Possessing or storing any food or refuse, as specified in the order.

States

State laws, rules, and regulations that provide authority to control grizzly bear mortality, control hunters, manage grizzly bear-human conflicts, and other management activities to maintain the Yellowstone grizzly bear population are attached to the three state draft MOA (Appendix P).

Federal Plans and Guidelines

In addition to federal and state laws, the following plans and guidelines provide both direction and guidance for grizzly bear population and/or habitat management.

National Park Service

NPS-77, Natural Resource Management Guidelines, May 16, 1991. Guides National Park managers to perpetuate and prevent from harm (through human actions) wildlife populations as part of the natural ecosystems of parks.

Final Environmental Impact Statement, Grizzly Bear Management Program, Yellowstone National Park, July 1983:
Identifies sanitation procedures designed to ensure that human foods and attractants are kept

secured from bears. Garbage and other unnatural food attractants will be eliminated before control actions are required. The solid waste handling program will encompass use of trash containers of bear-resistant design, careful and frequent garbage pickup to prevent overflow and overnight accumulations.

The Superintendent authorizes and approves the YNP Grizzly Bear Management Program that outlines the park's Bear Management Area Program. The Bear Management Area Program restricts recreational activity in areas with seasonal concentrations of grizzly bears. The goals of these restrictions include: (1) minimize bear-people interactions that may lead to habituation of bears to people (habituation can result in bears being removed from the population for human safety), (2) prevent human-caused displacement of bears from prime food sources, and (3) decrease the risk of bear-caused human injury in areas with high levels of bear activity. Outlines Park bear monitoring program. Outlines Park bear research goals and objectives. Leaves open the possibility for supplemental feeding of grizzly bears, if deemed necessary. Identifies as an objective that public awareness of exposing bears to unnatural food sources may lead to human injury, or to the bears' destruction, or both. Requires an active information program be directed at both visitors and employees to inform them of policies and goals of bear management, and the reasons for these. Provides guidelines for the distribution of bear safety warning information through entrance stations, signs, visitor contacts, and literature.

Yellowstone National Park Annual Bear Management Plan: Outlines grizzly bear ecology and management information distributed to park employees and the general public by the Bear Management Office.

Grand Teton National Park Human/Bear Management Plan, 1989:
Identifies sanitation procedures designed to ensure that human foods and attractants are kept secured from bears. Garbage and other unnatural food attractants will be eliminated before control actions are required. The solid waste handling program will encompass use of trash containers of bear-resistant design, and careful and frequent garbage pickup to prevent overflow and overnight accumulations. Containers not of bear-resistant design must be located inside the

building served. Large animal carcasses that are near trails, facilities, or roads will be managed in a way to reduce human/bear encounters.

Grizzly bear management follows the *Interagency Grizzly Bear Guidelines* (IGBC 1986*)*.
Management of Situation 1 areas includes area closures and/or activity curtailments to protect the bears.
Follows the procedures outlined in the *Interagency Grizzly Bear Guidelines* (IGBC 1986).
Actions subsequent to capture are coordinated with the U.S. Fish and Wildlife Service Grizzly Bear Recovery Coordinator.
All incidents involving human-bear interactions are documented on Bear Sighting/Identification reports. All Park employees and visitors are encouraged to complete these forms for all bear sightings.
Outlines Park bear research goals and objectives.
Outlines a program for the dissemination of information of human/bear relationships, the causes of human-bear conflicts, and how visitors, inholders, Park, and concession employees can help alleviate problems through their personal actions and compliance with Park regulations.

U.S. Forest Service

If a change of status for the Yellowstone grizzly bear population under the ESA takes place, Forest Service Regions 1, 2, and 4 will classify the grizzly bear as a sensitive species[5] in the

[5] 2672.1 - Sensitive Species Management. Sensitive species of native plant and animal species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing.
There must be no impacts to sensitive species without an analysis of the significance of adverse effects on the populations, its habitat, and on the viability of the species as a whole. It is essential to establish population viability objectives when making decisions that would significantly reduce sensitive species numbers.

- Identification of Sensitive Species. Regional Foresters shall identify sensitive species occurring within the Region. They shall examine the following sources as possible candidates for listing as sensitive species:

1. Fish and Wildlife Service or National Marine Fisheries Service candidates for Federal listing (categories 1 and 2) under Federal Register Notice of Review.

GYE. Grizzly bears and their habitats will then be managed as sensitive on National Forest System lands in accordance with Forest Service Manual 2670 (specifically 2670.22, 2670.32, and 2676.1-2676.17e). In addition, national forests will continue to follow direction established in existing land management plans until amended or revised. Bridge-Teton National Forest Land and Resource Management Plan with Amendments and Corrections (2015)

- Custer National Forest and Grasslands Land and Resource Management Plan (1987)
- Gallatin Forest Plan 1987 as Amended through November 2014
- 1997 Revised Forest Plan - Targhee National Forest
- Shoshone National Forest Land Management Plan (2015)
- Beaverhead-Deerlodge National Forest Land and Resource Management Plan (2009)

State Plans and Guidelines

Montana Department of Natural Resources and Conservation

It is the policy of MDNRC to conduct programs and activities in a manner that limits the potential for conflicts between grizzly bears and people and that provides habitat to help achieve and sustain recovery within the GYE. Land uses which can adversely affect grizzly bears or their habitat will be designed and coordinated in a manner that is compatible with grizzly bear behavior and habitat needs, but not to the extent of excluding other uses.

The Forestry Division of the MDNRC has additional policy guidance for management of grizzly bear habitat within the Yellowstone. In 1988, grizzly bear management standards and guidelines were implemented to integrate management of grizzly bear habitat with timber management on State lands within the GYE. Performance standards and guidelines cover long range planning, project planning and design, management of bear-human conflicts, and special management

2. State lists of endangered, threatened, rare, endemic, unique, or vanishing species, especially those listed as threatened under State law.

3. Other sources as appropriate in order to focus conservation management strategies and to avert the need for Federal or State listing as a result of National Forest management activities.

areas. These will be implemented until the Forestry Division develops and adopts other guidance through a programmatic planning effort that will incorporate grizzly bear management objectives.

Additional policy guidance will be developed in the near future. The USFWS and MDNRC have mutually agreed to develop and implement guidelines for integrating grizzly bear habitat protection and MDNRC land management activities. MDNRC will continue to consult with MFWP on specific projects that may adversely affect any species of wildlife in Montana, in an attempt to minimize or avoid adverse impacts to populations or their habitats.

Literature Cited

Bentz, B., J. Logan, and G. Amman. 1991. Temperature-dependent development of the mountain pine beetle (Coleoptera: Scolytidae) and simulation of its phenology. Canadian Entomologist 123: 1083–1094.

Bjornlie, D., and M.A. Haroldson. 2002. Grizzly bear use of insect aggregation sites documented from aerial telemetry and observations. Pages 33–37 *in* C. Schwartz and M. Haroldson, editors. Yellowstone grizzly bear investigations: annual report of the Interagency Study Team, 2001. U.S. Geological Survey, Bozeman, Montana, USA.

Bjornlie, D.D., and M.A. Haroldson. 2014. Grizzly bear use of insect aggregation sites documented from aerial telemetry and observations. Pages 40–43 *in* F.T. van Manen, M.A. Haroldson, and K. West, editors. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2013. U.S. Geological Survey, Bozeman, Montana, USA.

Bjornlie, D.D., D.J. Thompson, M.A. Haroldson, C.C. Schwartz, K.A. Gunther, S.L. Cain, D.B. Tyers, K.L. Frey, and B.C. Aber. 2014. Methods to estimate distribution and range extent of grizzly bears in the Greater Yellowstone Ecosystem. Wildlife Society Bulletin 38: 182–187. Doi: 10.1002/wsb.368.

Blanchard, B. 1978. Grizzly bear distribution in relation to habitat areas and recreational use: cabin Creek-Hilgard Mountains. M.S. Thesis, Montana State University, Bozeman, Montana, USA. 75 pp.

Blanchard, B., and R.R. Knight. 1996. Effects of wildfire on grizzly bear movements and food habits. Pages 117–122 *in* J.M. Greenlee, editor. The ecological implications of fire in Greater Yellowstone. Proceedings of the 2nd biennial conference on the Greater Yellowstone Ecosystem. 1993. Yellowstone National Park, Wyoming. International Association of Wildland Fire. Fairfield, Washington, USA.

Blanchard, B.M., R.R. Knight, and D.J. Mattson. 1992. Distribution of Yellowstone grizzly bears during the 1980s. American Midland Naturalist 128: 332–338.

Bockino, N.K., and D.B. Tinker. 2012. Interactions of white pine blister rust and mountain pine beetle in whitebark pine ecosystems in the southern Greater Yellowstone Ecosystem. Natural Areas Journal 32: 31–40.

Boyce, M.S. 1992. Population viability analysis. Annual Reviews of Ecology and Systematics 23: 481–506.

Boyce, M.S. 1993. Population viability analysis: Adaptive management for threatened and endangered species. Transactions North American Wildlife Natural Resource Conference 58: 520–527.

Boyce, M.S. 1995. Population viability analysis for grizzly bears (*Ursus arctos horribilis*): a critical review. Report to the Interagency Grizzly Bear Committee, Missoula, Montana, USA. 79 pp.

Boyce, M.S., B.M. Blanchard, R.R. Knight, and C. Servheen. 2001*a*. Population viability for grizzly bear: a critical review. Interagency Association of Bear Research and Management Monograph Series 4. 45 pp.

Boyce, M.S., D. MacKenzie, B.J.J. Manly, M.A. Haroldson, and D. Moody. 2001*b*. Negative binomial models for abundance estimation of multiple closed populations. Journal of Wildlife Management 65: 498–509.

Caughley, G. 1994. Directions in conservation biology. Journal of Animal Ecology 63: 215–244.

Costello, C.M., F.T. van Manen, M.A. Haroldson, M.R. Ebinger, S. Cain, K. Gunther, and D.D. Bjornlie. 2014. Influence of whitebark pine decline on fall habitat use and movements of grizzly bears in the Greater Yellowstone Ecosystem. Ecology and Evolution 4: 2004–2018.

Craighead, J.J., J.R. Varney, and F.C. Craighead, Jr. 1974. A population analysis of the Yellowstone grizzly bears. Montana Forest and Conservation Experiment Station and Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, Montana, USA. 20 pp.

Dooley, E.M. 2012. Mountain pine beetle outbreaks in high elevation whitebark pine forests: the effects of tree host species and blister rust infection severity on beetle productivity. Thesis. University of Montana, Missoula, Montana, USA. 123 pp.

Eberhardt, L.L. 1995. Population trend estimates from reproductive and survival data. Pages 13–19 *in* R. R. Knight and B. M. Blanchard. Yellowstone grizzly bear investigations: report of

the Interagency Study Team, 1994. National Biological Service, Bozeman, Montana, USA.

Eberhardt, L.L., B. Blanchard, and R. Knight. 1994. Population trend of the Yellowstone grizzly bear as estimated from reproductive and survival rates. Canadian Journal of Zoology 72: 360–363.

Eberhardt, L.L., and R.R. Knight. 1996. How many grizzlies in Yellowstone? Journal of Wildlife Management 60: 416–421.

French, S.P., M.G. French, and R.R. Knight. 1994. Grizzly bear use of army cutworm moths in the Yellowstone ecosystem. International Conference on Bear Research and Management 9: 389–399.

Greater Yellowstone Whitebark Pine Monitoring Working Group. 2011. Interagency Whitebark Pine Monitoring Protocol for the Greater Yellowstone Ecosystem, Version 1.1. Greater Yellowstone Coordinating Committee, Bozeman, Montana, USA.

Green, G.I., D.J. Mattson, and J.M. Peek. 1997. Spring feeding on ungulate carcasses by grizzly bears in Yellowstone National Park. Journal of Wildlife Management 61: 1040–1055.

Gunther, K.A., M.T. Bruscino, S. Cain, K. Frey, and R.R. Knight. 1997. Grizzly bear-human conflicts, confrontations, and management actions in the Yellowstone Ecosystem Subcommittee report. National Park Service. Unpublished report. 43 pp.

Gunther, K.A., M.A. Haroldson, K. Frey, S.L. Cain, J. Copeland, and C.C. Schwartz. 2004. Grizzly bear-human conflicts in the Greater Yellowstone Ecosystem, 1992–2000. Ursus 15: 10–22.

Gunther, K.A., R. Shoemaker, K. Frey, M.A. Haroldson, S.L. Cain, F.T. van Manen, and J.K. Fortin. 2014*a*. Dietary breadth of grizzly bears in the Greater Yellowstone Ecosystem. Ursus 25: 60–72.

Gunther, K.A., T. Wyman, and E. Reinertson. 2014*b*. Spring ungulate availability and use by grizzly bears in Yellowstone National Park. Pages 32–35 *in* F.T. van Manen and M.A. Haroldson, editors. Yellowstone grizzly bear investigations: Annual report of the Interagency Grizzly Bear Study Team, 2013. U.S. Geological Survey, Bozeman, Montana, USA.

Haroldson, M.A., K.A. Gunther, D.P. Reinhart, S.R. Podruzny, C. Cegelski, L. Waits, T. Wyman, and J. Smith. 2005. Changing numbers of spawning cutthroat trout in tributary streams in Yellowstone Lake and estimates of grizzly bears visiting streams from DNA. Ursus 16: 167–480.

Haroldson, M.A., C.C. Schwartz, S. Cherry, and D. Moody. 2004. Possible effects of elk hunting on the fall distribution of grizzly bears in the Greater Yellowstone Ecosystem. Journal of Wildlife Management 68: 129–137.

Haroldson, M.A., C.C. Schwartz, K.C. Kendall, K.A. Gunther, D.S. Moody, K. Frey, and D. Paetkau. 2010. Genetic analysis of individual origins supports isolation of grizzly bears in the Greater Yellowstone Ecosystem. Ursus 21: 1–13.

Haroldson, M.A., C.C. Schwartz, and G.C. White. 2006. Survival of independent grizzly bears in the Greater Yellowstone Ecosystem, 1983–2001. Pages 33–42 *in* C.C. Schwartz, M.A. Haroldson, G.C. White, R.B. Harris, S. Cheery, K.A. Keating, D. Moody, and C. Servheen, authors. Temporal, spatial, and environmental influences on the demographics of grizzly bears in the Greater Yellowstone Ecosystem. Wildlife Monographs 161.

Haroldson, M.A., F.T. van Manen, and D.D. Bjornlie. 2014. Estimating number of females with cubs-of-the-year. Pages 12–21 *in* F.T. van Manen, M.A. Haroldson, K. West, and S.C. Soileau, editors. Yellowstone grizzly bear investigations: Annual report of the Interagency Grizzly Bear Study Team, 2013. U.S. Geological Survey, Bozeman, Montana, USA.

Haroldson, M.A., F.T. van Manen, and D.D. Bjornlie. 2015. Estimating number of females with cubs-of-the-year. Pages 11–20 *in* F.T. van Manen, M.A. Haroldson, K. West, and S.C. Soileau, editors. Yellowstone grizzly bear investigations: Annual report of the Interagency Grizzly Bear Study Team, 2014. U.S. Geological Survey, Bozeman, Montana, USA.

Harris, R. 1986. Modeling sustainable harvest rates for grizzly bear populations. Pages 268–279 i*n* A. Dood, B. Brannon, and R. Mace. Final programmatic EIS: the grizzly bear in northwest Montana. Montana Fish, Wildlife & Parks, Helena, Montana, USA.

Harris, R.B., C.C. Schwartz, M.A. Haroldson, and G.C. White. 2006. Trajectory of the Yellowstone grizzly bear population under alternative survival rates. Pages 44–55 *in* C.C. Schwartz, M.A. Haroldson, G.C. White, R.B. Harris, S. Cherry, K.A. Keating, D. Moody, and C. Servheen, eds. Temporal, spatial, and environmental influences on the demographics of grizzly bears in the Greater Yellowstone Ecosystem. Wildlife Monographs 161.

Harris, R.B., G.C. White, C.C. Schwartz, and M.A. Haroldson. 2007. Population growth of Yellowstone grizzly bears: uncertainty and future monitoring. Ursus 18: 168–178.

Hoskins, W.P. 1975. Yellowstone Lake tributary study. Interagency Grizzly Bear Study Team. Unpublished report. 31 pp.

Interagency Grizzly Bear Committee. 1986. Interagency grizzly bear guidelines. Missoula, Montana, USA. 100 pp.

Interagency Grizzly Bear Committee. 1998. Interagency Grizzly Bear Committee Taskforce Report: Grizzly bear/motorized access management. Missoula, Montana, USA. 8 pp.

Interagency Grizzly Bear Study Team. 2012. Updating and evaluating approaches to estimate population size and sustainable mortality limits for grizzly bears in the Greater Yellowstone Ecosystem. Interagency Grizzly Bear Study Team, U.S. Geological Survey, Bozeman, Montana, USA.

Interagency Grizzly Bear Study Team. 2013. Response of Yellowstone grizzly bears to changes in food resources: a synthesis. Report to the Interagency Grizzly Bear Committee and Yellowstone Ecosystem Subcommittee. Interagency Grizzly Bear Study Team, U.S. Geological Survey, Bozeman, Montana, USA.

Jacoby, M.E., G.V. Hilderbrand, C. Servheen, C.C. Schwartz, S.M. Arthur, T.A. Hanley, C.T. Robbins, and R. Michener. 1999. Tropic relations of brown and black bears in several western North American ecosystems. Journal of Wildlife Management 63: 921–929.

Kamath, P.L., M. A. Haroldson, G. Luikart, D. Paetkau, C. Whitman, and F.T. van Manen. 2015. Multiple estimates of effective population size for monitoring a long-lived vertebrate: an application to Yellowstone grizzly bears. Molecular Ecology. Doi: 10.1111/mec.13398.

Keating, K.A., C.C. Schwartz, M.A. Haroldson, and D. Moody. 2002. Estimating number of females with cubs-of-the-year in the Yellowstone grizzly bear population. Ursus 13: 161–174.

Knight, R.R., and B.M. Blanchard. 1994.Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 1993. National Biological Service, Bozeman, Montana, USA. 26 pp.

Knight, R.R., and B.M. Blanchard. 1995. Yellowstone grizzly bear investigations: annual report of the Interagency Study Team, 1994. National Biological Service, Bozeman, Montana, USA. 27 pp.

Knight, R.R., B.M. Blanchard, and L.L. Eberhardt. 1995. Appraising status of the Yellowstone grizzly population by counting females with cubs of the year. Wildlife Society Bulletin 23: 245–248.

Larson, E.R. 2011. Influences of the biophysical environment on blister rust and mountain pine beetle, and their interactions, in whitebark pine forests. Journal of Biogeography 38: 453–470.

Mace, R.D. 2004. Integrating science and road access management lessons from the Northern Continental Divide Ecosystem. Ursus 15: 129–136.

Mace, R., J.S. Waller, T. Manley, L.J. Lyon, and H. Zuuring. 1996. Relationships among grizzly bears, roads, and habitat in the Swan Mountains, Montana. Journal of Applied Ecology 33: 1305–1404.

Mahalovich, M.F., K.E. Burr, and D.L. Foushee. 2006. Whitebark pine germination, rust resistance and cold hardiness among seed sources in the Inland Northwest: planting strategies for restoration. Pages 91–101 *in* L.E. Riley, R.K. Dumroese, and T.D. Landis, technical coordinators. National Proceedings: Forest and Conservation Nursery Associations; 2005. Proceedings RMRS-P-43. USDA Forest Service, Fort Collins, Colorado, USA.

Mattson, D.J., B.M. Blanchard, and R.R. Knight. 1992. Yellowstone grizzly bear mortality, human habituation, and whitebark pine seed crops. Journal of Wildlife Management 56: 432–442.

Mattson, D.J., and C. Jonkel. 1990. Stone pines and bears. Pages 223–236 *in* W.C. Schmidt and K.J. McDonald, compilers. Proceedings-symposium on whitebark pine ecosystems: ecology and management of a high-mountain resource. U.S. Forest Service. General Technical Report INT-270.

Mattson, D.J., and R.R. Knight. 1991. Effects of access on human-caused mortality of

Yellowstone grizzly bears. USDOI National Park Service Interagency Grizzly Bear Study Team Report 1991B. Bozeman, Montana, USA.

McKinney, S.T., C.E. Fiedler, and D.F. Tomback. 2009. Invasive pathogen threatens bird-pine mutualism: implications for sustaining high-elevation ecosystem. Ecological Applications 19: 597–607.

McLellan, B.N., and D.M. Shackleton. 1988. Grizzly bears and resource-extraction industries: effects of roads on behavior, habitat use and demography. Journal of Applied Ecology 25: 451–460.

Mealey, S.P. 1975. The natural food habits of free-ranging grizzly bears in Yellowstone National Park, 1973–1974. M.S. Thesis, Montana State University, Bozeman, Montana, USA. 158 pp.

Miller, C.R. and L.P. Waits. 2003. The history of effective population size and genetic diversity in the Yellowstone grizzly (*Ursus arctos*): Implications for conservation. Proceedings of the National Academy of Sciences 100: 4334–4339.

Mowat, G., and D.C. Heard. 2006. Major components of grizzly bear diet across North America. Canadian Journal of Zoology 84: 473–489.

Perkins, D.L., and D.W. Roberts. 2003. Predictive models of whitebark pine mortality from mountain pine beetle. Forest Ecology and Management 174: 495-510.

Podruzny, S.R., and K.A. Gunther. 2002. Spring ungulate availability and use by grizzly bears in Yellowstone National Park. Pages 29–33 *in* C. Schwartz and M. Haroldson editors. Yellowstone grizzly bear investigations: annual report of the Interagency Study Team, 2001. U.S. Geological Survey, Bozeman, Montana, USA.

Podruzny, S.R., K.A. Gunther, and T. Wyman. 2012. Spring ungulate availability and use by grizzly bears in Yellowstone National Park. Pages 29–31 *in* F.T. van Manen, M.A. Haroldson, and K. West, editors. Yellowstone grizzly bear investigations: Annual report of the Interagency Grizzly Bear Study Team, 2011. U.S. Geological Survey, Bozeman, Montana, USA.

Pritchard, G.T., and C.T. Robbins. 1990. Digestive and metabolic efficiencies of grizzly and black bears. Canadian Journal of Zoology 69: 1645–1651.

Proctor, M.F., D. Paetkau, B.N. McLellan, G.B. Stenhouse, K.C. Kendall, R.D. Mace, W.F. Kasworm, C. Servheen, C.L. Lausen, M.L. Gibeau, W.L. Wakkinen, M.A. Haroldson, G.

Mowat, C.D. Apps, L.M. Ciarniello, R.M.R. Barclay, M.S. Boyce, C.C. Schwartz, and C. Strobeck. 2012. Population fragmentation and inter-ecosystem movements of grizzly bears in western Canada and the northern United States. Wildlife Monographs 180: 1–46. Doi: 10.1002/wmon.6.

Reinhart, D.P., and D.J. Mattson. 1990. Bear use of cutthroat trout spawning streams in Yellowstone National Park. International Conference on Bear Research and Management 8: 343–350.

Schwartz, C.C., J.K. Fortin, J.E. Teisberg, M.A. Haroldson, C. Servheen, C.T. Robbins, and F.T. van Manen. 2014. Body and diet composition of sympatric black and grizzly bears in the Greater Yellowstone Ecosystem. Journal of Wildlife Management 78: 68–78.

Schwartz, C.C., M.A. Haroldson, and S. Cherry. 2006. Reproductive performance of grizzly bears in the Greater Yellowstone Ecosystem, 1983–2002. Pages 18–23 *in* C.C. Schwartz, M.A. Haroldson, G.C. White, R.B. Harris, S. Cherry, K.A. Keating, D. Moody, and C. Servheen, authors. Temporal, spatial, and environmental influences on the demographics of grizzly bears in the Greater Yellowstone Ecosystem. Wildlife Monographs 161.

Schwartz, C. C., M. A. Haroldson, K.A. Gunther, and D. Moody. 2002. Current distribution of grizzly bears in the greater Yellowstone ecosystem, 1990-2000. Ursus 13:156–162.

Schwartz, C.C., M.A. Haroldson, K.A. Gunther, and C.T. Robbins. 2013. Omnivory and the terrestrial food web: Yellowstone grizzly bear diets. Pages 109–124 *in* P.J. White, R.A. Garrot, and G.E. Plumb, editors. Yellowstone's wildlife in transition. Harvard University Press, Cambridge, Massachusetts, USA.

Schwartz, C.C., M.A. Haroldson, and G.C. White. 2010. Hazards affecting grizzly bear survival in the Greater Yellowstone Ecosystem. Journal of Wildlife Management 74: 654–667.

Schwartz, C.C., S.D. Miller, and M.A. Haroldson. 2003. Grizzly bear. Pages 556–586 *in* G.A. Feldhamer, B.C. Thompson, and J.A. Chapman, editors. Wild mammals of North America: biology, management, and conservation. Second edition. John Hopkins University Press, Baltimore, Maryland, U.SA.

Servheen, C.R., R. Knight, D. Mattson, S. Mealey, D. Strictland, J. Varley, and J. Weaver. 1986. Report to the IGBC on the availability of foods for grizzly bears in the Yellowstone ecosystem. 21 pp.

Summerfield, B., W. Johnson, and D. Roberts. 2004. Trends in road development and access management in the Cabinet-Yaak and Selkirk grizzly bear recovery zones. Ursus 15: 115–122.

Teisberg, J.E., M.A. Haroldson, C.C. Schwartz, K.A. Gunther, J.K. Fortin, and C.T. Robbins. 2014. Contrasting past and current numbers of bears visiting Yellowstone cutthroat trout streams. Journal of Wildlife Management 78: 369–378. Doi: 10.1002/jwmg.667

USDA Forest Service. 1985. Cumulative effects analysis process for the Yellowstone Ecosystem. Unpublished report 40 pp.

USDA Forest Service. 2004. Forest plan amendments for grizzly bear conservation for the Greater Yellowstone Area National Forests draft environmental impact statement. Idaho, Montana, and Wyoming, USA. 303 pp.

USDA Forest Service. 2005. Forest Service Manual 2600 – Wildlife, Fish, and Sensitive Plant Habitat Management. Amendment no. 2600-2005-1. National Headquarters (WO), Washington, D.C. 22 pp.

U.S. Fish and Wildlife Service. 1993. Grizzly bear recovery plan. Missoula, Montana, USA. 181 pp.

U.S. Fish and Wildlife Service. 2003. Draft Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area. U.S. Fish and Wildlife Service, Missoula, Montana, USA. 397 pp.

U.S. Fish and Wildlife Service. 2007a. Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area. U.S. Fish and Wildlife Service, Missoula, Montana, USA. 88 pp.

U.S. Fish and Wildlife Service. 2007b. Recovery Plan Supplement: Revised demographic criteria for the Greater Yellowstone Ecosystem. Missoula, Montana, USA. 35 pp.

U.S. Fish and Wildlife Service. 2007c. Recovery Plan Supplement: Habitat-based recovery criteria for the Greater Yellowstone Ecosystem. Missoula, Montana, USA. 52 pp.

Walters, C.J., and C.S. Holling. 1990. Large-scale management experiments and learning by doing. Ecology 71: 2060–2068.

U.S. Fish and Wildlife Service. 2016. Recovery Plan Supplement: Revised demographic criteria for the Greater Yellowstone Ecosystem. Missoula, Montana, USA.

Walters, C.J., and C.S. Holling. 1990. Large-scale management experiments and learning by

doing. Ecology 71: 2060–2068.

White, G.C. 1996. Two grizzly bear studies: moth feeding ecology and male reproductive biology. Ph.D. Dissertation, Montana State University, Bozeman, USA. 79 pp.