

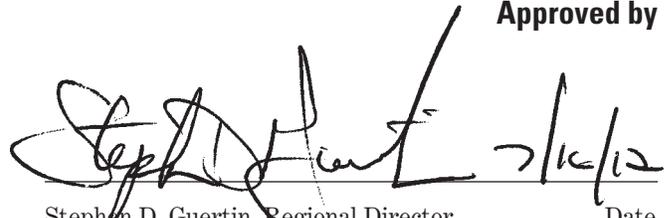
Comprehensive Conservation Plan

*Charles M. Russell National Wildlife Refuge
UL Bend National Wildlife Refuge*

Montana

July 2012

Approved by



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UL Bend National Wildlife Refuge*

Submitted by



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Summary

The U.S. Fish and Wildlife Service completed a comprehensive conservation plan in 2012 to guide management and use of the Charles M. Russell National Wildlife Refuge and the UL Bend National Wildlife Refuge in north-central Montana (these two units are managed cohesively as one refuge).

As part of the National Wildlife Refuge System, the refuge is managed for wildlife conservation above all else. In cooperation with partners, the Service will use natural, dynamic, ecological processes and management activities in a balanced, responsible manner to restore and maintain the biological integrity of the refuge. Once natural processes are restored, a more passive approach (less human assistance) will be favored. There will be quality wildlife-dependent public experiences. Economic uses will be limited when they are injurious to ecological processes.

REFUGE OVERVIEW

The refuge was established in 1936 as the Fort Peck Game Range for sustaining large numbers of sharp-tailed grouse, pronghorn, and other wildlife. In 1963, it was designated as the Charles M. Russell National Wildlife Range in honor of famous western painter Charlie Russell, and this “range” became a “refuge” in 1976. UL Bend National Wildlife Refuge was established in 1969 and lies within the boundary of Charles M. Russell National Wildlife Refuge.

Encompassing nearly 1.1 million acres—including Fort Peck Reservoir and UL Bend Refuge—Charles

M. Russell National Wildlife Refuge is one of the largest refuges in the lower 48 States. The refuge extends west about 125 air miles along the Missouri River from Fort Peck Dam to the refuge’s western edge at the boundary of the Upper Missouri River Breaks National Monument. A portion of the Missouri River along the refuge’s western boundary is part of Upper Missouri National Wild and Scenic River. This expansive refuge covers parts of six counties: Fergus, Garfield, McCone, Petroleum, Phillips, and Valley.

Refuge habitat includes native prairie, forested coulees, river bottoms, and badlands. Wildlife is as diverse as the topography and includes elk, mule deer, white-tailed deer, pronghorn, bighorn sheep, sharp-tailed grouse, prairie dogs, and more than 236 species of birds.

UL Bend National Wildlife Refuge contains the 20,819-acre UL Bend Wilderness, and Charles M. Russell National Wildlife Refuge has 15 proposed wilderness units totaling 155,288 acres.

More than 250,000 refuge visitors take part in wildlife-dependent recreational activities every year. In particular, the refuge is renowned for its outstanding hunting opportunities. Other visitors enjoy viewing and photographing wildlife along the refuge’s extensive network of roads. The Fort Peck Interpretive Center showcases an aquarium of native and game fish, other wildlife, and several casts of dinosaur fossils including a *Tyrannosaurus rex*. Still other visitors enjoy fishing along the Missouri River or on Fort Peck Reservoir.

VISION

The vision describes the focus of refuge management and portrays a picture of the refuge in 15 years.

Charles M. Russell National Wildlife Refuge’s expansive badlands, cottonwood river bottoms, old-growth forested coulees, sagebrush steppes, and mixed-grass prairies appear out of the sea that is the northern Great Plains.

Encompassing more than a million acres, the refuge affords visitors solitude, serenity, and unique opportunities to experience natural settings and wildlife similar to what Native Americans and, later, Lewis and Clark observed.

The diversity of plant and animal communities found on the refuge stretch from the high prairie through the rugged breaks, along the Missouri River, and across Fort Peck Reservoir. The refuge is an outstanding example of a functioning, resilient, and intact landscape in an ever-changing West.

Working together with our neighbors and partners, the Service employs adaptive management rooted in science to protect and improve the biological integrity, biological diversity, and environmental health of the refuge’s wildlife and habitat resources.

MANAGEMENT DIRECTION

The comprehensive conservation plan directs the management of Charles M. Russell National Wildlife Refuge and UL Bend National Wildlife Refuge to meet the purposes of the refuges, address issues, and guide management to meet the refuge vision. The plan is a broad umbrella of general concepts and goals, with specific objectives for habitat, wildlife, research, fire, public use, wilderness, cultural and paleontological resources, refuge operations, and partnerships for the next 15 years. As the plan is implemented, the Service will develop stepdown plans with details for carrying out the objectives.

The following goals direct work toward achieving the purposes and vision of the refuge. Each goal is followed by the general approach for managing refuge resources to meet the goal.

GOAL for HABITAT and WILDLIFE MANAGEMENT

Conserve, restore, and improve the biological integrity, environmental health, and ecological diversity of the refuge's plant and animal communities of the Missouri River Breaks and surrounding prairies to support healthy populations of native plants and wildlife in a changing climate. Working with others, reduce and control the spread of nondesirable, non-native, invasive plant and aquatic species for the benefit of native communities on and off the refuge.

Where feasible, the Service will apply management practices that mimic and restore natural processes on the refuge, managing for a diversity of plant spe-



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Big game management includes objectives for mule deer.

cies and wildlife species in upland and riparian areas. This includes a concerted manipulation of habitats or wildlife populations (using prescribed fire and grazing and hunting) through coordinated objectives. Management will evolve toward more passive approaches, allowing natural processes such as fire, grazing, and flooding to occur with less human aid or money. In collaboration with the Montana Department of Fish, Wildlife and Parks and others, the Service will maintain the health and diversity of all species' populations including focal birds and other migratory birds, threatened and endangered species, species of concern, game species, and nongame species by restoring and maintaining balanced, self-sustaining populations. This could include manipulating livestock grazing and wildlife numbers, or



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Eight goals guide management of the 1.1 million-acre refuge.

both, if habitat monitoring found that conditions were declining or plant species were being affected by overuse.

During the development of habitat management plans, the Service will cooperate with the Montana Department of Fish, Wildlife, and Parks to establish population levels, sex and age composition targets, and harvest strategies that are jointly agreed to and tailored to the varied habitat potential on the refuge.

Integrated pest management will be carried out. Predators will be managed to benefit the ecological integrity of the refuge. Limited hunting for mountain lion or other furbearers or predators will be considered only after monitoring verified that population levels could be sustained with a hunt.

The Service will remove interior fences to facilitate management of environmental processes including patch burning and long-distance movement of animals. Generational transfer of permits will continue; however, the Service will implement prescriptive grazing across most of the refuge (50–75 percent within 6–9 years and continue the progression over 15 years). In sensitive areas like river bottoms, fencing would be used to exclude livestock except at designated water gaps (areas where livestock can access water).

Based on climate change predictions and following Service and departmental policies and initiatives, the Service will identify (1) species of plants that are likely to be first to decline, (2) animals that are associated with these plant species including insects, birds, and mammals, and (3) species of plants and animals that could increase. Additionally, the Service will design science-based, long-term monitoring protocols to document changes in plant and animal composition or health due to climate change. The Service will coordinate with adjoining agencies and partners to immediately alleviate declines, if needed, using tools such as prescriptive grazing, prescribed fire, or flooding. The Service will do the following:

- maintain the small wind turbine and consider installing solar panels or more small wind turbines for offices and field stations
- continue recycling and provide more recycling bins
- replace vehicles with more fuel-efficient vehicles
- increase energy efficiency and adopt other ways to reduce the carbon footprint such as use of teleconferencing instead of meetings, turning off lights, and turning down heat
- consider what conditions precipitated by climate change the refuge may deal with such as increased drought, longer fire seasons, hotter fires, loss or increase of plant and wildlife species, change in migration patterns, and relocation of species
- study and promote the carbon sequestration benefits of the refuge

GOAL for THREATENED and ENDANGERED SPECIES and SPECIES OF CONCERN

Contribute to the identification, preservation, and recovery of threatened and endangered species and species of concern that occur or have historically occurred in the northern Great Plains.

The Service will protect or enhance populations of threatened and endangered species such as the black-footed ferret, several bird and fish species, and other species of management concern through research, disease management, population augmentation, or habitat manipulation.

The Service will development management plans for the grizzly bear, in accordance with Federal and State regulations and plans, to address potential immigration of this species to the refuge. With approved Montana Department of Fish, Wildlife and Parks plans, and in cooperation with the Montana Department of Fish, Wildlife, and Parks and others, the Service will consider reintroduction of more black-footed ferrets, swift foxes, and bighorn sheep into the landscape. Predators will be managed as an important component of the wildlife community, and predator management by the U.S. Department of Agriculture will be stopped.

Populations of the black-tailed prairie dog will be expanded to maintain or increase the health and diversity of all species' populations where prairie dogs are a critical component.



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Greater sage-grouse is a species of concern on the refuge.

GOAL for RESEARCH and SCIENCE

Advance the understanding of natural resources, ecological processes, and the effectiveness of management actions in a changing climate in the northern Great Plains through compatible scientific investigations, monitoring, and applied research.

Research and monitoring will be designed to understand the interaction between fire, grazing, plant response, wildlife populations, and other ecological

factors. The Service will adopt an active approach to using livestock grazing as a management tool by shifting from traditional annually permitted grazing to a prescriptive grazing regime for enhancement of wildlife habitats. If monitoring reveals that adequate populations of sentinel plant species are not viable, changes in livestock permitting such as reduced animal unit months or retired permits will be initiated.

The Service will cooperate with Montana Department of Fish, Wildlife and Parks; Bureau of Land Management; Montana Department of Natural Resources and Conservation; conservation organizations; and others to conduct the necessary biological, social, and economic research to determine the feasibility of restoring wild bison on the surrounding landscape.

GOAL for FIRE MANAGEMENT

Manage wildland fire using a management response that promotes fire's natural role in shaping the landscape while protecting values at risk.

The Service will maintain plant diversity and health using fire in combination with wild ungulate herbivory or prescriptive livestock grazing, or both, to ensure the viability of populations of sentinel plants—those plant species that decline first when management practices are injurious—and in concert with other focal bird species or special status wildlife species.

The Service will restore the natural fire regime through an increased use of prescribed fire to increase the viability of fire-dependent plant species. The Service will burn patches of varying size and within the historical fire-return intervals on a rotational basis. This technique will create a mosaic of habitats that (1) restores heterogeneity (more natural diversity in species) within the landscapes, (2) preserves fire refugia and associated plant species, (3) enhances food resources for wildlife, (4) ensures biological diversity and integrity and environmental health, and (5) promotes ecological resilience. Furthermore, some areas could need intensive manipulation with mechanical and hand restoration tools. The Service will minimize the use of fire in other areas to protect species of concern like the greater sage-grouse.

The Service will work with partners to address wildland–urban interface areas at the Pine Recreation Area and other U.S. Army Corps of Engineers recreation areas. In adherence with an approved fire management plan and using historical fire frequency data and current fire conditions, the Service will evaluate each wildfire to determine the management response and whether the wildfire could be used in the patch-burning program or whether the fire should be suppressed.

GOAL for PUBLIC USE and EDUCATION

Provide all visitors quality education, recreation, and outreach opportunities that are appropriate and compatible with the purpose and goals of the refuge and the mission of the National Wildlife Refuge System while maintaining the remote and primitive experience unique to the refuge.

The Service will cooperate with Montana Department of Fish, Wildlife and Parks to provide hunting experiences that keep game populations at levels that meet State objectives, sustain ecological health, and provide opportunities not found on other public lands. Hunting regulations will be designed to provide a variety of quality recreational opportunities including populations with diverse male age structures not generally managed for on other public lands. Opportunities for expanding hunting programs will be considered to encourage and facilitate young hunters and mobility-impaired hunters. Limited hunts for furbearers or other predators will be considered only if monitoring verifies that population levels could be sustained.

Refuge access will be managed primarily to benefit natural processes, but some improvements will be made to provide quality visitor experiences. There are special regulations for public access. Access to State lands will be provided to livestock permittees. Boating and landing sites for seaplanes will be allowed.

Initially, the Service will close about 21 miles of roads and implement a seasonal closure along 2.4 miles of road 315. Thirteen miles of roads on the northeast side of the refuge will be designated as motorized-access, game-retrieval roads where seasonal closures are applied to restrict access to sensitive river and road areas. Other closures or modifications could be necessary after further review of the road program. This will encourage free movement of wildlife, permit prescribed fire or wildfire suppression activities, and increase effective harvest of wild ungulates.

Additionally, the Service may upgrade about 5 miles of roads to all-weather access (gravel), allow for more winter fishing access, and expand opportunities for quality wildlife observation, interpretation, and environmental education by adding trails, viewing blinds, and a science interpretive center.

GOAL for WILDERNESS

Conserve, improve, and promote the wilderness character and associated natural processes of designated and proposed wilderness areas and wilderness study areas within the refuge for all generations.



Brett Billings / USFWS

Fishing is a popular activity at the refuge.

The Service will expand or adjust existing proposed wilderness units by 19,942 acres in Alkali Creek, Antelope Creek, Crooked Creek, East Seven Blackfoot, Mickey Butte, Sheep Creek, Wagon Coulee, and West Hell Creek. Additions to these proposed wilderness units are referred to as wilderness study areas. Roads will be closed in proposed wilderness units and in wilderness study areas except roads that provide access to private land within the refuge.

The UL Bend Wilderness will be protected and managed as a class 1 air shed.

GOAL for CULTURAL and PALEONTOLOGICAL RESOURCES

Identify, value, and preserve the significant paleontological and cultural resources of the refuge to connect refuge staff, visitors, and the community to the area's prehistoric and historic past.

The Service will protect and manage significant cultural and paleontological resources found at the refuge.

GOAL for REFUGE OPERATIONS and PARTNERSHIPS

Through effective communication and innovative use of technology and resources, the refuge uses funding, personnel, partnerships, and volunteer programs for the benefit of natural resources while recognizing the social and economic connection of the refuge to adjacent communities.

The Service will protect areas with special designations such as historic trails, landmarks, research areas, and scenic rivers.

For lands not needed by U.S. Army Corps of Engineers, the Service will coordinate a jurisdiction transfer. The Service will adhere to legal obligations of rights-of-way for access to private and State lands. There will be an exchange of State lands within the refuge boundary where feasible. The Service will acquire priority lands within the refuge boundary from willing sellers.

The Service will collaborate with partners to carry out the plan. Accessible opportunities will be provided through partnerships.

Abbreviations

ATV	all-terrain vehicle
AUM	animal-unit month
BCR 17	Badlands and Prairies Bird Conservation Region
BLM	Bureau of Land Management
CCP	comprehensive conservation plan
CFR	Code of Federal Regulations
CO₂	Carbon dioxide
DNRC	Montana Department of Natural Resources and Conservation
DOI	U.S. Department of the Interior
EIS	environmental impact statement
Enhancement Act	Title VIII of the Water Resources Development Act of 2000
FWS	U.S. Fish and Wildlife Service
GIS	Geographic Information System
GPS	Global Positioning System
GS	General Schedule (employment type)
HDP	height–density plot
HMP	Habitat Management Plan
IMPLAN	Impact Analysis for Planning
Improvement Act	National Wildlife Refuge System Improvement Act of 1997
MFWP	Montana Department of Fish, Wildlife and Parks
MIAG	Montana/Idaho Airshed Group
NRCS	Natural Resources Conservation Service
Refuge System	National Wildlife Refuge System
region 6	Mountain–Prairie Region of the U.S. Fish and Wildlife Service
RLGIS	Refuge Land Geographic Information System
Service	U.S. Fish and Wildlife Service
TEA–21	1998 Transportation Equity Act for the 21st Century
TES	threatened and endangered species
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFS	USDA Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WG	wage grade (employment type)
WSA	wilderness study area

Definitions of these and other terms are in the glossary, located after chapter 4.

1—Introduction

In 2012, the U.S. Fish and Wildlife Service (Service) completed this 15-year comprehensive conservation plan (CCP) to guide management and use of the Charles M. Russell National Wildlife Refuge and the UL Bend National Wildlife Refuge in north-central Montana. Following publication of the final CCP and environmental impact statement (EIS), the Regional Director of the Mountain–Prairie Region selected the preferred alternative for implementation, which becomes this standalone plan (refer to “Appendix A, Record of Decision”).

Located within the boundary of the Charles M. Russell Refuge, UL Bend Refuge is, in essence, a refuge within a refuge (see vicinity map in figure 1). The Service manages these refuges as one refuge. Together, they encompass an area of 1.1 million acres that span about 125 air miles along the Missouri River, from the Fort Peck Dam west to the boundary with the Upper Missouri River Breaks National Monument. Throughout this document, the two refuges are referred to as “the refuge” unless individually named.

Figure 2 shows landownership in and around the refuge (refer to chapter 2 for a description of the refuge history). Where USACE holds primary jurisdiction and the refuge has secondary jurisdiction, a memorandum of understanding guides how habitat and wildlife resources are managed (refer to chapters 2 and 4).

Wildlife conservation is the first priority in managing national wildlife refuges. Public uses, specifically wildlife-dependent recreational uses, are allowed and encouraged as long as they are compatible with the refuge’s purposes.

In preparing this document, the Service complied with the National Wildlife Refuge System Administration Act of 1966, as amended (16 U.S.C. 668dd et seq.), also known as the National Wildlife Refuge System Improvement Act (Improvement Act) and Part 602 (National Wildlife Refuge System Planning) of the Fish and Wildlife Service Manual (FWS 2000c). Additionally, the actions described meet the requirements of the National Environmental Policy Act of 1969.

The CCP was developed with extensive public input and by working closely with agencies and local governments that have close ties to the refuge. The core planning team of representatives from several Service programs (refer to “Appendix B, List of Preparers and Contributors”) prepared the draft and final documents. The following cooperating agencies participated on the planning team:

- U.S. Army Corps of Engineers (USACE)
- Bureau of Land Management (BLM)
- Montana Department of Fish, Wildlife and Parks (MFWP)
- Montana Department of Natural Resources and Conservation (DNRC)
- Counties of Fergus, Garfield, McCone, Petroleum, Phillips, and Valley
- Missouri River Conservation Districts Council, representing the six conservation districts next to the refuge

Public involvement throughout the planning process is discussed in section 1.7 below and in detail in “Appendix C, Public Involvement Summary.”



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About 276 bird species, including the burrowing owl, have been recorded on the refuge.

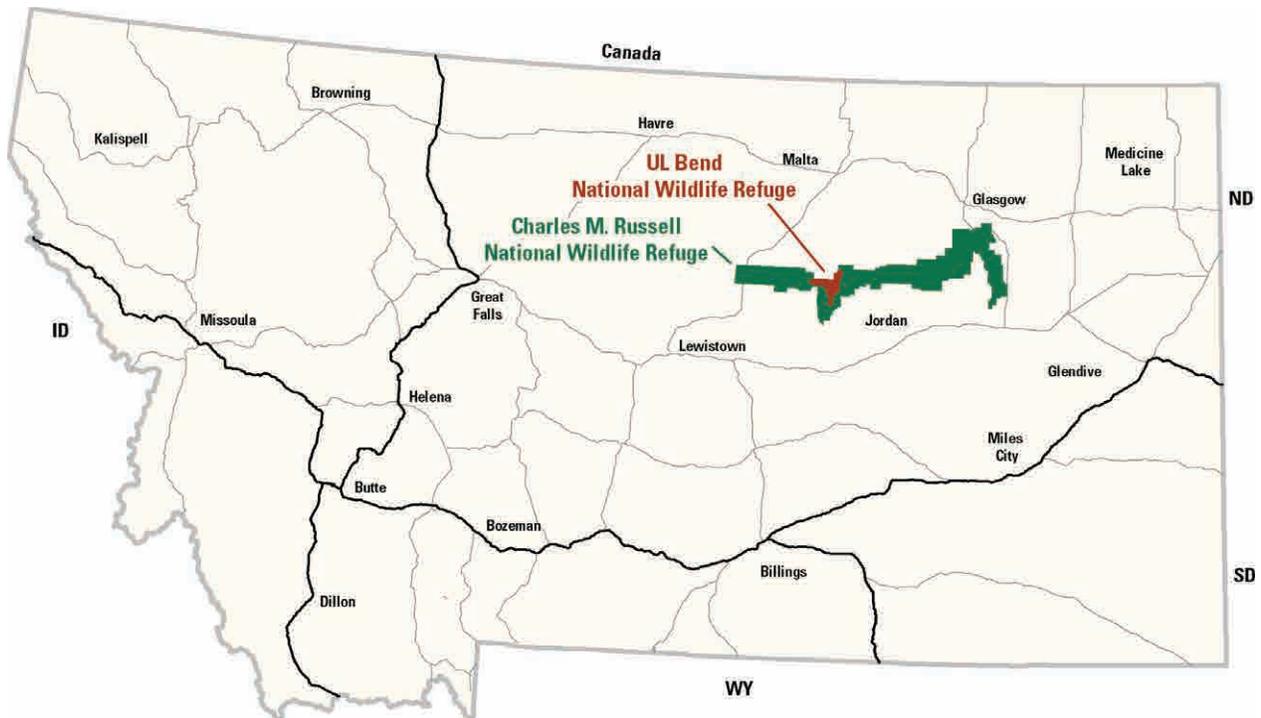


Figure 1. Vicinity map for the Charles M. Russell and UL Bend Refuges, Montana.

After reviewing a wide range of management needs and public comments during three public comment periods (scoping, draft alternatives, and draft CCP and EIS), the Service completed the final CCP and EIS, which contains the environmental analysis and responses to public comments. This CCP is the standalone plan. “Chapter 4, Management Direction” details the objectives and strategies that will be carried out based on the record of decision (appendix A).

The CCP describes program levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning purposes. The CCP specifies the necessary actions to achieve the vision and goals of the refuge. The plan will guide the management, programs, and actions for 15 years.

1.1 PURPOSE and NEED for ACTION

The purpose of the CCP is to identify the role the refuge will play in support of the mission of the National Wildlife Refuge System (Refuge System) and to provide long-term guidance for management of refuge programs and activities. The CCP is needed:

- to communicate with the public and other partners in efforts to carry out the mission of the Refuge System;

- to provide a clear statement of direction for management of the refuge;
- to provide neighbors, visitors, and government officials with an understanding of the Service’s management actions on and around the refuge;
- to ensure that the Service’s management actions are consistent with the mandates of the Improvement Act;
- to ensure that management of the refuge considers other Federal, State, and local government plans;
- to provide a basis for development of budget requests for the operation, maintenance, and capital improvement needs of the refuge.

The Service is committed to sustaining the Nation’s fish and wildlife resources together through the combined efforts of governments, businesses, and private citizens.

1.2 The U.S. FISH and WILDLIFE SERVICE and REFUGE SYSTEM

The Service is the principal Federal agency responsible for fish, wildlife, and plant conservation. The Refuge System is one of the Service’s major programs.



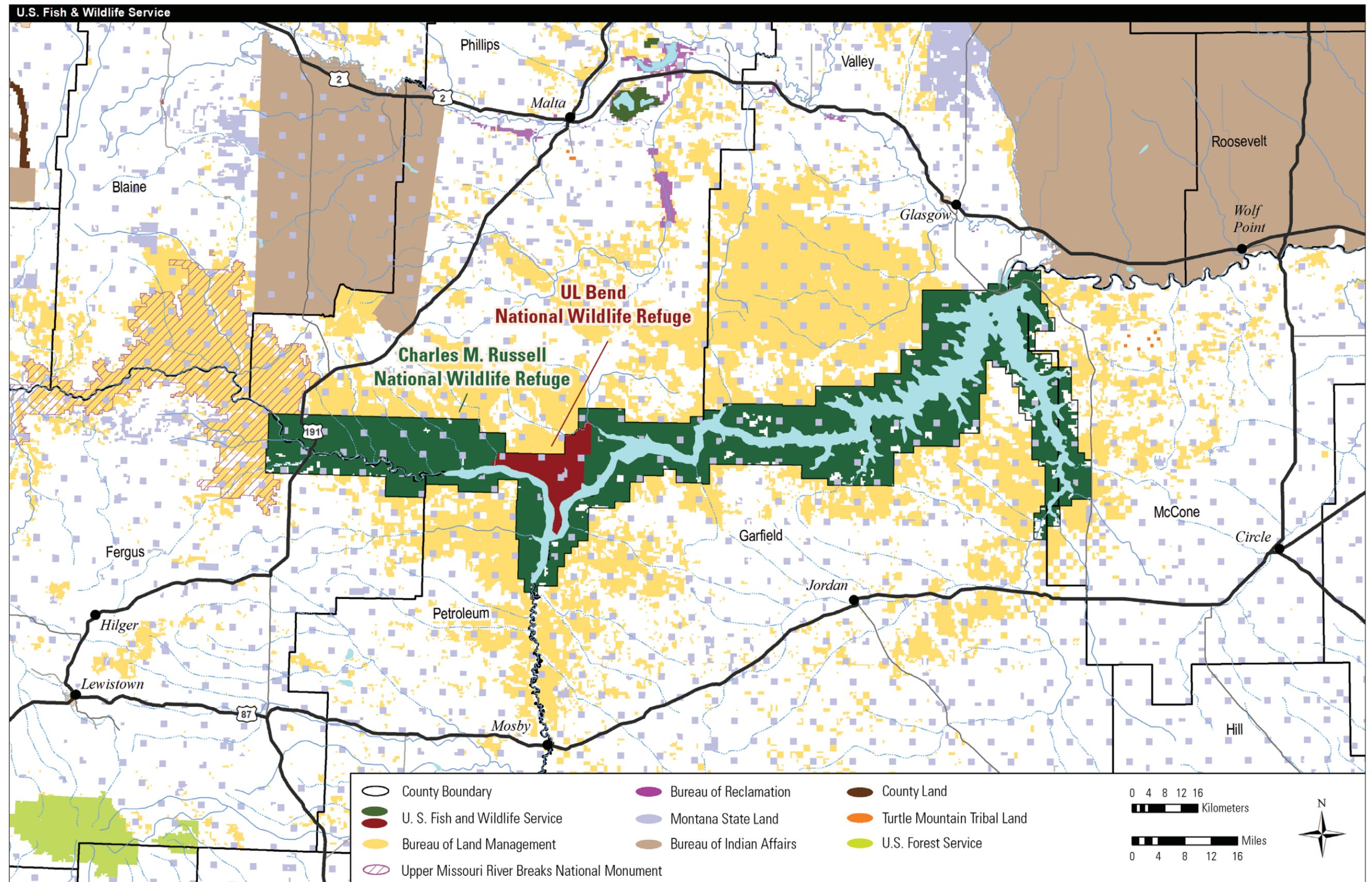


Figure 2. Map of landownership in and around the Charles M. Russell and UL Bend Refuges, Montana.

U.S. FISH and WILDLIFE SERVICE

The Service was established in the Department of the Interior (DOI) in 1940, through the consolidation of bureaus then operating in several Federal departments. The primary precursor agency was the Bureau of Biological Survey in the U.S. Department of Agriculture (USDA). Today, the Service enforces Federal wildlife laws, manages migratory bird populations, restores nationally significant fisheries, conserves and restores vital wildlife habitat, protects and recovers endangered species, and helps other governments with conservation efforts. In addition, the Service administers a Federal aid program that distributes hundreds of millions of dollars to States for fish and wildlife restoration, boating access, hunter education, and related programs.

Our mission is working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

Service Activities in Montana

Service activities in Montana contribute to the State's economy, ecosystems, and education programs. The following list describes the Service's presence and activities:

- Management of two national fish hatcheries, one fish health center, one fish technology center, four ecological services field offices, and one fish and wildlife management assistance office (FWS 2010a).

- Management of 23 national wildlife refuges encompassing 1,228,575 acres (FWS 2010a).
- Management of five wetland management districts (FWS 2010a).
- Management of 209,479 acres of waterfowl production areas (includes fee-title lands, easements, or leases) (FWS 2010a).
- Annually provides millions of dollars to MFWP for sport fish and wildlife restoration and hunter education (FWS 2009f).
- For more than 20 years, the Service's Partners for Fish and Wildlife program has helped private landowners restore about 33,000 wetland acres on 2,715 sites, 388,760 upland acres, and 1,288 miles of river and stream channel habitat (FWS 2008a).
- In 2009, payment to Montana counties of \$371,727 under the Refuge Revenue Sharing Act for use in schools and for roads (FWS 2010b).

NATIONAL WILDLIFE REFUGE SYSTEM

In 1903, President Theodore Roosevelt designated the 5.5-acre Pelican Island in Florida as the Nation's first wildlife refuge for the protection of brown pelicans and other native, nesting birds. This was the first time the Federal Government had set aside land for wildlife. This small but significant designation was the beginning of the National Wildlife Refuge System.

One hundred years later, the Refuge System has become the largest collection of lands in the world specifically managed for wildlife, encompassing more than 550 units that total 150 million acres (FWS 2009e). Today, there is at least one refuge in every State and in five U.S. territories and Commonwealths. These units of the Refuge System



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Elk grazing on the refuge under bright fall colors.

vary widely in size, purpose, origin, climate, level of development and use, and degree of Federal ownership (Fischman 2005, FWS 2011d).

Before 1997, most refuge-establishing statutes authorizing acquisition of national wildlife refuge lands gave broad authority to the Service for managing lands for wildlife. However, in many cases the establishing authorities lacked specific direction or procedures for uniform management of the acquired and reserved lands. To resolve this, Congress passed two statutes in the 1960s to provide administrative guidance: Refuge Recreation Act of 1962 and National Wildlife Refuge System Administration Act of 1966. While the Administration Act of 1966 consolidated the units under the Service's jurisdiction, it still did not meet its goal of giving clear direction for Refuge System management. The Administration Act gave the Secretary of the Interior broad power to determine what secondary uses could occur on national wildlife refuges but did not provide any biological standards or other standards of review outside of the establishing purposes. Furthermore, Congress did not specify a definition for compatible uses or provide any other direction on making such a determination (Tredennick 2000).

In the late 1980s, a decline in migratory bird populations prompted a General Accounting Office study of wildlife practices affecting the Service's ability to reverse the decline with refuge lands (General Accounting Office 1989, U.S. House of Representatives 1997). The report concluded that the management of secondary uses of refuges diverted refuge managers' attention and scarce resources away from wildlife management. In the early 1990s, several environmental organizations sought to end recreational and economic uses on refuges because of alleged incompatibility with wildlife conservation and challenged the Service through several lawsuits (Tredennick 2000). Eventually, the Service settled the lawsuits by changing or eliminating several existing uses on refuge lands. The pressure for new legislation intensified as a direct result of these lawsuits combined with other issues, and the ground was laid for passage of a bill that would give the Service a clear mission and help resolve the problems of the past (U.S. House of Representatives 1997). Finally, on October 9,

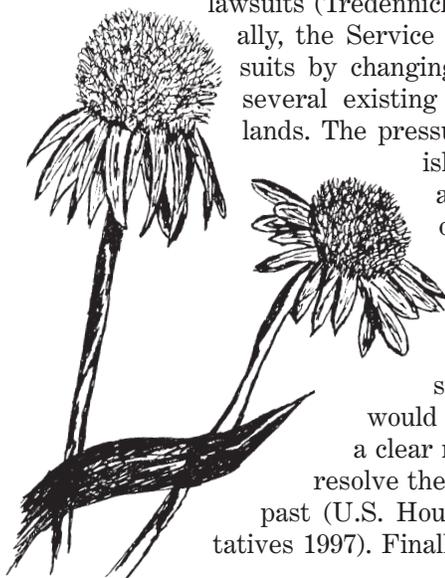
1997, Congress passed into law the National Wildlife Refuge System Improvement Act of 1997. The Improvement Act established a clear vision for the Refuge System.

*The mission of the
National Wildlife Refuge System
is to administer a national network of lands
and waters for the conservation, management,
and where appropriate, restoration of the fish,
wildlife, and plant resources and their habitats
within the United States for the benefit of
present and future generations of Americans.*

The Improvement Act (or associated regulations) states that each national wildlife refuge shall be managed:

- to “fulfill the mission of the System, as well as the specific purposes for which that refuge was established”;
- to consider “wildlife conservation ... [as] the singular National Wildlife Refuge System mission” (Final Compatibility Regulations Pursuant to the National Wildlife Refuge System Improvement Act of 1997);
- to “ensure that the biological integrity, diversity, and environmental health of the System are maintained”;
- to fulfill the requirements of preparing “a comprehensive conservation plan ... for each refuge within 15 years after the date of enactment of the ... Act” and of ensuring opportunities for “public involvement in the preparation and revision of [these] plans”;
- to recognize that “compatible wildlife-dependent recreation [fishing, hunting, wildlife observation and photography, and environmental education and interpretation] is a legitimate and appropriate general public use of the System”;
- to retain the authority of a refuge manager to “make ... the compatibility determination” after exercising “sound professional judgement ... regarding wildlife conservation and uses of the National Wildlife Refuge System” (Final Compatibility Regulations Pursuant to the National Wildlife Refuge System Improvement Act of 1997).

Following passage of the Improvement Act, the Service started carrying out the direction of the new legislation including the preparation of CCPs for all national wildlife refuges and wetland management districts. Consistent with the Improvement Act, the



Service prepares CCPs in conjunction with public involvement. Each refuge and district is required to complete its first CCP within the 15-year schedule, by 2012.

People and the Refuge System

The Nation's fish and wildlife heritage contributes to the quality of American lives and is an integral part of the country's greatness. Wildlife and wild places have always given people special opportunities to have fun, relax, and appreciate the natural world.

Wildlife recreation contributes millions of dollars to local economies, whether through birdwatching, fishing, hunting, photography, or other wildlife pursuits. Nearly 35 million people visited national wildlife refuges in 2006 (Carver and Caudill 2007), mostly to observe wildlife in their natural habitats. Visitors experience nature trails, auto tours, interpretive programs, and hunting and fishing opportunities. Local communities that surround the refuges and districts generate significant economic benefits. Economists report that Refuge System visitors contribute more than \$1.7 billion annually to local economies (Carver and Caudill 2007). These figures do not include Alaska or the Pacific Island refuges, which together hosted more than 2 million visitors in 2006.



USFWS

Hunting is a compatible use on the refuge, which will encourage opportunities for young hunters.

Compatible Refuge Uses

Lands within the Refuge System are different from multiple-use Federal lands. Refuge System lands are closed to all public uses unless specifically and legally opened. A refuge use is not allowed unless the Service finds the use to be appropriate and compatible (FWS 2000a). The Service cannot initiate or permit a new use of a refuge or expand, renew, or extend an existing use of a refuge unless the Secretary has determined that the use is a compatible use and is consistent with public safety. A compatible

use is one that, in the sound professional judgment of the refuge manager, will not materially interfere with, or detract from the fulfillment of the Refuge System mission or the purposes of the refuge. Sound professional judgment is defined as a decision that is consistent with the principles of fish and wildlife management and administration, the available science and resources, and adherence to law.

Compatibility determinations for uses at the refuge are in appendix D. A compatibility determination is the written documentation that a proposed or existing use of a national wildlife refuge is or is not a compatible use. The determination is completed, signed, and dated by the refuge manager with the concurrence of the assistant Regional Director for the Refuge System. Compatibility determinations are typically completed as part of the process for a CCP or stepdown management plan. Once a final compatibility determination is made, it is not subject to administrative appeal.

The Improvement Act states that six priority uses—hunting, fishing, wildlife observation, photography, interpretation, and environmental education—should receive consideration in planning and management over other public uses. All facilities and activities associated with recreational uses, or where there is an economic benefit associated with a use, such as livestock grazing or commercial recreation, require compatibility determinations. However, refuge management activities such as prescribed fire or invasive plant control do not require compatibility determinations.

Biological Integrity, Diversity, and Environmental Health

Central to the Improvement Act is the requirement that the biological integrity, diversity, and environmental health of the Refuge System be maintained for the benefit of present and future generations of Americans. In 2001, the Service published a policy with guidance on this topic (FWS 2001). This policy presents a directive for refuge managers to follow while achieving refuge purposes and the Refuge System mission: a refuge manager is to consider the broad spectrum of fish, wildlife, and habitat resources found on the refuge and associated ecosystem. The policy defines the terms biological integrity, diversity, and environmental health and provides direction for allowing secondary economic uses like farming, haying, logging, livestock grazing, and other extractive activities. These are permissible habitat management practices only when prescribed in plans to meet wildlife or habitat management objectives and only when more natural methods, such as fire or grazing by native herbivores, cannot meet refuge purposes and goals.

1.3 NATIONAL and REGIONAL MANDATES

The Service manages Refuge System units to achieve the mission and goals of the Refuge System, along with the designated purposes of the refuges and districts as described in establishing legislation, Executive orders, or other establishing documents. Key concepts and guidance for the Refuge System are in the National Wildlife Refuge System Administration Act of 1966, as amended by the Improvement Act (16 United States Code [U.S.C.] 668dd et seq.) and further detailed in Title 50 of the Code of Federal Regulations (CFR) and the Fish and Wildlife Service Manual.

Brief descriptions of the laws and Executive orders that may affect the development or implementation of this CCP are in “Appendix E, Key Legislation and Policy.” Service policy for the planning process and management of refuges and districts is in the Fish and Wildlife Service Manual and the Refuge Manual.

1.4 REFUGE CONTRIBUTIONS to NATIONAL and REGIONAL PLANS

Refuge resources contribute to the planning and conservation efforts, both regional and national, listed below.

FULFILLING THE PROMISE

A 1999 report, “Fulfilling the Promise—The National Wildlife Refuge System” (FWS 1999a), was the culmination of a yearlong process by teams of Service employees to evaluate the Refuge System nationwide. This report was the focus of the first National Refuge System conference (in 1998), which was attended by refuge managers, other Service employees, and representatives from leading conservation organizations. The report contains 42 recommendations packaged with three vision statements dealing with wildlife and habitat, people, and leadership. The outcome of that effort continues to influence CCP planning both nationally and locally.

BIRD CONSERVATION

During the past few decades, there has been growing interest in conserving birds and their habitats. This has led to the development of partnership-based bird conservation initiatives that have produced international, national, and regional conservation plans. The

North American Bird Conservation Initiative Committee was started in 1999. This coalition of government agencies, private organizations, and bird initiative groups in the United States, Canada, and Mexico is working to advance and integrate bird conservation efforts. The primary conservation planning initiatives follow: Partners In Flight North American Landbird Conservation Plan, North American Waterfowl Management Plan, U.S. Shorebird Conservation Plan, and North American Waterbird Conservation Plan. The refuge’s role is described below for the Partners in Flight plan and the North American Waterfowl Management Plan.

Partners in Flight

The Partners in Flight program began in 1990 with the recognition of declining population levels of many migratory bird species. The program’s primary goal is to provide for the long-term health of birdlife in North America. Priorities include the following: (1) prevent the rarest species from going extinct; (2) prevent uncommon species from descending into threatened status; and (3) “keep common birds common” (Partners in Flight 2010).

For planning purposes, Partners in Flight splits North America into seven groupings of birds by ecological area, avifaunal biomes, and 37 conservation regions (see figure 3). The refuge lies within Bird Conservation Region 17—Badlands and Prairies (North American Bird Conservation Initiative



Yellow-headed blackbirds nest on the refuge.

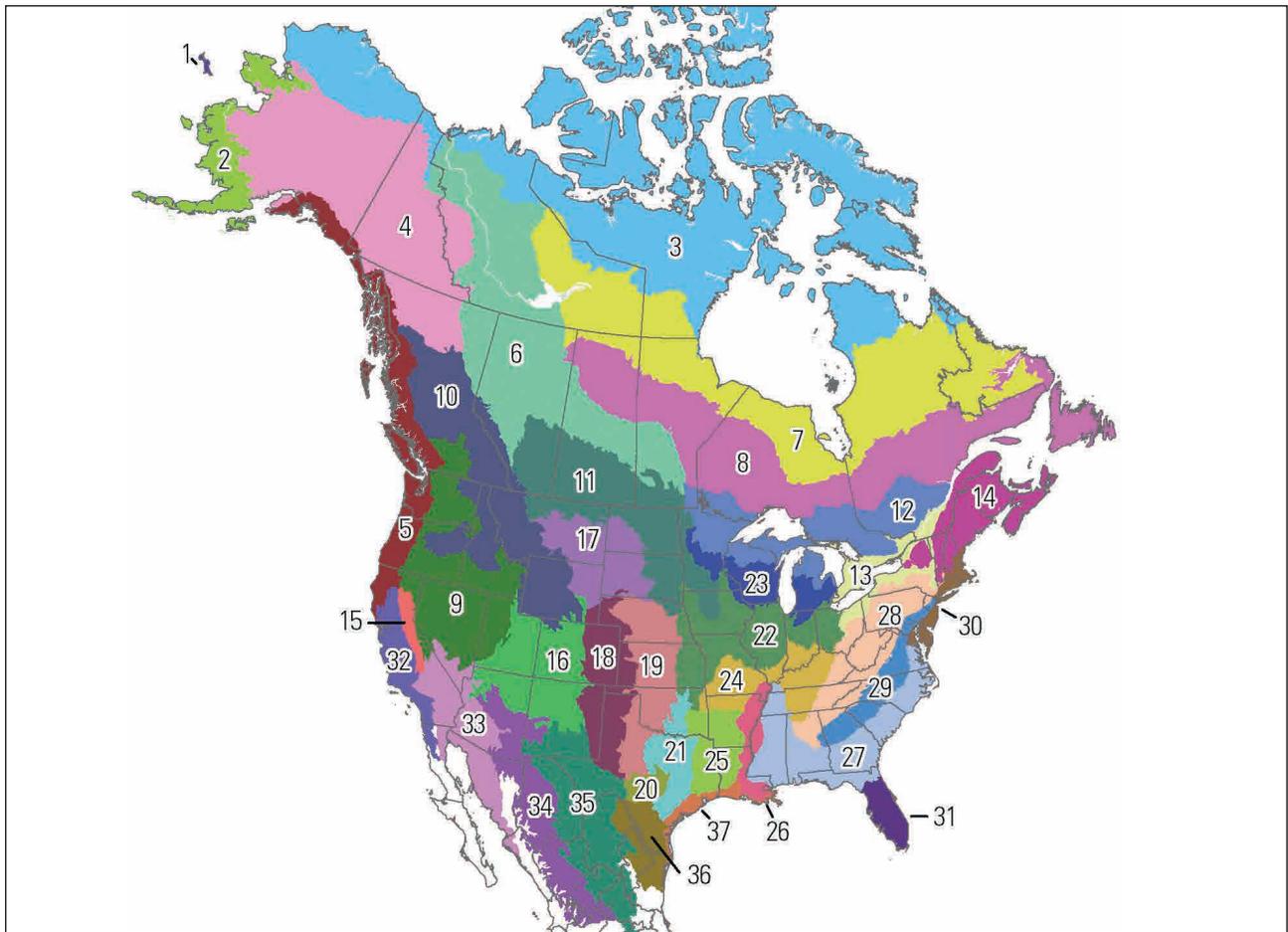


Figure 3. Map of the bird conservation regions in North America.

2009). Region 17 is a semiarid plain dominated by mixed-grass prairie. Importantly, this region provides habitat for some of the healthiest populations of high-priority, dry-grassland bird species on the continent including greater sage-grouse, Sprague's pipit, mountain plover, McCown's longspur, and long-billed curlew.

Focal birds are species representative of a broader group of species that share similar conservation needs. They are a subset of the list of the Service's 2009 Birds of Management Concern (FWS 2011c) and are chosen based on one of five criteria: (1) high conservation need; (2) representative of a broader group of species sharing the same or similar conservation needs; (3) high level of current Service effort; (4) potential to stimulate partnerships; and (5) high likelihood that factors affecting status can realistically be addressed.

As discussed in chapter 3, section 3.2, and chapter 4, section 4.2, many of the Region 17 species are found on the refuge.

North American Waterfowl Management Plan

By 1985, waterfowl populations had plummeted to record lows, with waterfowl habitat disappearing

at a rate of 60 acres per hour. The North American Waterfowl Management Plan envisioned a 15-year effort to achieve landscape conditions that could sustain waterfowl populations. Specific objectives of the plan are to increase and restore duck populations to the average levels of the 1970s: 62 million breeding ducks and a fall flight of 100 million birds.

Recognizing the importance of waterfowl and wetlands to North Americans and the need for international cooperation to help recover a shared resource, the United States and Canada Governments developed a strategy to restore waterfowl populations through habitat protection, restoration, and enhancement. Mexico signed the plan in 1994. The plan is innovative because of its international scope plus its implementation at the regional level (DOI [FWS], SEMARNAP Mexico, Environment Canada 1998).

The success of the waterfowl management plan depends on the strength of partnerships called joint ventures, which involve Federal, State, provincial, tribal, and local governments; businesses; conservation organizations; and individual citizens. Joint ventures are regional, self-directed partnerships that carry out science-based conservation through

community participation. Joint ventures develop implementation plans that focus on areas of concern identified in the plan. The refuge is part of the Northern Great Plains Joint Venture (FWS 2009b).

RECOVERY PLANS for THREATENED and ENDANGERED SPECIES

Where federally listed threatened or endangered species occur at the Charles M. Russell and UL Bend Refuges, the refuge staff adheres to the management goals and strategies in the recovery plans. The list of threatened and endangered species at the refuge changes as species are listed or delisted or as listed species are discovered on refuge lands. Currently, the refuge follows the recovery and management plans for black-footed ferret, pallid sturgeon, piping plover, and least tern. In 1994, the Service released black-footed ferrets into prairie dog towns on the refuge. Since their release, the ferrets have suffered from canine distemper and starvation due to the devastation of their main food source, prairie dogs, caused by the sylvatic plague (refer to “Chapter 3, Refuge Resources and Description”).

STATE COMPREHENSIVE FISH and WILDLIFE CONSERVATION STRATEGY

Documented declines of wildlife populations have occurred nationwide over the past several decades. As an ambitious endeavor to take an active hand in keeping species from becoming threatened or endangered, Congress created the State Wildlife Grant program in 2001. This program provides States and territories with Federal money to support wildlife conservation.

Under this program, a State develops a Comprehensive Fish and Wildlife Conservation Strategy that defines an integrated approach to the stewardship of all wildlife species, with emphasis on species of concern and habitats at risk. The goal is to shift focus from single-species management and highly specific individual efforts to a geographically based, landscape-oriented, conservation effort. The Service approves each State’s conservation strategy and administers the State Wildlife Grant money.

Montana’s focus has been on game animals and their habitats from the early years of fish and wildlife management, and hunters and anglers have provided most of MFWP’s funding. MFWP intends to keep its focus on important game species and maintains that conserving particular types of habitat will benefit a variety of game and nongame species. With Montana’s Comprehensive Fish and Wildlife Conservation Strategy and State Wildlife Grant money in place, MFWP believes that managing fish and wildlife more comprehensively is a natural progression in the effective conservation of Montana’s remarkable fish and wildlife resources (MFWP 2005a).

Although game species are included in Montana’s conservation strategy, the priority is species and their related habitats “in greatest conservation need.” This means identifying focus areas or community types that are significantly degraded or declining, federally listed species and other declining populations, and areas where important distribution and occurrence information needed to assess the status of individuals and groups of species are lacking.

The planning team reviewed Montana’s Comprehensive Fish and Wildlife Conservation Strategy and used the information during the development of the final CCP and EIS (MFWP 2005a). Implementation of the CCP’s habitat goals and objectives will support the goals and objectives of the State conservation strategy.

1.5 STRATEGIC HABITAT CONSERVATION

In the face of escalating challenges such as land use conversion, invasive species, water scarcity, and complex issues that have been amplified by accelerating climate change, the Service has evolved from its ecosystem approach of thinking about conservation to developing a broader vision.

A cooperative effort by the Service and U.S. Geological Survey (USGS) culminated in a report by the National Ecological Assessment Team (USGS 2006). The report outlines a unifying adaptive resource management approach for conservation at a landscape scale, the entire range of a priority species or suite of species. This is strategic habitat conservation—a way of thinking and doing business by incorporating biological goals for priority species populations, by making strategic decisions about the work needed, and by constantly reassessing.

Since 2006, the Service has taken significant steps to turn this vision into reality and has defined a framework of 22 geographic areas. Experts from the Service and USGS developed this framework through an aggregation of bird conservation regions (figure 3). The Charles M. Russell and UL Bend Refuges lie in the Plains and Prairie Potholes Geographic Area (figure 4). Key issues in this geographic area are conservation of paddlefish, pallid sturgeon, waterfowl, shorebirds, grassland birds, and black-footed ferret.

The Service is using the framework as the basis to locate the first generation of landscape conservation cooperatives. These cooperatives are conservation-science partnerships between the Service and other Federal agencies, States, tribes, nongovernmental organizations, universities, and others. Designed as fundamental units for planning and science, the cooperatives have the capacity to help the Service carry

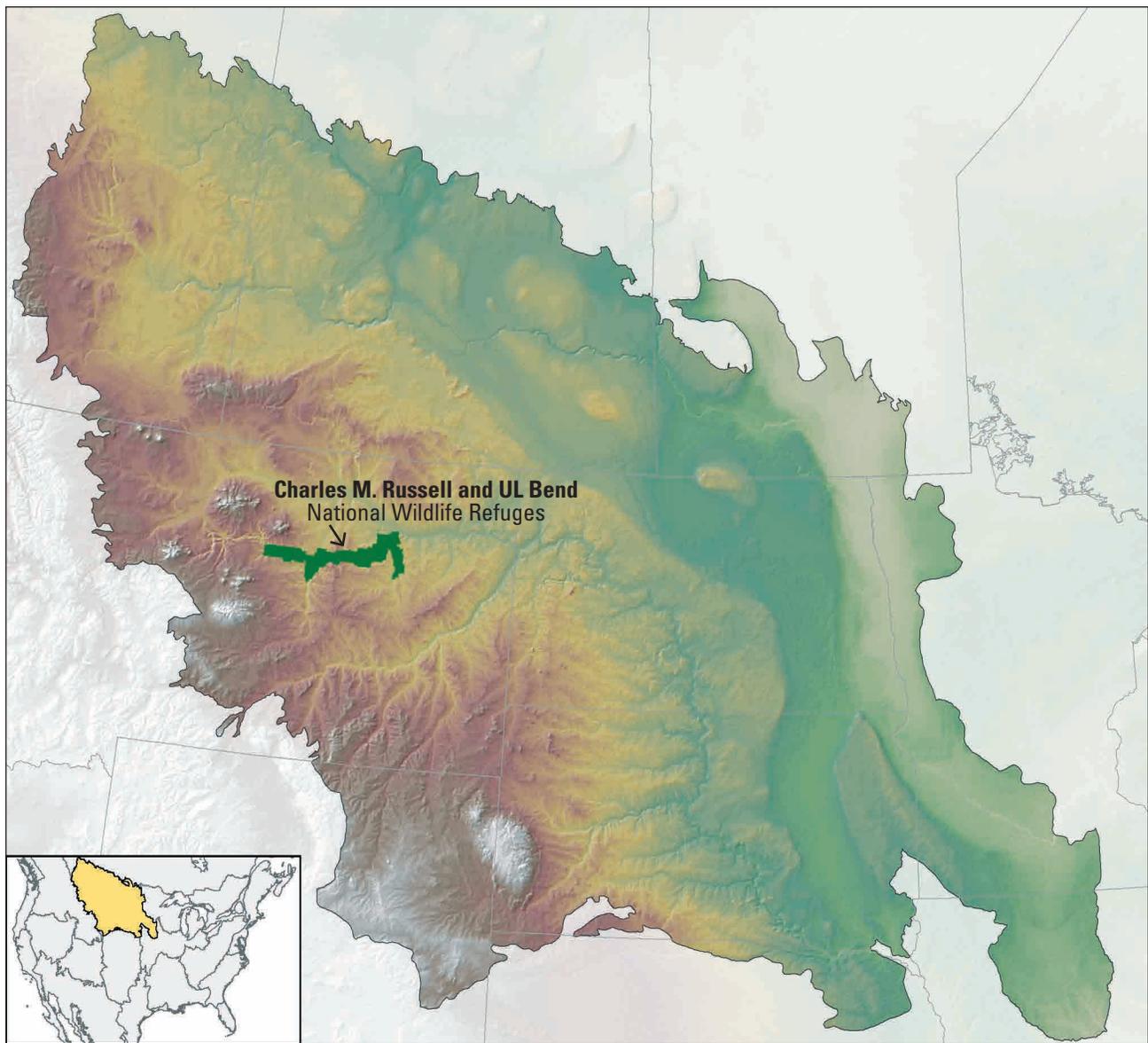


Figure 4. Map of the Plains and Prairie Potholes Geographic Area in North America.

out the elements of strategic habitat conservation: biological planning, conservation design and delivery, and monitoring and research. Coordinated planning and scientific information will strengthen the Service’s strategic response to accelerating climate change.

CLIMATE CHANGE

The Service expects that accelerating climate change will affect the Nation’s fish, wildlife, and plant resources in profound ways. While many species will continue to thrive, some may decline and in some instances go extinct. Others will survive in the wild only through direct and continuous intervention by managers. In 2010, the Service completed a strategic plan to address climate change for the next 50 years. The strategic plan employs three key strat-

egies: adaptation, mitigation, and engagement. In addition, the plan acknowledges that no single organization or agency can address climate change without allying itself with others in partnerships across the Nation and around the world (FWS 2010c). This strategic plan is an integral part of DOI’s strategy for addressing climate change as expressed in Secretarial Order 3289 (DOI 2009).

The Service will use the following guiding principles from the strategic plan (FWS 2010c) in responding to climate change:

- *Priority Setting*—Continually evaluate priorities and approaches, make difficult choices, take calculated risks, and adapt to climate change.
- *Partnership*—Commit to a new spirit of coordination, collaboration, and interdependence with others.

- *Best Science*—Reflect scientific excellence, professionalism, and integrity in all the Service’s work.
- *Landscape Conservation*—Emphasize the conservation of habitats within sustainable landscapes, applying the Service’s strategic habitat conservation framework.
- *Technical Capacity*—Assemble and use state-of-the-art technical capacity to meet the climate change challenge.
- *Global Approach*—Be a leader in national and international efforts to meet the climate change challenge.

1.6 PLANNING PROCESS

In 2000, the Service issued its Refuge System planning policy (FWS 2000c). The resulting requirements and guidance for refuge and district plans, including CCPs and stepdown management plans, ensure that planning efforts comply with the Improvement Act. The planning policy sets out the steps of the CCP and environmental analysis process (see figure 5).

The Service began the pre-planning step for the refuge’s CCP in June 2007 with the establishment of a core planning team comprising Service personnel from the refuge and region 6. Appendix B lists the planning team members, cooperating agency members, contributors, and consultants for this planning process.

The core team was responsible for the analysis, writing, and production of the draft and final versions of the CCP and EIS. Together with the entire refuge staff, the core team developed a preliminary vision and set of goals for the refuge. The cooperating agencies (refer to section 1.7) are part of the larger planning team, which met throughout the process to develop and review the alternatives and to review drafts of the CCP and EIS.

While developing the CCP, the planning team collected available information about the resources of the refuge and surrounding area. This information is summarized in chapter 3 and served as the baseline for analyzing the predicted effects of alternatives (documented in the final CCP and EIS). Table 1 lists these and many other planning activities that occurred.

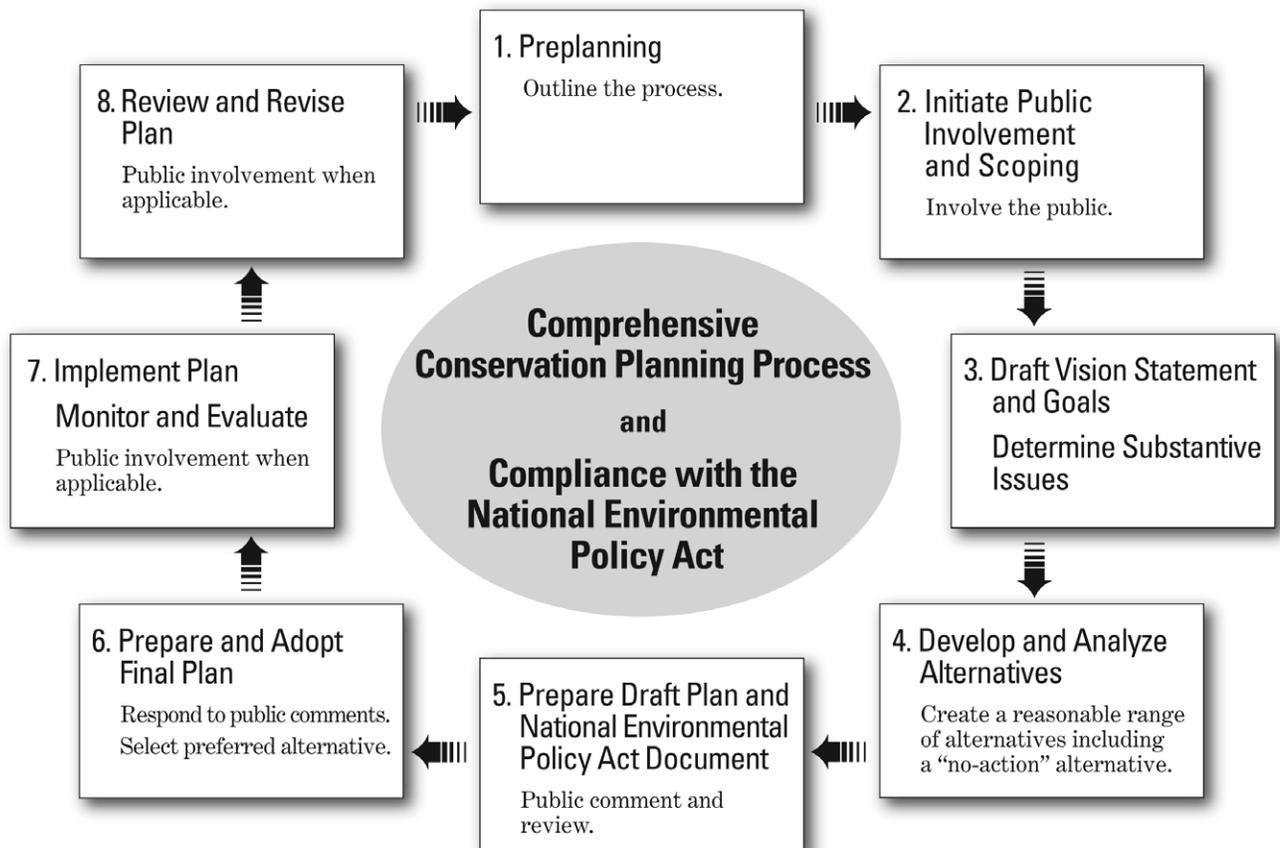


Figure 5. The process for comprehensive conservation planning and environmental analysis.

Table 1. Planning process summary for the comprehensive conservation plan for the Charles M. Russell and UL Bend Refuges, Montana.

<i>Date</i>	<i>Planning activity</i>	<i>Outcome</i>
June 2007	Initial site meeting	Finalization of planning team. Identification of refuge purposes and initial list of issues and qualities. Development of the CCP overview and mailing list.
October 9–12, 2007	Kickoff meeting and workshop for vision and goals	Update of the list of issues and qualities. Identification of needed biological information and maps. Draft of vision and goals. Process for public scoping.
October 7, 2007	Public Involvement Summary	Report of the planned public involvement process for use as a handout and posting to the CCP Web page.
Fall 2007	Scoping	Notification or briefing about CCP development to State of Montana, Native American tribes, agencies, county commissioners, conservation districts, and organizations.
November 14, 2007	Planning team kickoff	Initial meeting with refuge staff and the planning team.
December 4, 2008	Notice of intent in the Federal Register	Notice of intent to develop a CCP and EIS and a request for comments published in the Federal Register (scoping comments accepted until February 29, 2008).
January 2008	Planning Update 1	Announcement of dates, location, and format of public meetings; and description of the draft vision and goals. Distribution of update to the mailing list and posting to the CCP Web page.
January 28–30, 2008 February 4–6, 21, 2008	Public scoping meetings	People in six adjacent communities informed about the refuge and CCP development.
April 2008	Scoping report	Documentation of public comments from the comment period and identification of significant issues. Posting of report to the CCP Web page.
April 29–May 1, 2008	Planning team meeting for draft alternatives	Development, discussion, and revision of draft alternatives with refuge staff and the planning team.
May 2008	Planning Update 2	Summary of issues identified during the scoping process. Distribution of update to the mailing list and posting to the CCP Web page.
August 6, 2008	Draft alternatives	Release to the public of four draft alternatives. Posting of draft alternatives to the CCP Web page.
August 2008	Planning Update 3	Summary of four alternatives and schedule for the alternative workshops. Distribution of update to the mailing list and posting to the CCP Web page.
September 2–4, 15–17, 2008	Public workshops for draft alternatives	Input on draft alternatives from people in six communities.
January 2009	Planning Update 4	Summary of comments received on the draft alternatives. Distribution of the update to the mailing list and posting to the CCP Web page.
January 27–29, 2009	Biological objectives, strategies workshop	Development of biological objectives and strategies for each alternative.
February 24–26, 2009	Public use objectives, strategies workshop	Development of public use objectives and strategies for each alternative.
March 18, 2009	Meeting with MFWP for wildlife objectives	Identification of potential outcomes for the objectives for big game and wildlife reintroductions.
May 12, 2009	Transportation meeting	Development of information on road data and the transportation aspects of the draft alternatives.
March 2009–March 2010	Draft CCP and EIS	Initial development of the draft CCP and EIS.

Table 1. Planning process summary for the comprehensive conservation plan for the Charles M. Russell and UL Bend Refuges, Montana.

<i>Date</i>	<i>Planning activity</i>	<i>Outcome</i>
July 2009	Tribal consultation	Government-to-government consultation with the Fort Peck Tribes and Fort Belknap Tribes about the CCP and EIS process.
April 2010	Internal review of the draft CCP and EIS	Review of the draft plan by other Service programs and cooperating agencies.
June 2010	Internal review meeting	Met with cooperating agencies to review comments on the internal review document.
August 2010	Plan status meeting	Met with cooperating agencies for an update on the status of the draft CCP and EIS.
September–October 2010	Public hearings	Conducted meetings to gather and record public comments on the draft CCP and EIS.
July 2011	Plan progress meeting	Met with cooperating agencies for an update on the progress of the final CCP and EIS.
April 2012	Plan progress meeting	Met with cooperating agencies for an update on the progress of the final CCP and EIS.
May 2012	Publish final CCP and EIS	Release of documents with final changes and public comments.
June 2012	Tribal consultation	Government-to-government consultation with Fort Belknap Tribes and Fort Peck Tribes.
July 2012	Regional Director signs the record of decision	Start implementation of the CCP.

DRAFT CCP and EIS

On September 7, 2010, the draft CCP and EIS was released to the public for a 60-day review and comment period following publication of a notice of availability in the Federal Register (75 FR 54381). The comment period was extended to December 10, 2010 (75 FR 67095). During the comment period, the Service received 20,600 comments. As a result of public comments, the Service made several significant changes to the final CCP and EIS; these changes are summarized in appendix C, section C.7.

FINAL CCP and EIS

The final CCP and EIS was released to the public on May 7, 2012, following publication of a notice of availability in the Federal Register (77 FR 26781). The Service responded to all substantive comments that were received about the draft CCP and EIS. Subsequently, the Service received two comments during the 30-day waiting period that ended June 18, 2012.

RECORD of DECISION

The Regional Director for region 6 signed the record of decision on July 16, 2012 (appendix A), selecting alternative D of the final EIS to implement as the CCP.

1.7 PUBLIC INVOLVEMENT

Public scoping began in October and November 2007 with the publication of a public involvement summary and a planning update that described the CCP process and anticipated schedule (FWS 2007a). The Service published a notice of intent to prepare a CCP and EIS in the Federal Register on December 4, 2007. The Service conducted 21 public meetings during scoping, development of the alternatives, and release of the draft CCP and EIS; mailed six planning updates; posted information on the Web page for the CCP; and coordinated with Federal, State, and local agencies, and Native American tribes.

An important consideration in the development of this plan—including the vision, goals, objectives and strategies—is the opinions, perspectives, and values of all interested citizens, agencies, and organized groups. While there are no requirements to base management decisions on public opinion, the Service values and considers input from the public. As detailed in appendix C, the Service has consulted with Native American tribes and actively involved Federal and State agencies, local governments, organizations, and private citizens throughout the process.

COOPERATING AGENCIES

The Service sent letters of notification about the planning process including an invitation to participate on the planning team to the both MFWP and DNRC. The Service also notified the Montana State Historic Preservation Office and the six counties (Fergus, Garfield, McCone, Petroleum, Phillips, and Valley).

In September 2007, Service staff met with representatives from the conservation districts and the counties to inform them of the CCP and EIS process, answer any questions about the project, and gather any issues or concerns.

The Service received formal letters requesting cooperating agency status from the six counties, the Missouri River Conservation Districts Council, and the Garfield County Conservation District. The Service granted the six counties cooperating agency status, and two representatives attend the planning team meetings on the counties' behalf. The Service also granted the six conservation districts that surround the refuge cooperating status, and one representative attends meetings on the districts' behalf.

TRIBAL COORDINATION

The Service sent letters of notification about the planning process, including an invitation to participate on the planning team, to the following tribes: Arapahoe Business Council, Chippewa Cree Tribe, Crow Tribal Council, Fort Belknap Tribal Council, Fort Peck Tribal Council, and Northern Cheyenne Tribe. The Service has continued to communicate with the tribes and encourage participation in the CCP process. The Service entered into government-to-government consultation with the Fort Belknap Tribes and Fort Peck Tribes in July 2009 and continued the consultation process in June 2012.

INVOLVEMENT of INTERESTED GROUPS and the PUBLIC

Many interested groups and private citizens have participated in the CCP process by attending public meetings, submitting comments, or obtaining information about the plan from the CCP Web page or other outreach methods.

1.8 SIGNIFICANT ISSUES ADDRESSED

The scoping process identified many qualities of the refuge along with issues and recommendations. Based on this information as well as guidance from the Improvement Act, National Environmental Pol-

icy Act, and planning policy, the Service identified seven significant issues to address in the CCP:

- habitat and wildlife
- water resources
- public use and access
- wilderness
- socioeconomics
- partnerships and collaboration
- cultural values, traditions, and resources

The planning team considered every comment received during the public scoping process. These comments were grouped into related topics and sub-topics as described in the scoping report published on the CCP Web page in April 2008 (FWS 2008c). Significant issues are those that are within the Service's jurisdiction, which suggest different actions or alternatives and that will influence the Service's decision.



HABITAT and WILDLIFE

The refuge encompasses more than a million acres of expansive badlands (arid lands dissected by steep, eroded slopes), riparian areas, old-growth forested coulees (ravines), sagebrush steppes (level, shrubland plains), and mixed-grass prairie in north-central Montana. This CCP addresses the following aspects of the habitat and wildlife issue:

- the use and role of wildland fire, livestock grazing (including water resources needed to support livestock), hunting, fencing, and other management tools for the preservation and restoration of habitat conditions on the refuge
- implementation of the Service's climate change policy in managing habitat and wildlife
- management of the refuge as climate change accelerates and affects refuge wildlife and habitats
- habitat and wildlife management in the context of the larger landscape that includes adjacent private, State, tribal, and Federal lands
- species reintroductions or management of species that could move onto the refuge: wild American bison, gray wolf, grizzly bear, and Rocky Mountain bighorn sheep

- special consideration of threatened and endangered species and species of concern
- invasive species and noxious weed management including the management tools used to combat invasive species
- the definition of prescriptive grazing and how it is used to manage refuge habitat
- predator management

WATER RESOURCES

Wildlife populations, both on and off the refuge, are affected by water quality and access to water. Livestock grazing has degraded habitat, particularly near water sources. Furthermore, stock watering ponds can affect streamflow, fish, and riparian areas conditions. This CCP addresses these important aspects of the water resources issue:

- water quality and quantity
- water development
- Missouri River riparian ecosystem

PUBLIC USE and ACCESS

The refuge is one of the most visited refuges in the Refuge System, with nearly 250,000 recreational visits (Carver and Caudill 2007), and it is the main core of a larger regional area that provides many outdoor recreation opportunities and access. The most popular activity is hunting. Large populations of wild ungulates (elk, deer, and pronghorn) offer renowned hunting opportunities that attract local, regional, out-of-state, and international visitors. The refuge provides uncrowded, solitary experiences not afforded on other public lands, and many areas require skills in self-reliance and backcountry travel. However, about 80 percent of the refuge is accessible by more than 680 miles of road (mostly two-track and gravel roads), and there are 135 miles of lake and river access for visitors to take part in a variety of activities.

The Service allows the public uses of hunting, fishing, wildlife observation, photography, interpretation, and environmental education. In addition, the Service supports these uses by providing associated access and facilities such as roads, motorized access, and camping. This CCP addresses the following important aspects of the public use and access issue:

- priority public uses—hunting, fishing, wildlife observation, photography, interpretation, and environmental education
- motorized and nonmotorized access and law enforcement
- roads including number, location, types, and maintenance
- nonpriority uses such as camping and bicycling

- facilities, programs, and infrastructure to support public uses and access
- permitted uses such as other commercial recreation, livestock grazing, or other uses



Dotted Gayfeather

WILDERNESS

There is one federally designated wilderness within the refuge boundaries, UL Bend Wilderness, consisting of about 20,819 acres. In addition, there are 15 units (also referred to as “areas”) of proposed wilderness (155,288 acres). These units are awaiting congressional action on formal inclusion into the National Wilderness Preservation System. It is Service policy to manage proposed wilderness units as though they were designated wilderness (FWS 2008d).

Planning policy requires refuges to review special designation areas such as wilderness and address the potential for any new designations. Concurrent with the CCP process, the Service conducted a wilderness review (refer to “Appendix F, Wilderness Review and Summary”) and has made final recommendations in the record of decision (appendix A). This plan addresses the following aspects of the wilderness issue:

- consolidation or addition of existing proposed wilderness units
- identification of the potential for new designations
- access, infrastructure, and use of management tools

SOCIOECONOMICS

It is important to manage refuge resources and public use in ways that protect the resources, that are financially responsible, and that are integrated with the economic viability of the surrounding communities. This CCP addresses the following aspects of the socioeconomics issue:

- benefits of the refuge and promotion of refuge values
- range of alternatives and effects of those alternatives on the local economy and community

PARTNERSHIPS and COLLABORATION

Because of the long, narrow extent of the refuge boundary, the subsequent amount and variety of adjacent land uses not only affect, but also are interrelated with, refuge resources. Therefore, it is crucial for the Service to collaborate with refuge neighbors and to establish partnerships with interested agencies, stakeholders, and other organizations. Wildlife populations and movements are greatly affected by conditions both outside and inside the refuge. Similarly, invasive species are one of the biggest threats facing State, Federal, and private landowners. Reduced budgets require collaboration between the Service and others to leverage money for combating invasive plants and managing wildlife on lands within and next to the refuge. Changes in the ownership of private lands next to the refuge may change conditions for habitat, wildlife, and public access. Privately owned mineral rights, future energy development, and rights-of-way influence the future conditions and use of the refuge and adjacent lands. This CCP addresses the following important aspects of the partnerships and collaboration issue:

- adjacent land management related to habitat, wildlife, and public use
- consultation and coordination with Federal, State, and local partners
- climate change and development of minerals including recommendations for reducing effects on resources
- priorities for future land acquisition

CULTURAL VALUES, TRADITIONS, and RESOURCES

The refuge, second largest in the lower 48 States, contains unique qualities that are valued on a national, regional, and local level (refer to chapter 2). Montana's glaciated plains in and around the refuge support rich and diverse wildlife populations. In addition to its wildlife value, the geology and landforms have created valued scenery and backcountry areas: the Upper Missouri National Wild and Scenic River is along the refuge's western boundary, the refuge is part of the Missouri Breaks National Back Country Byway, and large areas are designated or proposed for the National Wilderness Preservation System. During scoping, many people described the refuge's qualities as rugged, isolated, and offering outstanding opportunities for solitude, hunting, fishing, and other public uses.

The refuge has significant archaeological resources and rich prehistoric and historic values to the local and regional community from when Native Americans hunted the lands to the area's documentation by the Lewis and Clark expedition. The western traditions and practices of livestock grazing have affected the lives of ranchers and their families for many generations. Of unique value for a refuge, Charles M. Russell and UL Bend Refuges have significant paleontological resources (fossilized plants and animals).

This CCP addresses the following aspects of the resource and cultural values issue:

- refuge values and qualities
- land management designations
- traditions and lifestyles
- cultural and paleontological resources

1.9 ISSUES not ADDRESSED

The Service considered several issues that were identified by the public during scoping and alternatives' development but were not selected for detailed analysis in the CCP and EIS. In accordance with requirements of the National Environmental Policy Act, the Service eliminated from detailed study the topics or issues that were not significant or were out of the scope of this planning process. These issues and the rationale for not selecting them as significant issues are briefly described below.

ENHANCEMENT ACT

Title VIII of the Water Resources Development Act of 2000 is known as the Enhancement Act (Public Law 106-54). The act authorized the Secretary of the Army, working with the Secretary of the Interior, to identify cabin sites suitable for sale to current lessees. The Enhancement Act also directed the performance of necessary environmental and real estate activities to dispose of these cabin sites at fair-market value. Money from the sale of the cabin sites will be deposited in the Montana Fish and Wildlife Conservation Trust for use in acquiring other lands with greater wildlife and public value for the refuge. The actions outlined in the Enhancement Act, including the time limits imposed in the act, are outside the scope of this planning process. The Service does not have control over the sale of the cabins.

EXERCISE of PRIVATE PROPERTY RIGHTS for MINERAL EXTRACTION

The CCP does not address the rights of private property owners to exercise their rights to extract minerals on State or private lands within or next to the refuge.

FORT PECK LAKE LEVELS

Fort Peck Lake is the Nation's fifth-largest constructed reservoir and backs up from the dam for about 134 river miles to the west and south. At maximum pool levels, the lake surface area is about 245,000 acres (USACE 2009). The Fort Peck Project was authorized for flood control, navigation, hydro-power, fish and wildlife, recreation, municipal and industrial water supply, and irrigation. Management of Fort Peck Lake is under the authority of USACE; therefore, determination of water levels on Fort Peck Lake is outside the scope of this Service planning process.

LIVESTOCK GRAZING FEES, TRANSFER of GRAZING PERMITS, and ANIMAL-UNIT MONTHS

Service guidance on grazing, including the process for determining rates of charge, is in the Refuge Manual (6 RM 9) (FWS 1982). Neither the Public Rangelands Improvement Act of 1978, the Federal Land Policy and Management Act of 1976, nor the Taylor Grazing Act apply to the Service's management of grazing lands within the refuge.

Grazing Fee Rates

For region 6, grazing fee rates are based on the USDA Statistics Board publication, *Grazing Fee Rates for Cattle by Selected States and Regions* (USDA 2011). USDA fee structure is adjusted each year based on the data available. Region 6 uses the annual published USDA rate as the base rate of charge with increases in the yearly fee allowed by \$1.00 per animal-unit month (AUM) until the base rate is reached. The refuge began adjusting to fair market value for grazing rates in 1994, per national Service guidance. The grazing fee rates for the refuge are the same rates for refuges across Montana. Grazing fees are not addressed in the CCP.

Transfer of Grazing Privileges

Unlike other public lands, such as BLM lands, the Improvement Act does not provide for the transfer of grazing permits. The transfer of grazing privileges on the refuge follows current policies, which have guided permit transfers associated with ranch sales. Grazing is considered a secondary use on a national wildlife refuge and must be compatible with the purposes of the refuge. Therefore, the CCP does not address this topic further.

Increase Animal-Unit Months

The 1986 record of decision for the final EIS for re-source management for the refuge (FWS 1986) called for a substantial decrease in the number of AUMs of livestock grazing. This decision was subse-

quently carried out. The CCP does not readdress the 1986 record of decision about the maximum number of AUMs that could be grazed (refer to chapter 2 for more information including past litigation). Instead, this CCP addresses how livestock grazing will be used as a management tool to meet specific goals and objectives for managing habitat and wildlife, which are described in the Improvement Act and the Service's policies on biological integrity and planning.

REFUGE REVENUE-SHARING PAYMENTS and PAYMENTS in LIEU of TAXES

Since 1935, the Service has made revenue-sharing payments for refuge land under its administration to counties under the Refuge Revenue Sharing Act of 1935 (16 U.S.C. 715s), which has been revised several times. These payments are not the same as other Federal revenue-sharing measures such as Payments in Lieu of Taxes, which applies to lands administered by USACE and by other DOI agencies such as the BLM. When there is not enough money to cover the payments, Congress is authorized to appropriate money to make up the deficit; however, payments to a county are reduced when Congress fails to appropriate the money. These are issues of considerable concern for the six counties, but the refuge has no control over these payments and, as such, they are outside the scope of the CCP.

ROADS under REVISED STATUTE 2477 and PETITIONED ROADS

Several of the adjacent counties asked that Revised Statute 2477 roads or county-petitioned roads be recognized as legally valid roads in the planning process. Section 2477 of the Revised Statutes emerged from section 8 of the Mining Act of 1866 to promote public highway construction through the large, unsettled western territories. Revised Statute 2477 was repealed on October 21, 1976, by the Federal Land and Policy and Management Act (43 U.S.C. § 932). Because this act did not terminate valid existing rights-of-way, the existence and extent of many Revised Statute 2477 claims remains an issue today. Determining the validity of any Revised Statute 2477 claim is outside the scope of the CCP and EIS process.

Similarly, one or more of the adjacent counties have identified roads within the refuge that they believe were legally petitioned as county roads recorded before refuge establishment. Some of these roads follow near, or on the same alignment, as current refuge roads. Other roads, often not more than two-track trails, were closed long ago. Some of these roads are in the UL Bend Wilderness or are within USACE's primary jurisdiction. Like Revised Statute 2477 claims, determining or recognizing the legal validity of these rights-of-way is outside the scope

of the CCP. These are important issues for the counties, but the CCP is not the tool to resolve many of these issues.

FEDERAL RESERVED WATER RIGHTS

The United States holds Federal reserved water rights for the Charles M. Russell and UL Bend Refuges. The United States is in the process of quantifying these reserved rights with the Montana Reserved Rights Compact Commission. Issues related to the adjudication process for water rights are outside the scope of the CCP. More information about water rights is in chapter 3, section 3.1, under “Water Resources.”

MILITARY OVERFLIGHTS

The refuge is located beneath the Hays Military Operations Area. This airspace operations area overlies a large part of north-central Montana at altitudes ranging from 300 feet above ground level, up to 18,000 feet above mean sea level. The Federal Aviation Administration has the responsibility to plan, manage, and control the structure and use of all airspace over the United States including the Hays Military Operations Area. Furthermore, the Improvement Act specifically exempted overflights above a refuge from compatibility requirements (FWS 2000a). Therefore, the Hays Military Operations Area is outside the scope of this planning process.



Brett Billings / USFWS

The immense, rugged landscape of the refuge offers outstanding opportunities for priority public uses.

2—Refuge History and Vision



USFWS

The topography on the refuge is varied and diverse.

This chapter explains the history, purpose, and special values of the Charles M. Russell and UL Bend National Wildlife Refuges, as well the development of the vision and goals for the CCP planning process. These refuges are part of a complex of refuges managed from the headquarters station in Lewistown, Montana. Because the UL Bend Refuge lies within the boundary area of the Charles M. Russell Refuge, essentially they are managed as one unit even though they were established through different authorities and for different purposes. Several other refuges and a wetland management district are part of the refuge complex but are not part of this CCP.

Each national wildlife refuge is managed to fulfill the mission of the National Wildlife Refuge System, as well as the specific purpose for which that refuge was established. This purpose is the foundation on which to build all refuge programs, from biology and public use to maintenance and facilities. Refuge purposes are found in the legislative acts or administrative orders that authorize either the transfer or acquisition of land for a refuge. An individual refuge

may contain lands that have been acquired under a variety of transfer and acquisition authorities, giving a refuge more than one purpose. This is true for Charles M. Russell National Wildlife Refuge and UL Bend National Wildlife Refuge; table 2 lists the significant land authorizations for the refuges. The objectives and strategies in this CCP (chapter 4) are intended to support the purposes for which both refuges were established.

2.1 ESTABLISHMENT, ACQUISITION, and MANAGEMENT HISTORY

Although the UL Bend National Wildlife Refuge is within the boundary of the Charles M. Russell National Wildlife Refuge, they were established through different authorities as shown in table 2. This section first describes each refuge separately, and then summarizes the existing management of the refuges as one unit.

Table 2. History of significant land authorizations for the Charles M. Russell and UL Bend Refuges, Montana.

<i>Date</i>	<i>Authority</i>	<i>Number</i>	<i>Subject</i>
12/12/1933	Executive Order	6491	Lands withdrawn for Fort Peck Dam (USACE)
05/09/1934	Executive Order	6707	Lands withdrawn for Fort Peck Dam (USACE)
09/11/1934	Executive Order	6841	Lands withdrawn for Fort Peck Dam (USACE)
04/03/1936	Executive Order	7331	Lands withdrawn for Fort Peck Dam (USACE)
12/11/1936	Executive Order	7509	Fort Peck Game Range established; jurisdiction transferred from USACE to what is now the Service; superseded Executive Order 6910 that provided for prevention of injury to public livestock grazing lands through overgrazing and soil deterioration
04/13/1942	Executive Order	9132	Lands withdrawn for Fort Peck Dam (USACE)
02/25/1963	Public Land Order	2951	Name changed to Charles M. Russell National Wildlife Range
03/25/1969	Public Land Order	4588	UL Bend National Wildlife Refuge designated and Executive Order 7509 withdrawn; established by the Migratory Bird Conservation Commission on February 7, 1967
05/15/1970	Public Land Order	4826	Mineral entry withdrawn for UL Bend National Wildlife Refuge
04/25/1975	Public Land Order	5498	Jurisdiction of certain lands transferred to BLM
02/27/1976	Public Law	94–223	Game Range Act transferred administrative status of all game ranges to the Service under the authority of the National Wildlife Refuge System; ended joint management with BLM
10/12/1976	Public Law	94–486	Modification of the Wild and Scenic Rivers Act applied a scenic designation to the river and its bank within Charles M. Russell National Wildlife Range as part of the Upper Missouri River Breaks Wild and Scenic River
10/19/1976	Public Law	94–557	UL Bend Wilderness designated in parts of UL Bend National Wildlife Refuge; size eventually modified to about 20,819 acres
04/25/1978	Public Land Order	5635	Public Land Order 5498 changed name to Charles M. Russell National Wildlife Refuge and clarified administration and management of the refuge under the National Wildlife Refuge System Administration Act of 1966
10/31/1983	Public Law	98–140	Modified the boundary of UL Bend Wilderness Area to exclude 28 acres as designated in Public Law 94–557
09/28/1993	Public Land Order	6997	Mineral estate withdrawn within Charles M. Russell National Wildlife Refuge for 20 years
12/08/1993	Wildlife order	183	General Services Agency transfer of 6,020 acres from USACE to the Service for wildlife conservation

CHARLES M. RUSSELL NATIONAL WILDLIFE REFUGE

Encompassing nearly 1.1 million acres—including Fort Peck Reservoir and UL Bend Refuge—the Charles M. Russell National Wildlife Refuge is the second largest refuge within the lower 48 States. This refuge in north-central Montana extends west about 125 air miles along the Missouri River from Fort Peck Dam to the refuge’s western edge at the boundary of the Upper Missouri River Breaks National Monument (BLM administers). The refuge spans six counties: Fergus, Garfield, McCone, Petroleum, Phillips, and Valley. Habitat includes native prairie, forested coulees (ravines), river bot-

toms, and badlands (arid lands dissected by steep, eroded slopes). Wildlife is as diverse as the topography and includes Rocky Mountain elk, mule deer, white-tailed deer, pronghorn, Rocky Mountain bighorn sheep, sharp-tailed grouse, prairie dogs, and more than 236 species of birds (refer to “Appendix G, List of Plant and Animal Species”). A portion of the Missouri River along the refuge’s western boundary is part of Upper Missouri River National Wild and Scenic River.

Establishment and Acquisition

In May of 1805, Meriwether Lewis and William Clark first detailed accounts of the abundant wildlife resources they found in the area now known as

Charles M. Russell National Wildlife Refuge during their Corps of Discovery journey of the Missouri River (Moulton 2002). One hundred thirty years later in August 1935, Olaus Murie, a biologist for the Bureau of Biological Survey (now the U.S. Fish and Wildlife Service), traveled to the Fort Peck area to do a biological assessment. He documented his findings in a report about the Fort Peck Migratory Bird Refuge (Murie 1935). Of interest in Murie's comprehensive assessment of the topography, soils, vegetation, wildlife, and grazing, was his notation on sharp-tailed grouse and the importance of shrubs to its distribution and abundance. He estimated that 25,000–40,000 grouse could be sustained on the refuge. Murie observed:

“The sharp-tailed grouse was given careful study since this is the most important bird affected by the plans for the refuge. We found that this is true sharp-tailed range. Of course, as in the case of big game animals, the winter period is the critical one and we studied the factors concerned in this phase of its life history. In the winter, these grouse spend much time in the Missouri River bottoms but live also in the rough breaks, especially at the



Brett Billings / USFWS

The protection of sharp-tailed grouse was specifically identified in the establishing legislation for the refuge.



USFWS

Pronghorn

heads of numerous draws. Their distribution is of course largely determined by the food supply. It is known that in winter they feed extensively on buffalo berry, snowberry, and rosehips.”

In 1936, President Franklin D. Roosevelt established the Fort Peck Game Range through Executive Order 7509. The area was set aside for the preservation of wildlife, specifically sharp-tailed grouse, pronghorn, and other wildlife. Beyond the wildlife priorities, resources are to be made available for domestic livestock providing it is compatible with the uses for which the lands were acquired. The Executive order detailed the purposes of the game range:

“That the natural forage resources therein shall be first utilized for the purpose of sustaining in a healthy condition a maximum of four hundred thousand (400,000) sharp-tailed grouse, and one thousand five hundred (1,500) antelope, the primary species, and such non-predatory secondary species in such numbers as may be necessary to maintain a balanced wildlife population, but in no case shall the consumption of the forage by the combined population of the wildlife species be allowed to increase the burden of the range dedicated to the primary species: Provided further, That all the forage resources within this range or preserve shall be available, except as herein otherwise provided with respect to wildlife, for domestic livestock ... And provided further, That land within the exterior limits of the area herein described ... may be utilized for public grazing purposes only to the extent as may be determined by the said Secretary (Agriculture) to be compatible with the utilization of said lands for the purposes for which they were acquired.”

It is unclear why there was a discrepancy between Murie's estimate for the number of sharp-tailed grouse that could be sustained and what appeared in the Executive order. Chapter 3 has more information about the vegetation and wildlife found on the refuge.

Since 1936, other lands within the refuge have been acquired under a variety of transfer and acquisition authorities or have different designations (see table 2). Today, the Charles M. Russell Refuge (not including the UL Bend Refuge and Fort Peck Reservoir) covers about 916,107 acres, of which 739,097 acres are reserved from the public domain. The Service has sole jurisdiction on about 358,196 acres and secondary jurisdiction on the remainder where USACE has primary jurisdiction. The Federal Government has acquired another 155,969 acres where the Service has primary jurisdiction on 8,574

acres and secondary jurisdiction on the remainder. The remaining acreage has been purchased (13,994 acres), received by donation (139 acres), or is under agreement or lease (6,907 acres) (FWS 2010a).

Refuge Management History

Originally, the secretaries for USDA (The Bureau of Biological Survey, in Agriculture, was the principle precursor agency of the Service) and DOI administered the game range jointly. In comanaging the uplands from 1936 to 1976, the Service and BLM struggled to maintain the lands' value to wildlife while supporting a large number of livestock. With differing agency mandates and missions, the management arrangement functioned poorly (FWS 1986). The Fort Peck Game Range became the Charles M. Russell National Wildlife Range in 1963 (Public Land Order 2951) in recognition of Charlie Russell, the colorful western artist who often portrayed the refuge's landscape in his paintings (see table 2).

Of significant interest in this planning process has been the provision in the Executive order for domestic livestock grazing to occur if it remains compatible with use of the land for the primary purposes. The root of this text can also be found in the Executive orders of other former game ranges. Historically, there were six game ranges set aside by various Executive orders but with similar, or even identical, provisions for livestock grazing: Hart Mountain National Antelope Range (1935), Desert Game Range (1936), Fort Peck Game Range (1936), Sheldon Game Range (1936), Kofa Game Range (1936), and Cabeza Prieta Game Range (1939). Hart Mountain National Antelope Range was changed to the Hart Mountain National Antelope Refuge in 1936, and Desert Game Range was designated as a national wildlife refuge by Congress in 1966 (FWS 2009a).

The administrative status of Fort Peck Game Range (renamed Charles M. Russell National Wildlife Range by Public Land Order 2951 on February 25, 1963) and all remaining game ranges in the Nation—Sheldon Game Range, Cabeza Prieta Game Range, and Kofa Game Range—was changed on February 27, 1976, by the signing of Public Law 94-223 (90 Stat. 199). Commonly called the Game Range Act, this law brought to a close the joint management between the Service and BLM and vested management authority of the game ranges with the Service. Public Land Order 5635 (1978) changed the name of Charles M. Russell National Wildlife Range to Charles M. Russell National Wildlife Refuge and clarified the administration and management of the refuge under the National Wildlife Refuge System Administration Act of 1966, subsequently amended (16 U.S.C. 668dd et seq.) (see table 2). Today, Charles M. Russell National Wildlife Refuge is the only for-

mer game range that still uses livestock grazing to manage habitat (FWS 1994a, FWS and BLM 1996, FWS 2009a, FWS 2011e, and personal communication with staff at Hart Mountain National Antelope Refuge and Sheldon National Wildlife Refuge).

Within the uplands of the refuge lies the Missouri River and the nearly 250,000-acre Fort Peck Reservoir, established by Executive Order 6491 on December 12, 1933. Agreements exist between the Service and USACE for management of areas where the Service has secondary jurisdiction. The Service and USACE cooperatively manage the surrounding edges of the reservoir, and its associated recreational areas.

There are approximately 36,000 acres of State school trust lands managed by DNRC and about 41,000 acres of private inholdings within the refuge (see figure 2 in chapter 1). The Service has an offset fire-protection agreement to allow wildfire protection strategies to be used on State lands. This agreement allows for initial attack and other actions related to the spread of wildfire to comply with DNRC's standards for fire suppression on State lands.

The refuge annual performance plan reports that 250,000 visitors, on average, come to the refuge each year. Containing some of the best elk habitat in Montana, the refuge hosts recreationists not only for hunting, but for fishing, wildlife and landscape photography, wildlife observation, hiking, camping, and much more.

In addition to the UL Bend Wilderness (described in the UL Bend Refuge section below), there are 15 areas of about 155,288 acres (public domain and USACE) proposed for wilderness (DOI 1974b). These 15 separate units along the Missouri River and Fort Peck Reservoir (see figure 41 in chapter 4) are awaiting congressional action on their formal inclusion in the National Wilderness Preservation System. In the meantime, these areas are managed in accordance with the Service's wilderness policy (FWS 2008c). More details about wilderness are in chapter 3, section 3.3, and in appendix F.

UL BEND NATIONAL WILDLIFE REFUGE

UL Bend National Wildlife Refuge is located north of the Missouri River about 50 miles south of Malta, Montana, in Phillips County (see the topographic base map of the refuge in figure 6). Bison, elk, deer, and pronghorn historically used the crossing at this huge bend in the Missouri River, and the abundance of game attracted Native Americans including the Assiniboine, Gros Ventre, and the Blackfeet. Explorer Meriwether Lewis noted the following in his journal on May 21, 1805 (Moulton 2002):

“The Missouri in its course downward makes a sudden and extensive bend toward the south,

Figure 6 follows (two foldout pages)

U.S. Fish & Wildlife Service

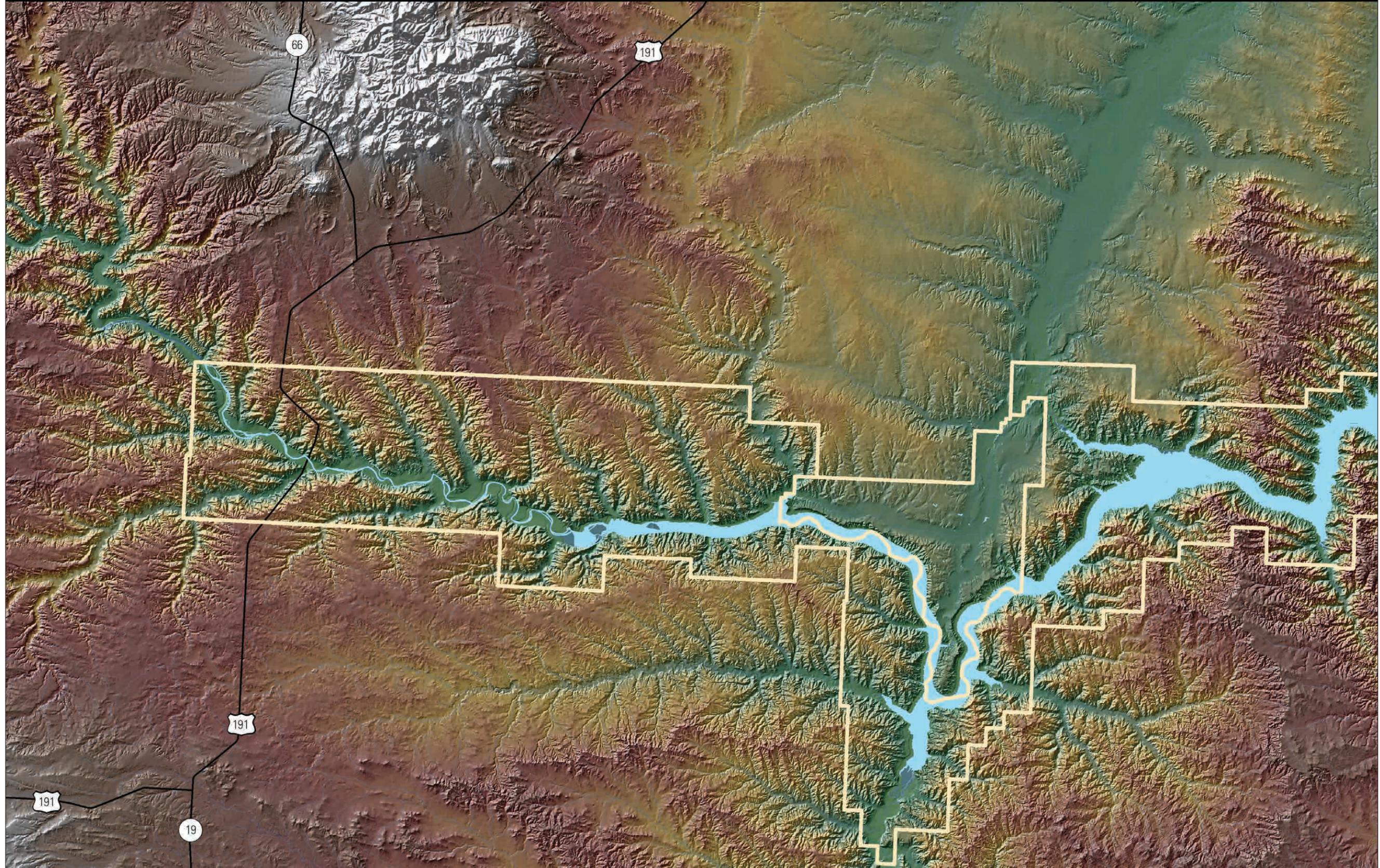


Figure 6. Topographic base map of the Charles M. Russell and UL Bend Refuges, Montana.

Figure 6 (topographic map, west)

U.S. Fish & Wildlife Service

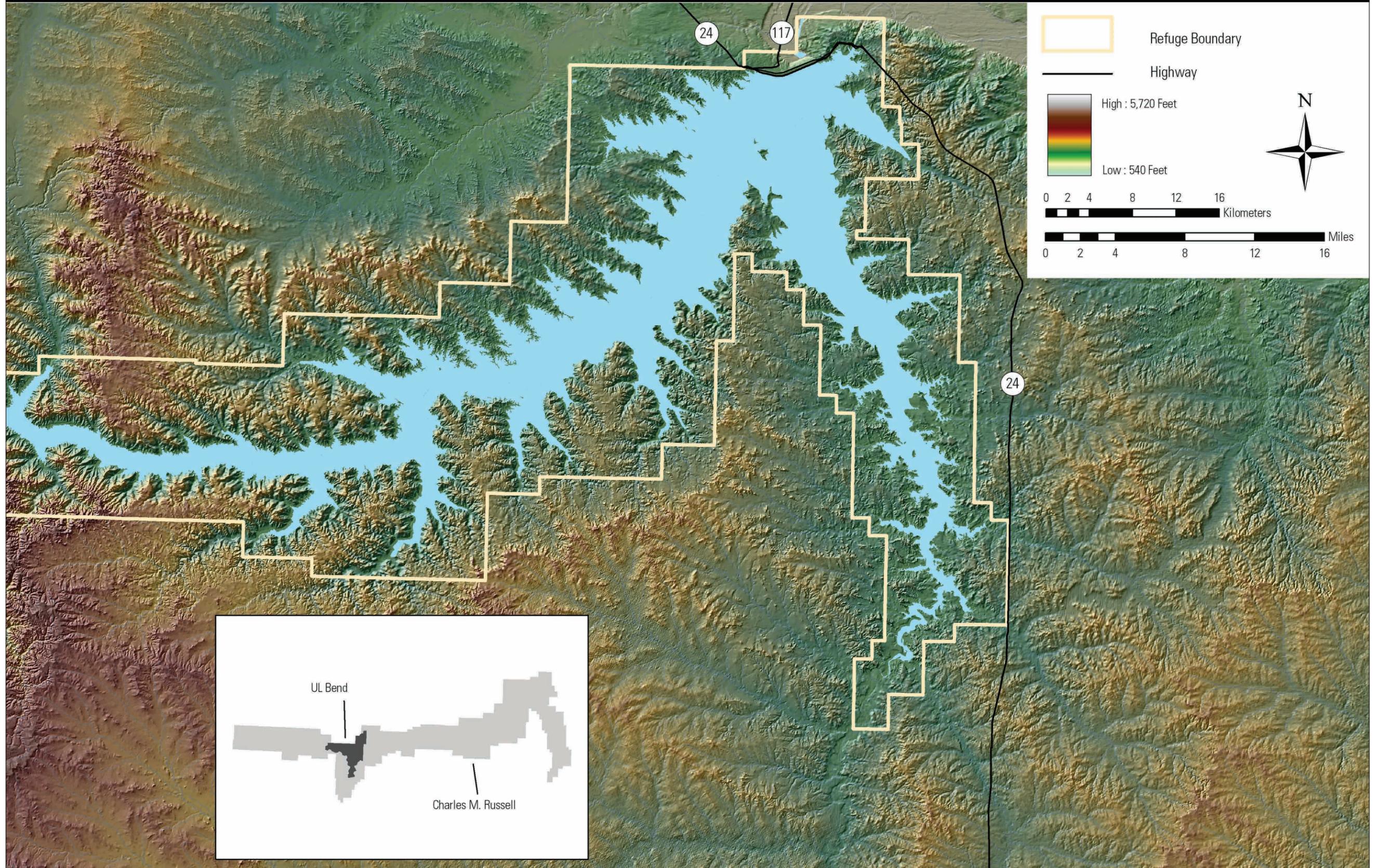


Figure 6 (topographic map, east)



© Google Earth

The bend in the Missouri River at its confluence with the Musselshell River.

to receive the Muscle shell river, the point of country thus formed tho' high is still much lower than that surrounding it, thus forming a valley of wavey country which extends itself for a great distance in a Northerly direction; the soil is fertile, produces a fine turf of low grass and some herbs, also immense quantities of the Prickley pear, without a stick of timber of any description."

In 1896, Oren and Will Bachues established a ranch in the "Big Bend of the Missouri River." The place became known as UL Bend after the ranch's stock brand (DOI 1974c).

Establishment and Acquisition

The refuge was established through the Migratory Bird Conservation Commission on February 7, 1967. On March 25, 1969, Public Land Order 4588 designated the UL Bend National Wildlife Refuge on about 39,456 acres (revoking Executive Order 7509 on those lands). The order defined the refuge's purpose: "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act, 16 U.S.C. 715d). Although it was primarily established for the development and management of waterfowl, other wildlife that use refuge habitat includes the endangered black-footed ferret, elk, deer, pronghorn, migratory birds, and other prairie species.

Today, the UL Bend Refuge contains about 56,090 acres (FWS 2010a). Of this land base, 36,615 acres are reserved from public domain, where the Service

has sole or primary jurisdiction on 29,678 acres and secondary jurisdiction on 6,937 acres. About 9,226 acres were acquired by another Federal agency, where the Service has primary jurisdiction on about 1,300 acres and secondary jurisdiction on the remainder. Another 9,688 acres have been purchased, and another 560 acres are under easement or lease (FWS 2010a). Following passage of the Wilderness Act of 1964, there was a wilderness study of public lands (DOI 1974c). In 1976, Public Law 94-557 (90 Stat 2633-4) designated about 20,890 acres in the refuge as the UL Bend Wilderness (see table 2). This acreage was later modified to its current size of about 20,819 acres (see figure 41 in chapter 4). More details about wilderness are in chapter 3, section 3.3, and in appendix F.

Refuge Management History

Early development plans called for the construction of a series of dikes in the interior of the refuge to convert uplands to aquatic habitat for waterfowl. Some attempts were made toward this development, but these were never completed, and the plans were abandoned.

OVERALL MANAGEMENT HISTORY

For nearly 25 years, the Service managed the refuge under a resource management plan developed through an EIS and approved in a record of decision signed April 1986 (FWS 1985, 1986). In addition to identifying specific habitat and wildlife objectives, the record of decision called for a sizeable reduction

in annual livestock grazing. While implementation of the 1986 record of decision helped improve habitat for wildlife, many problems and issues still exist (refer to chapter 3). The refuge has 65 habitat units and one concern is that many of these units are not meeting the habitat objectives set forth in the 1985 EIS. Furthermore, with the passage of the Improvement Act and requirements contained therein, Service management policies specify that secondary economic uses such as livestock grazing are permissible only when prescribed to meet wildlife and habitat objectives. Many of the units were managed through an annual grazing program with a limited prescriptive component.

Due to a host of issues such as drought, climate change, grazing by wildlife and livestock, invasive species, and altered fire regimes, the uplands saw a decline in desirable species such as forbs and shrubs. Some riparian areas are functioning in poor condition, and invasive species are of concern. There were court challenges to the Service's management of the refuge both before and after the 1986 record of decision, and these decisions influenced refuge management as described below.

Schwenke v. Secretary of the Interior, 720 F.2d 571 (Ninth Circuit 1983): The Ninth Circuit Court of Appeals addressed the issue of whether grazing or wildlife conservation had priority of forage resources at the Charles M. Russell Refuge. The lower court had found that conservation and grazing were of coequal priority and that grazing on refuge land should be administered under the Taylor Grazing Act. On appeal, the Ninth Circuit Court held that, under Executive Order 7509, wildlife has a limited priority to the refuge's forage resources. Beyond Executive Order 7509's wildlife population limits (400,000 sharp-tailed grouse, 1,500 pronghorn, and "non-predatory secondary species in such numbers as may be necessary to maintain a balanced wildlife population") wildlife and grazing livestock have coequal priority to the refuge's forage resources. The court also held that amendments to the National Wildlife Refuge Administration Act of 1966 (Public Law 89-669; 80 Stat. 927; codified as amended at 16 U.S.C. Sec. 668dd [1976]) shifted administration of national wildlife refuges from being under the Taylor Grazing Act to the National Wildlife Refuge Administration Act of 1966 (commonly known as the Wildlife Refuge Act).

James Kirkland v. Department of the Interior (1996): The plaintiff (Kirkland) challenged an administrative decision when the Service did not renew his grazing permit. The district court found the Service's decision to be a rational decision and not arbitrary and capricious. A grazing permit is not a property right on the Charles M. Russell Refuge, and grazing is administered under the National Wildlife Refuge

Administration Act of 1966 and not the Taylor Grazing Act. The defendant (DOI [FWS]) repeatedly notified Kirkland of violations of his grazing permit. Kirkland received due process when the Service complied with Title 50 CFR 25.45 and the described appeal process.

Silver Dollar Grazing Association v. U.S. Fish and Wildlife Service, No. 07-35612, (Ninth Circuit, January 13, 2009): The Ninth Circuit Court of Appeals held that the Service may analyze habitat as a proxy for wildlife populations rather than taking an actual inventory of the populations and that the Service's failure to follow monitoring guidelines in a habitat management plan (HMP) was not arbitrary and capricious. The Silver Dollar Grazing Association filed suit against the Service for allegedly violating the National Environmental Policy Act and the Silver Dollar HMP. The grazing association alleged that prescriptive grazing would harm the environment and that initiating prescriptive grazing before conducting a wildlife population survey violated Executive Order 7509. The district court granted summary judgment for the Service, and the Silver Dollar Grazing Association appealed. The Ninth Circuit Court of Appeals dismissed the suit because Silver Dollar failed to provide evidence that prescriptive grazing would harm the environment. Furthermore, without evidence of a specific, personally suffered injury, the grazing association lacked standing to sue.

2.2 SPECIAL VALUES

Refuge qualities are the characteristics and features of the refuge that make it special, valuable for wildlife and people, and worthy of refuge status. Qualities can be unique biological values, as well as something as simple as a quiet place to see a variety of birds and enjoy nature. The following summarizes the qualities that make the Charles M. Russell and UL Bend Refuges unique and valued:

- The refuge encompasses a large landscape containing diverse species that not only occur today but also are historic residents of the land.
- The refuge is part of a large block of undeveloped land that includes adjacent Federal, State, and private lands.
- The UL Bend Refuge contains quality wintering habitat for sage-grouse.
- There is great potential for improving important habitat for sharp-tailed grouse.
- The riparian area corridor through the refuge is one of the last natural free-flowing remnants of the Missouri River where natural processes like flooding and cottonwood regeneration still occur.

- The Missouri River Breaks provide excellent habitat for Rocky Mountain elk and mule deer.
- The refuge supports a premier elk population consisting of good herd population dynamics and good herd structure with diverse age classes.
- The refuge supports the oldest and largest reintroduction effort in Montana for the black-footed ferret population.
- There is a large amount of public land, such as BLM land, within the vicinity and buffering the refuge.
- Multiple wilderness designations provide habitat protection and opportunities to experience the remoteness of the landscape.
- Multiple land designations within and next to the refuge complement the refuge: wild and scenic river designation within the refuge and the adjacent Upper Missouri River Breaks National Monument managed by BLM, UL Bend Wilderness and proposed wilderness, and the Missouri Breaks Back Country Byway.
- The refuge is home to several threatened and endangered species including birds of concern such as the piping plover, mountain plover, and sage-grouse. Other species such as the black-tailed prairie dog and many reptile species are found on the refuge.
- The refuge is host to more than 150 homesteaded river bottoms. There are more than 300 known archaeological sites, mostly Native American.
- There are important paleontological resources associated with the Hell Creek Formation found on the refuge. The refuge also contains fossils from the Early Tertiary Tullock Formation of the Fort Union Group showing the transition from the “Age of Reptiles” to the rise of mammals (Bug Creek).
- The large landscape offers the opportunity for a remote recreational and wildlife experience not available elsewhere.
- The refuge attracts numerous recreationists including Montanans from every county and many out-of-state residents.
- The refuge provides a large outdoor laboratory for potential research and science investigation by graduate students, with the opportunity to provide biological data to refuge staff.
- The refuge offers opportunities for wildland fire research including understanding how fires shape the landscape and affect species.
- There are multiple opportunities to use natural-ignition wildfire for habitat management at the landscape scale.
- With much of the refuge being accessible either within 1 mile of a road or by the river, it allows for ample access. However, due to its remoteness and rugged terrain, the refuge provides many opportunities to experience wilderness and solitude.

2.3 VISION

The vision describes the focus of refuge management and portrays a picture of the refuge in 15 years.

Charles M. Russell National Wildlife Refuge’s expansive badlands, cottonwood river bottoms, old-growth forested coulees, sagebrush steppes, and mixed-grass prairies appear out of the sea that is the northern Great Plains.

Encompassing more than a million acres, the refuge affords visitors solitude, serenity, and unique opportunities to experience natural settings and wildlife similar to what Native Americans and, later, Lewis and Clark observed.

The diversity of plant and animal communities found on the refuge stretch from the high prairie through the rugged breaks, along the Missouri River, and across Fort Peck Reservoir. The refuge is an outstanding example of a functioning, resilient, and intact landscape in an ever-changing West.

Working together with our neighbors and partners, the Service employs adaptive management rooted in science to protect and improve the biological integrity, biological diversity, and environmental health of the refuge’s wildlife and habitat resources.

2.4 GOALS

The Service developed eight goals for the refuge based on the Improvement Act, the refuge purposes, and information developed during planning. The goals direct work toward achieving the vision and purposes of the refuge and outline approaches for managing refuge resources.

GOAL for HABITAT and WILDLIFE MANAGEMENT

Conserve, restore, and improve the biological integrity, environmental health, and ecological diversity of the refuge's plant and animal communities of the Missouri River Breaks and surrounding prairies to support healthy populations of native plants and wildlife in a changing climate. Working with others, reduce and control the spread of nondesirable, nonnative, invasive plant and aquatic species for the benefit of native communities on and off the refuge.

GOAL for THREATENED and ENDANGERED SPECIES and SPECIES of CONCERN

Contribute to the identification, preservation, and recovery of threatened and endangered species and species of concern that occur, or have historically occurred, in the northern Great Plains.

GOAL for RESEARCH and SCIENCE

Advance the understanding of natural resources, ecological processes, and the effectiveness of management actions in a changing climate in the northern Great Plains through compatible scientific investigations, monitoring, and applied research.

GOAL for FIRE MANAGEMENT

Manage wildland fire using a management response that promotes fire's natural role in shaping the landscape while protecting values at risk.

GOAL for PUBLIC USE and EDUCATION

Provide all visitors quality education, recreation, and outreach opportunities that are appropriate and compatible with the purpose and goals of the refuge and the mission of the Refuge System while maintaining the remote and primitive experience unique to the refuge.

GOAL for WILDERNESS

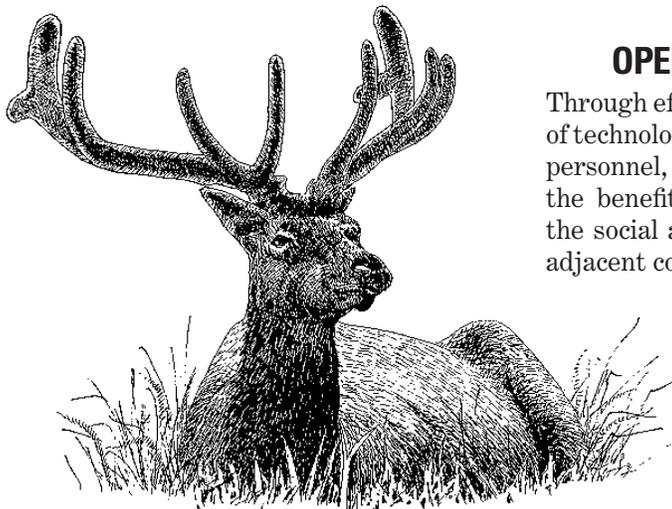
Conserve, improve, and promote the wilderness character and associated natural processes of designated and proposed wilderness areas and wilderness study areas within the refuge for all generations.

GOAL for CULTURAL and PALEONTOLOGICAL RESOURCES

Identify, value, and preserve the significant paleontological and cultural resources of the refuge to connect refuge staff, visitors, and the community to the area's prehistoric and historic past.

GOAL for REFUGE OPERATIONS and PARTNERSHIPS

Through effective communication and innovative use of technology and resources, the refuge uses funding, personnel, partnerships, and volunteer programs for the benefit of natural resources while recognizing the social and economic connection of the refuge to adjacent communities.



Rocky Mountain Elk

3—Refuge Resources and Description

This chapter describes the characteristics and resources of the refuge and how existing or past management or influences have affected these resources. It specifically addresses the physical environment, biological environment, special land designations, recreational opportunities, cultural and paleontological resources including a history of human use on the site, and the socioeconomic environment. Service data and other information, both published and unpublished, was used to quantify what is known about refuge resources. Additionally, other sources were used including data and information from other agencies or other scientific studies.

The following narrative describes those parts of the natural and human environment that could be affected by implementing the plan and is organized as follows:

- 3.1 Physical Environment
- 3.2 Biological Environment
- 3.3 Special Land Designations
- 3.4 Visitor Services
- 3.5 Human History and Cultural Resources
- 3.6 Paleontological Resources
- 3.7 Socioeconomic Environment

3.1 PHYSICAL ENVIRONMENT

The following sections discuss the physical environmental resources that could be affected by the implementation of the CCP. Physical characteristics include climate, air, visual resources, soundscapes, geography, soils, and water resources.

CLIMATE

The climate of the refuge region is typical of the high plains in North America with moderately cold winters (average January lows are near 0 °F) and occasional cold periods exceeding -20 °F. Summers are generally pleasant (averaging in the 80s during afternoon hours) with occasional hot periods exceeding 100 °F. Low humidity, high temperatures, and moderate to strong winds cause rapid loss of soil moisture. Mean annual precipitation is 12–13 inches with about 70 percent occurring from April–September. Due to the dominantly heavy-textured soils, runoff is rapid, often exceeding 50 percent of the total precipitation. The average frost-free period is about 120 days. The refuge is also subject to intense lightning storms from late July to early September, often resulting in wildfires.



USFWS

The elk-viewing area is popular, particularly during the fall months.

Climate Change

In 2001, the Secretary for the Department of the Interior issued Secretarial Order 3226 (DOI 2001) requiring Federal agencies under its direction that have land management responsibilities to consider potential climate change effects as part of long-range planning endeavors. Recently, this order was replaced by Secretarial Order 3289 (DOI 2009). It left intact many of the planning requirements of Secretarial Order 3226, reiterating the need to analyze climate change effects but made organizational changes to enable the bureaus and agencies to fulfill the planning requirements (refer to chapter 1). In 2009, President Obama signed Executive Order 13514 requiring Federal agencies to establish an integrated strategy toward sustainability in the Federal Government and to make reduction of greenhouse gas emissions a priority for Federal agencies. In 2010, the Service completed its strategic plan for managing climate change (FWS 2010c).

The U.S. Department of Energy report, “Carbon Sequestration Research and Development,” concluded that ecosystem protection is important to carbon sequestration and may reduce or prevent loss of carbon currently stored in the terrestrial biosphere (U.S. Department of Energy 1999). The report defines carbon sequestration as “the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere.”

The increase of carbon dioxide (CO₂) within the earth’s atmosphere has been linked to the gradual rise in surface temperature commonly referred to as “global warming.” In relation to comprehensive conservation planning for Refuge System units, carbon sequestration constitutes the primary climate-related effect to be considered in planning. Vegetated land such as what occurs on the refuge is a tremendous factor in carbon sequestration. Large, naturally occurring communities of plants and animals that occupy major habitats—grasslands, forests, wetlands, tundra, and desert—are effective both in preventing carbon emission and in acting as biological “scrubbers” of atmospheric CO₂.

Recently, the U.S. Global Change Research Program released a comprehensive report (Karl et al. 2009) synthesizing information from a wide variety of scientific assessments about what is known about the observed and projected consequences of climate change in the United States. Average temperatures in the United States have increased by more than 2 °F over the past 50 years. Global temperatures are expected to rise at least 1 °F over the life of the CCP. In the Great Plains, temperatures could increase more by 2–4 °F. Additionally, there could be increases in both evaporation and drought stressing limited water supplies. Invasive weeds will likely increasingly compete with native vegetation

on rangelands (Karl et al. 2009). Precise estimates of how climate change will affect the refuge are not known.

AIR QUALITY

The UL Bend Wilderness is a class I air quality area, and receives special protections against air pollution under the Federal Clean Air Act. The refuge is a member of the Interagency Monitoring of Protected Visual Environments (IMPROVE) network, a cooperative program of Federal and State agencies whose primary purpose is to protect visibility in class I areas and to characterize regional haze. This program was established to aid in the implementation of the 1977 Clean Air Act goal of preventing future and remedying existing visibility impairment in class I areas (national parks, wilderness, and wildlife refuges). At the UL Bend Refuge, a monitoring station filters the air every third day, collecting fine particles in three modules and larger particles in one of the modules. The filters are changed on a weekly basis and sent to a laboratory in Davis California where the data is analyzed. The lab looks at visual obscurity due to particulate matter and long-term trends of 50 years or more. The laboratory was not able to provide information as to whether the UL Bend monitoring site had ever exceeded class I standards (Jose Mojica, Crocker Nuclear Laboratory; personal communication, December 2, 2009).

The Service conforms with the interim air quality policy on wildland and prescribed fires (Environmental Protection Agency 1998). The policy was prepared in an effort to integrate the public policy goals of allowing fire to function in its natural role in maintaining healthy ecosystems and protecting public health and welfare by mitigating the negative effects of air pollutant emissions on air quality and visibility. Prescribed fires are conducted under strict smoke and air regulations as established by the Montana/Idaho Airshed Group. The purpose of this group is to reduce the effect of particulate matter within specific air sheds throughout the two States. The group was formed in 1978 and all prescribed fires conducted on the refuge have met permitted requirements. The refuge is assessed a fee based on tons of particulate matter produced by prescribed fires.

Critical smoke concerns are addressed in each individual prescribed burn plan. These plans are very thorough and discuss specific smoke issues, measures to reduce negative effects, downwind receptors, and smoke vector maps. The Service obtains clearance from the Montana/Idaho Airshed Group (MIAG) before conducting any prescribed fire (MIAG 2010). An air shed coordinator and meteorologist evaluate each prescribed fire for information air shed by air shed to anticipate cumulative

smoke effects. Key factors include burn elevation, windspeed and direction, type of burn, closeness to smoke-sensitive features, anticipated impacts from nonmember burners, and any other pertinent information made available at the time of the decision. A prescribed burn is not conducted if negative effects cannot be mitigated.

VISUAL RESOURCES

The National Environmental Policy Act requires that measures be taken to “assure for all Americans ... aesthetically pleasing surroundings.” Visual resources are those qualities of the resource that often inspire people and contribute to their overall experience. There are several land designations found on the refuge that are intended to preserve or even capitalize on the refuge’s scenic values. These include the Wild and Scenic River designation along the western boundary, the Lewis and Clark National Historic Trail along the entire Missouri River, and the designated and proposed wilderness designations. There are sweeping views of the prairie, forested coulees, deep river canyons, broad mesas, badlands, and river bottoms. Throughout its human history explorers, writers, photographers, and visitors have penned, photographed, or painted vibrant descriptions of the refuge’s abundant wildlife resources and its rugged and picturesque scenery.

Three categories were used to address potential effects on visual resources: (1) facilities and structures such as roads, buildings, fencing, and developed areas; (2) management activities like livestock grazing including the use of water impoundments and use of prescribed fire or other activities; and

(3) other indirect factors like wildfires, drought, and invasive species. These categories are also addressed in greater detail later in this chapter under other topics, and only the visual aspects are addressed here.

Facilities, Structures, and Developed Areas

Roads, buildings, and developed camping areas provide access and amenities, but potentially affect the visual resources.

Roads. The refuge covers a vast remote area with about 670 miles of road that crisscross the refuge and provide vehicle access that is otherwise only accessible by foot or horseback (refer to “Access” under visitor services in section 3.4 below). A road borders several of the proposed wilderness units as boundaries were often drawn around roads. Most of the refuge’s roads are primitive, nongraveled roads that are inaccessible during wet periods; nonetheless, refuge roads are highly visible in some areas, particularly from bluffs, ridges, and other viewpoints as the aerial photo below shows. In places, roads have become heavily rutted and braided, which potentially degrade scenic and resource values.

In 2009, the Wilderness Society conducted a spatial analysis (The Wilderness Society 2009) assessing the visibility of roads on the refuge from various distances ranging from 0.25 mile to 10 miles. Using GIS software, points were plotted along refuge roads to assess how visible a road could be from any location on the refuge. Figures 7 and 8 show the potential visibility of roads from a distance of 1 mile and 3 miles. Although this was a modeling exercise and may not represent the actual visibility from all locations, the analysis is instructive in showing where road density



© Google Earth

Roads often follow ridges, bottomlands, and drainages.

is lowest with fewer visible roads versus where road density is highest and roads are more visible. The aerial photo on the facing page gives an overview of the area marked as “A” in figure 7 below, which has some of the least road density on the refuge. Several proposed wilderness units are located next to this area.

Roads are likely more visible from further away than close in to the resource (for examples, ridges and viewpoints). Figure 9 summarizes the number of road segments that are likely to be visible from various sight distances across the refuge including non-wilderness and wilderness.

Other Facilities and Structures. Fencing is used across the refuge to fence livestock pastures including common pastures with BLM, riparian areas, and for delineating the refuge boundary (refer to “Uplands” in section 3.2 below). In addition, there are a few ungulate exclosures for monitoring purposes. Refuge fences are typically a three-strand wire with a t-post and commonly found throughout the west. The ungulate exclosures are wire fences approximately 8 feet high. Although refuge fencing is generally unobtrusive and not visible from any great distance, in places, it could potentially affect view

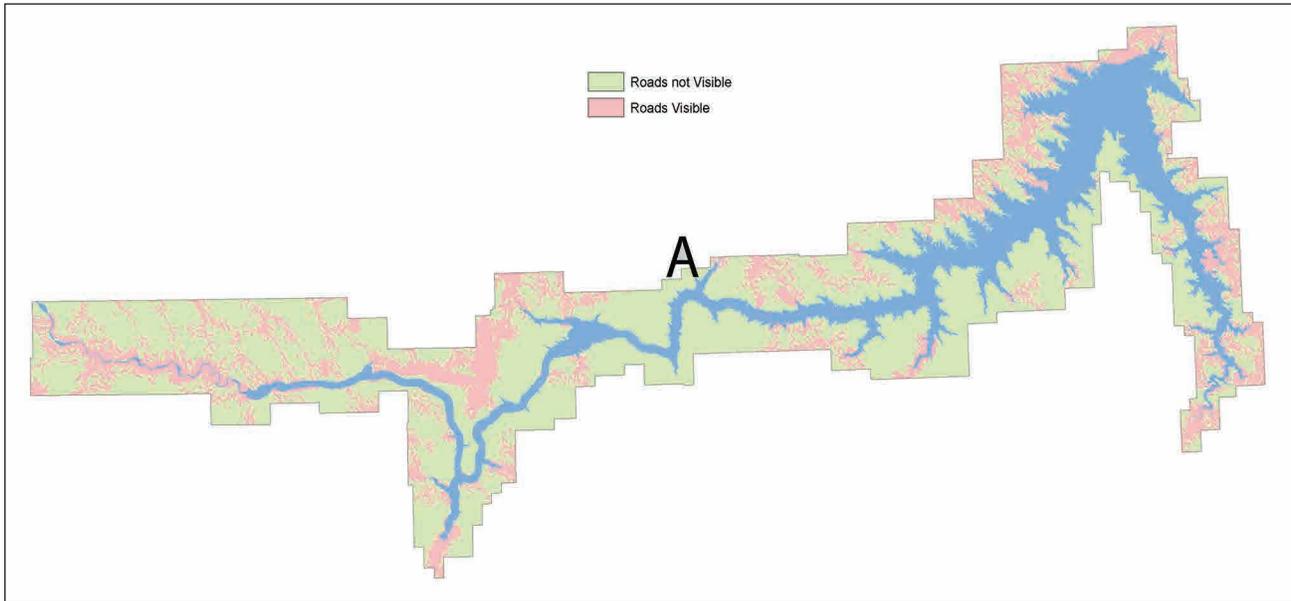


Figure 7. Map of potential visibility of roads at 1 mile along the Charles M. Russell and UL Bend Refuges, Montana. (Pink indicates that roads are likely to be visible and green indicates roads are less likely to be visible.)

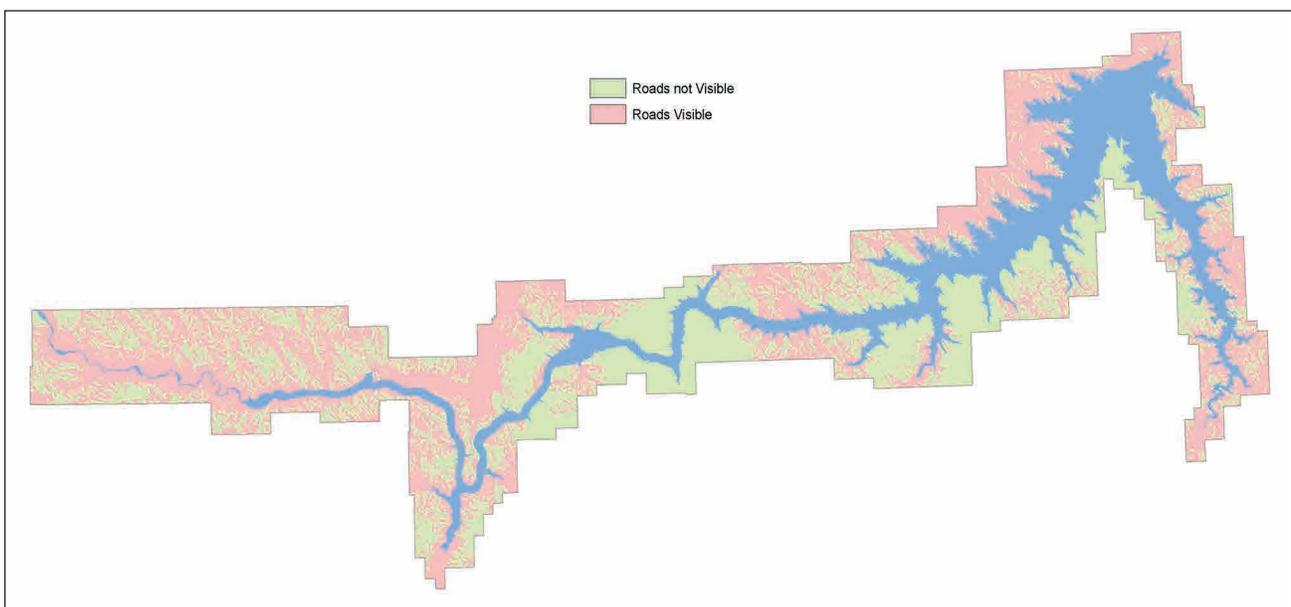


Figure 8. Map of potential visibility of roads at 3 miles along the Charles M. Russell and UL Bend Refuges, Montana. (From further away, roads could be more visible.)



© Google Earth

An aerial photograph shows the low density of roads in a wilderness unit (near the same area marked as “A” in figure 7.)

in the foreground (for example, a photographer who was photographing wildlife could have a fence visible in the picture in some locations, whereas in a landscape photograph, a fence would be less visible).

The developed areas (both USACE and Service) are generally found along the Missouri River and Fort Peck Reservoir and are associated with boat ramps, roads, and campsites. Some are visible from ridges and other viewpoints, but generally, they are small with few facilities and are scattered along 134

miles of river. The east end is more developed. A few of the existing proposed wilderness units directly border or are near one of USACE’s developed recreation areas (for example, Crooked Forchette, and Hell Creeks). The Service does not have primary jurisdiction over USACE’s developed areas, and these are not analyzed further. The camping areas that the Service manages are primitive, consisting of camping area and a vault toilet (see figure 10). Additionally, there are several historic homesteads found

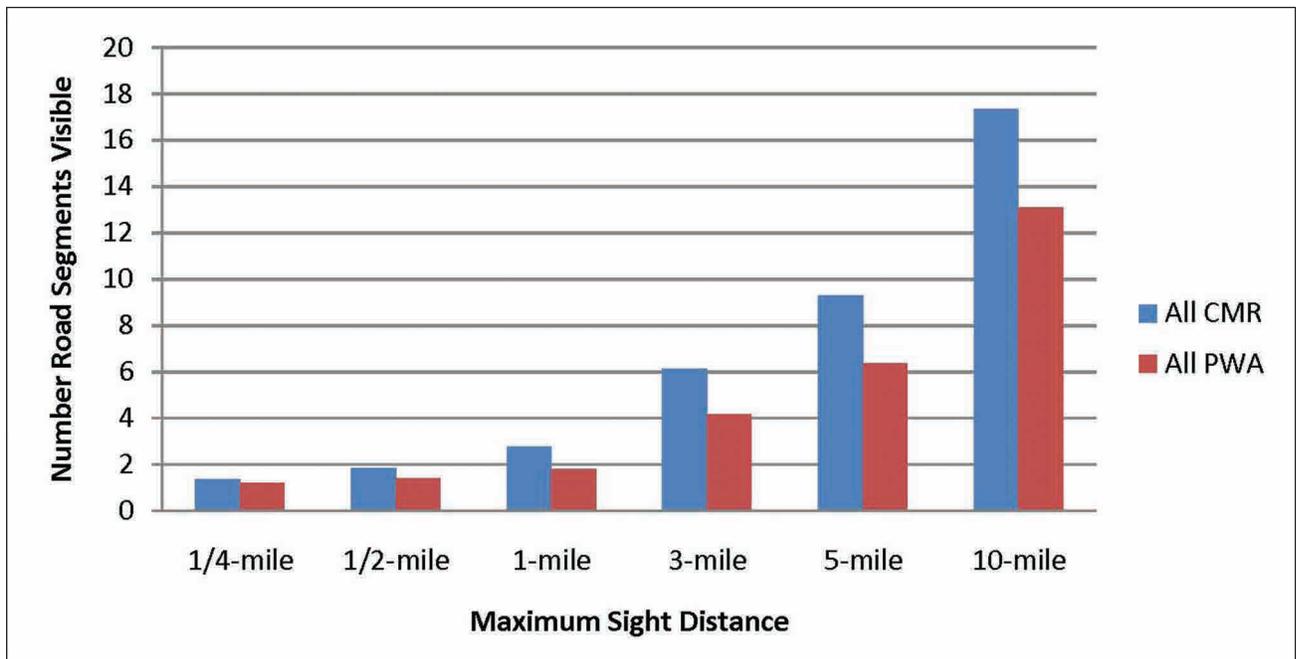


Figure 9. Chart of the number of road segments visible across the Charles M. Russell and UL Bend Refuges in Montana and from proposed wilderness units and wilderness study areas.

across the refuge; these are unobtrusive and are slowly fading into the landscape or even adding to the view. There are several areas with Service buildings across the refuge including Sand Creek Field Station, UL Bend Refuge, and Fort Peck Field Station, making up a small footprint.

Management Activities

Habitat and wildlife management practices or other public use activities can also affect visual resources. Sanderson et al. (1986) looked at the effect that intensive management activities on public lands have on scenic beauty and recreational activities. They found some recreationists placed a great emphasis on the visual qualities while others did not. They also found that dispersed recreationists do perceive differences in visual resources. In addition, perception about visual qualities differs among subgroups of recreationists.

Livestock Grazing on Wilderness and Nonwilderness Lands. Livestock grazing occurs across much of the refuge, but due to changes in ranch ownership, or because there were never AUMs allocated, some areas are not currently grazed (for example, most of UL Bend Refuge). Grazing occurs in some but not all of the proposed wilderness units. Some areas are grazed more heavily than others (see figure 11). Artificial water impoundments are also scattered across the refuge. Livestock are fenced out of some riparian areas along the Missouri and Musselshell Rivers, but in other riparian areas it is difficult to keep cattle out (for example, Big Dry Arm). Livestock congregate along water resources on the refuge, and monitoring has shown many of these areas to be degraded both in the biological and physical sense (refer to “Riparian Areas and Wetlands” in section 3.2 below).

Several studies have looked at visitor perceptions about livestock grazing on public lands, specifically how grazing relates to visitor experiences. Johnson et al. (1997) surveyed more than 1,000 visitors from different backgrounds to five wildernesses in Colorado and Utah. The proportion of visitors who accepted livestock grazing in wilderness and on public lands (43 percent) was similar to the proportion to those who considered grazing unacceptable (40 percent). However, most of the visitors surveyed reported that direct encounters and negative livestock effects detracted from their wilderness experience. Wilderness visitors were more tolerant of grazing on nonwilderness public lands if properly managed to protect ecosystems like riparian areas. Many visitors made their judgments on issues related to what they observed. Mitchell et al. (1996) found varying attitudes from users in the Uncompahgre National Forest in Colorado. They concluded that as long as livestock are kept out of

developed campgrounds and adjacent riparian areas used for fishing and dispersed camping, visitors to those locations are likely to be less offended by livestock grazing. Brunson and Gilbert (2003) found differences in the type of visitor seeking recreational experiences along with demographic characteristics. Hikers were more likely than hunters to have negative opinions about livestock management in a protected area, but hunters were more likely to report seeing moderate to heavy vegetation impacts as they were more likely to venture off trails. Sanderson et al. (1986) examined the effect of grazing intensity on scenic quality and found that anglers were the most vocal in responding to management activities that had a negative effect on riparian habitat. Similar to the study by Brunson and Gilbert (2003), they also found that the visual effects of livestock grazing did not bother hunters as long as it did not affect their chances for success.

Prescribed Fire. Very little prescribed fire currently occurs on the refuge (refer to fire under “Disturbance Factors Affecting Major Ecological Processes” in section 3.2 below). Fire management is a significant issue in this planning process and one that could affect visual resources. Prescribed fire is described in detail under vegetation.

Following Service policy (FWS 2000b), the Service uses prescribed fire in accordance with fire management plans and have the proper approvals. Smoke management is always a concern in using prescribed fire, and planning for prescribed fires requires notification to local and State agencies (refer to air quality above). Substantial planning occurs in advance of a prescribed fire to limit the effects to visual resources (FWS 2000b) and to notify local agency officials. Prescribed fire is used to reduce vegetative litter and improve the vigor and health of plants, thus improving scenic values.

Airplanes and Motorboats

Although the visual sight of airplanes and motorboats could negatively affect some users, information about the aircraft and motorboat use is described under soundscapes below and under “Access” in section 3.4 later in this chapter.

Other Conditions Affecting Visual Resources

Invasive species, severe drought conditions, and wildfires are other factors that potentially affect the refuge’s scenic values. Saltcedar infestations along the shoreline of the large rivers are pervasive. USACE conducts treatment below the high-watermark, but infestations move into the upland areas. Some former agricultural areas (river bottoms) have been heavily infested with invasive plants (refer to the discussion under vegetation).

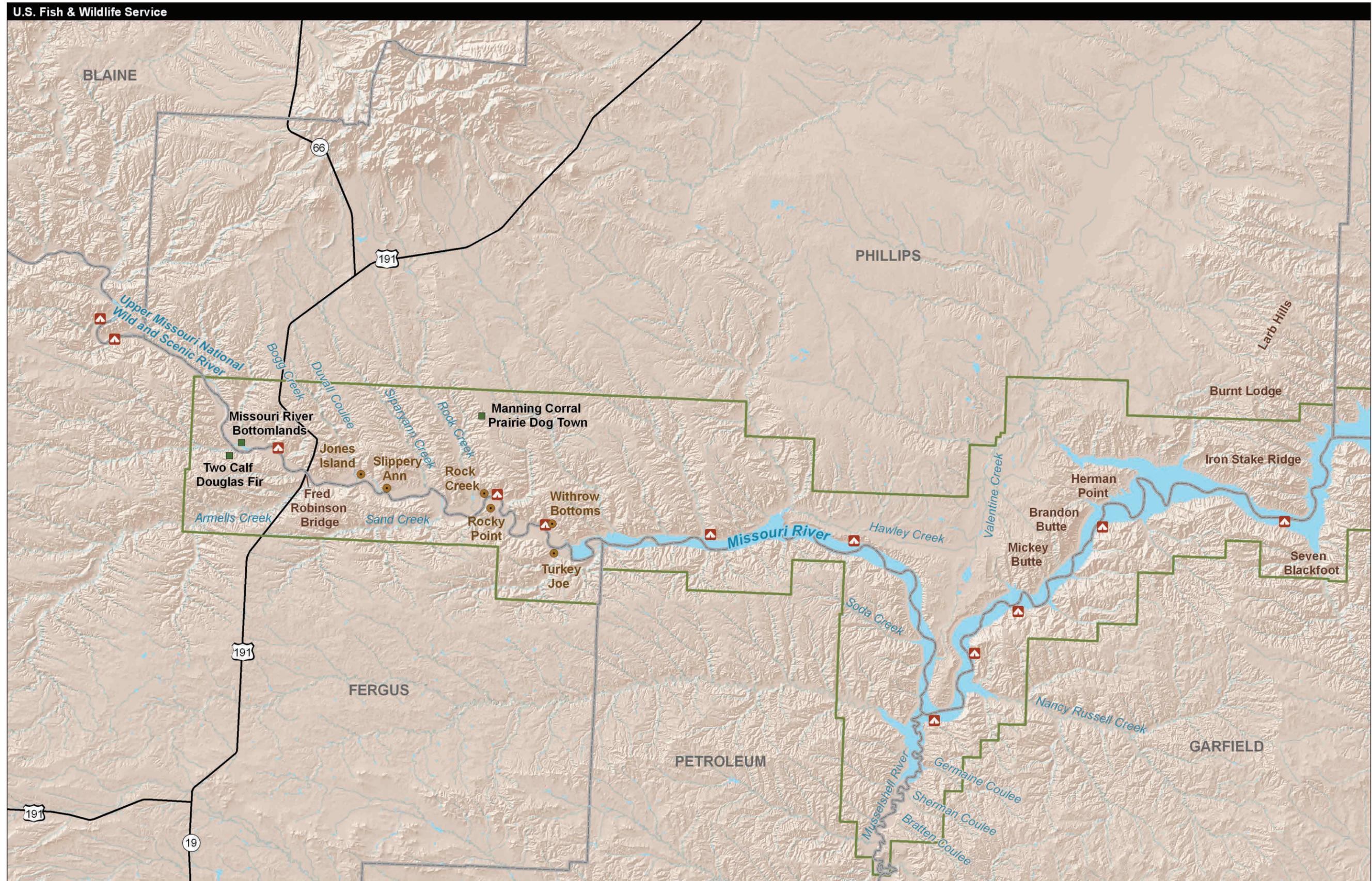


Figure 10. Map of water and geographic features in the Charles M. Russell and UL Bend Refuges, Montana.

Figure 10 (water and geographic map, west)

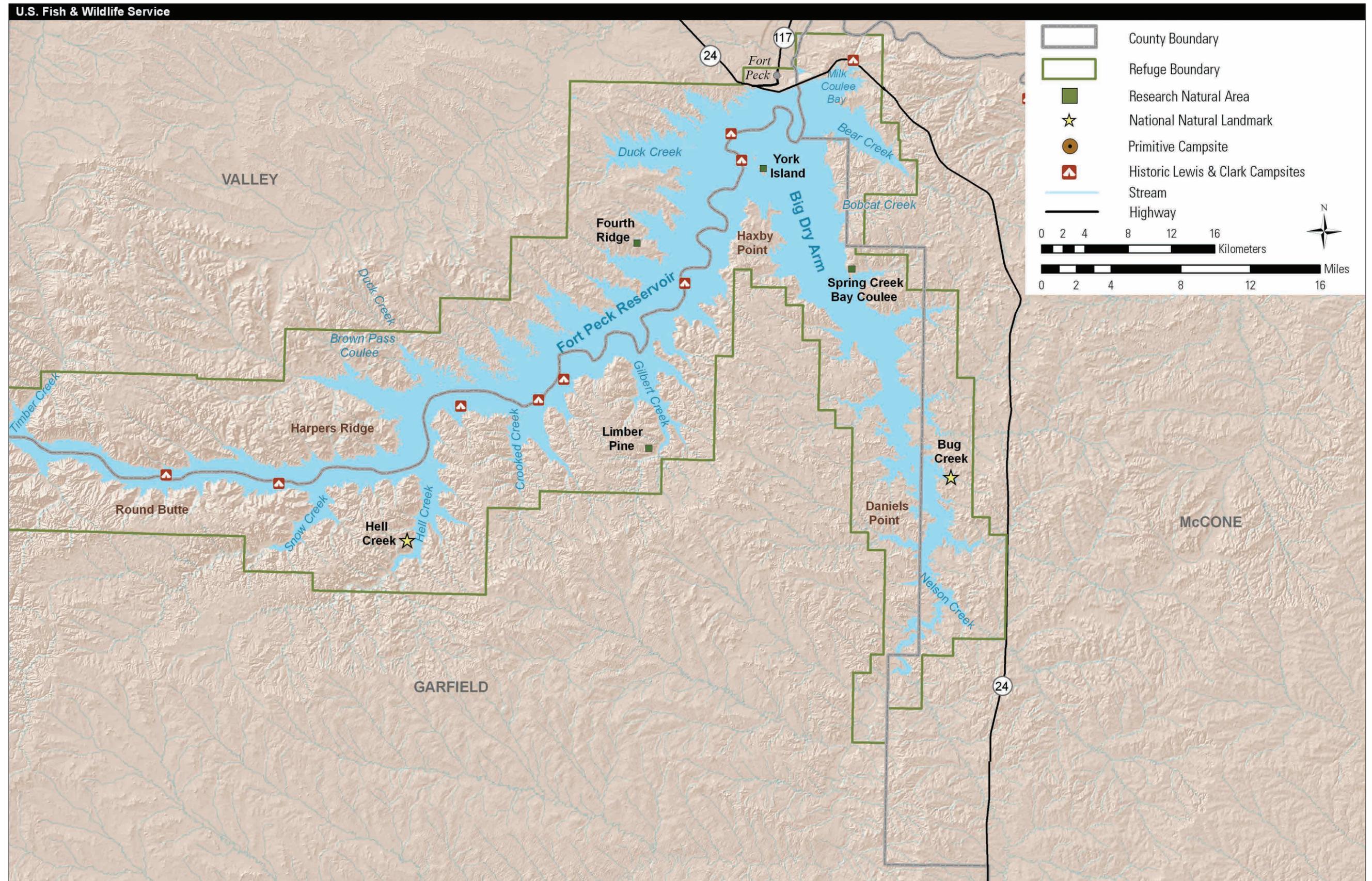


Figure 10 (water and geographic map, east)

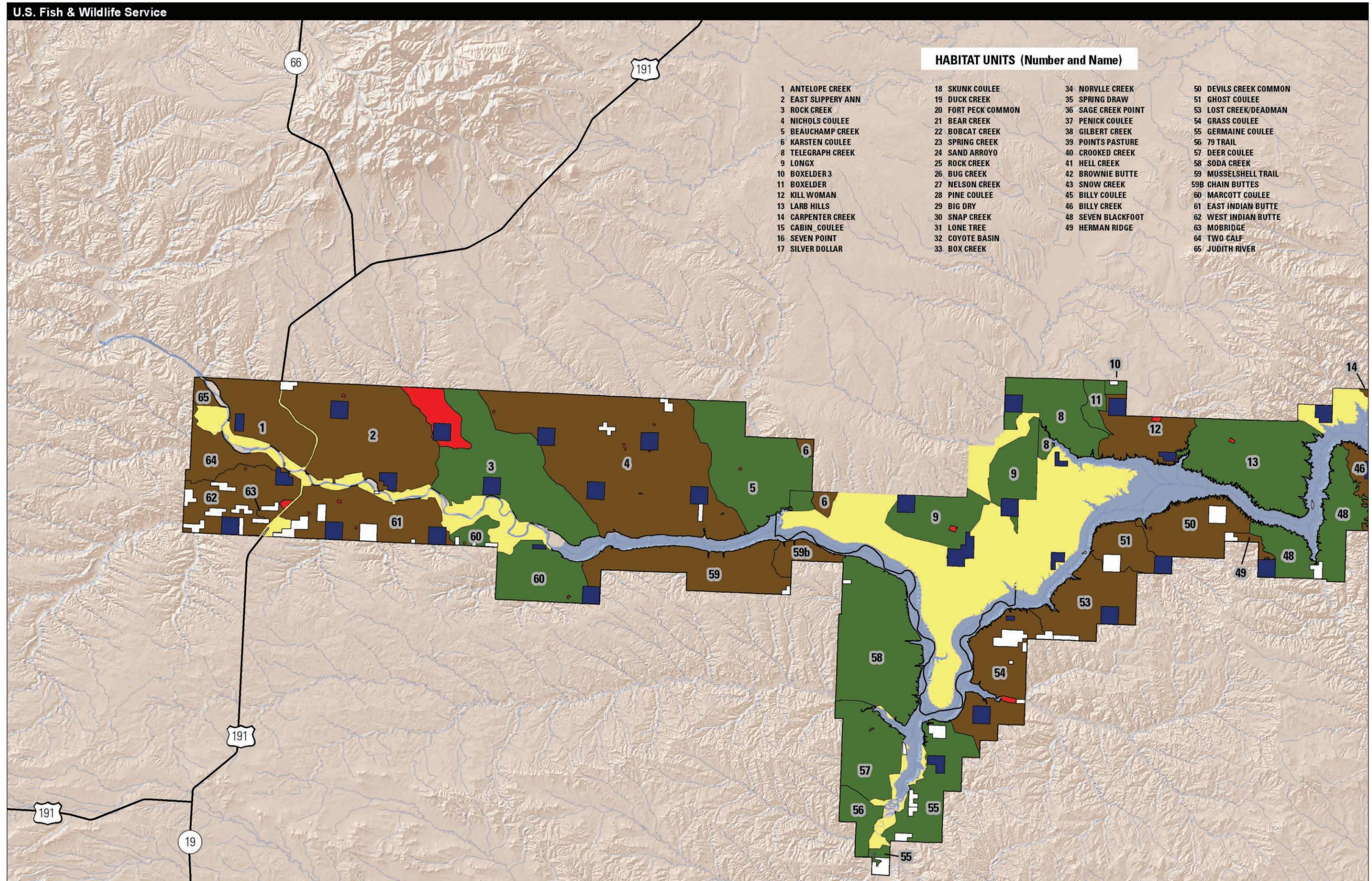


Figure 11. Map of habitat units (grazing) in the Charles M. Russell and UL Bend Refuges, Montana.

Figure 11 (habitat grazing units, west)

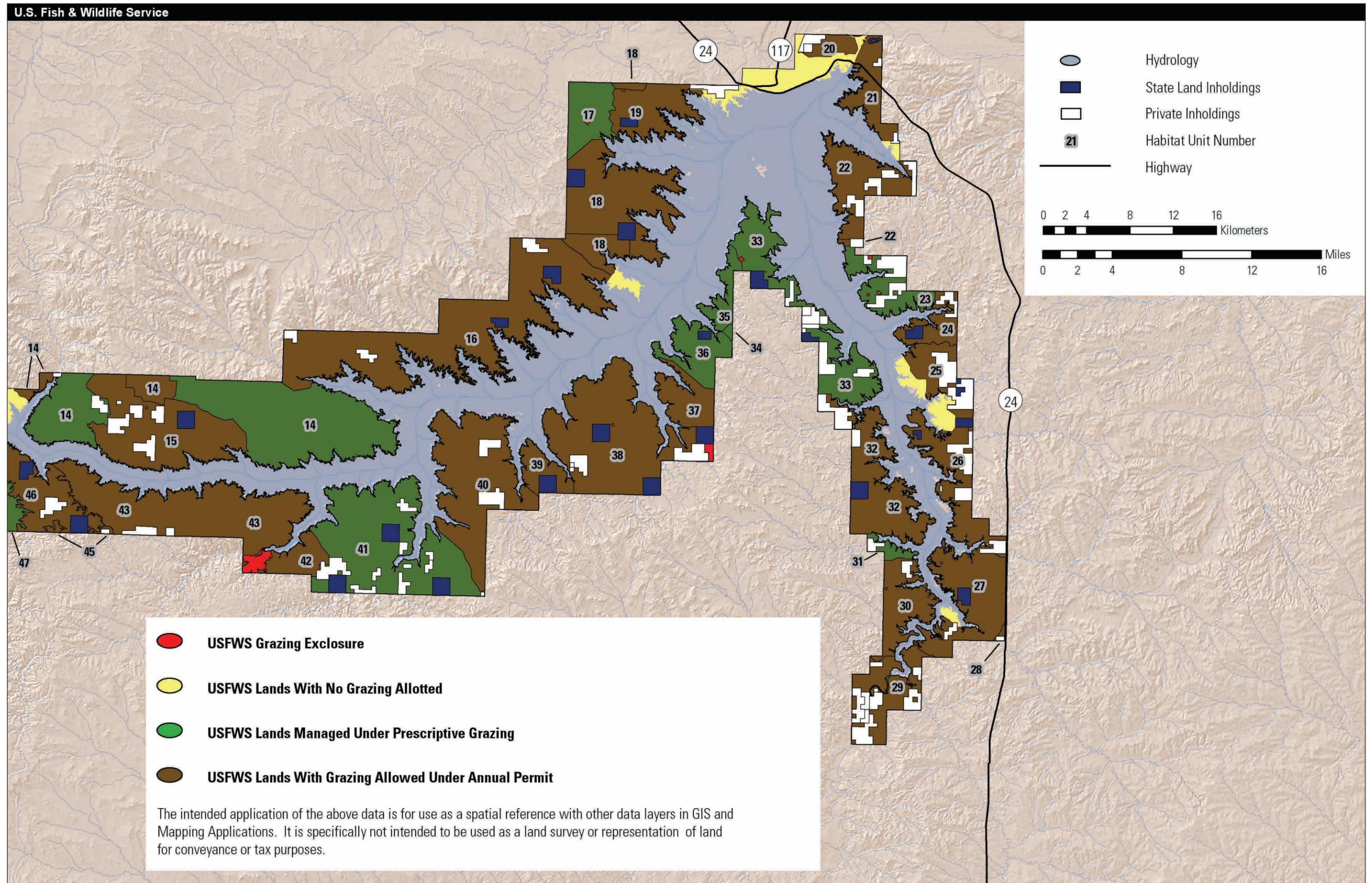


Figure 11 (habitat grazing units, east)

Wildfires, generally lightning-caused, occur frequently across the refuge during the summer months (refer to wildfires under “Uplands” in section 3.2 below). At times, there has been significant visible smoke during large wildfires, most recently during the large fires in 2003 and 2006.

SOUNDSCAPES

A soundscape refers to the natural acoustic environment consisting of sounds such as wildlife vocalizations and weather events. The disruption of natural sounds can affect visitors and wildlife. An important quality of the refuge as identified by the public and staff is the opportunity to experience a remote recreational setting not available in other places (refer to chapter 2). A tangible and intangible aspect of wilderness is maintaining soundscapes, whereby solitude is enhanced by the absence of distractions such as unnatural noise (FWS 2008c). Although the refuge is considered remote, there are several sources of noises found on the refuge that could affect a visitor’s experience:

- motor vehicles including four-wheel-drive vehicles, all-terrain vehicles (ATVs), quadricycles, and snowmobiles
- management activities associated with developed areas such as camping areas, restoration projects, and equipment
- motorboat activity on Fort Peck Reservoir and the Missouri River
- airplanes
- military overflights (This issue is outside the scope of the CCP and is not discussed further.)

Motor Vehicles

Most vehicle access occurs during the summer and fall months with most activity occurring during the hunting season. Snowmobiles are allowed on the frozen surface of Fort Peck Reservoir during the winter. All vehicles must be licensed to travel on refuge roads, and under Montana law noise emissions cannot exceed 96 decibels for all off-highway vehicles including snowmobiles.

Management Activities and Developed Recreation Areas

Activities associated from management activities and other recreation include equipment (such as generators), tractors, chainsaws, and other machinery. Few of the proposed wilderness units are near developed areas or bottomland restoration areas.

Motorboats

From the refuge’s western boundary to the Fred Robinson Bridge, the Missouri River is designated as a unit of the Upper Missouri National Wild and Sce-

nic River. Travel is limited upstream of the bridge from June 15 through September 15. Downstream travel is restricted to idle speeds only with no wake from Thursday through Saturday, and no motorized boats can travel downstream to the bridge on Mondays and Tuesdays.

As with motor vehicles, Montana law limits noise emissions for motor boats (less than 86 decibels).

Within the next few years, the Service will be initiating a study to assess the amount of boat use that occurs along the Missouri River, particularly during hunting season. The Service believes that more hunters are accessing the refuge from the river, but there is not enough information to assess the effects, if any, on wildlife populations.

Airplanes

Aircraft can only land in designated landing zones in accordance with USACE and the refuge’s seaplane landing plan (USACE 1995). There are no landing zones or landing areas west of Crooked Creek, but some landing zones and areas border or are near edges of proposed wilderness units (for example, Crooked Creek, Forchette, and Bone Trail). Landing zones are located near USACE developed recreation areas. In addition, there are several other landing areas on Fort Peck Reservoir. The number of aircraft flying over the refuge on an annual basis is unknown.

Hunting

Every year, more than 100,000 hunters come to the refuge to hunt big game, small game, and migratory birds. Gunshots could potentially be heard. The distance that any weaponry could be heard varies greatly with the terrain and other factors.



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Restrictions are in place on motorboats to limit the effects on soundscapes along the wild and scenic river part of the refuge.

LAND FEATURES, SOILS, and GEOLOGY

Many of the topographical and water sources in this section are identified on figure 10. The Missouri and Musselshell Rivers flow through deep valleys with narrow floodplains lying 500 to 1,000 feet below the average elevation of surrounding uplands. Elevations vary from slightly more than 2,000 feet above mean sea level near Fort Peck Dam to more than 3,200 feet in the Seven Blackfoot area (see figure 10). Three main landforms—uplands, breaks and floodplains—dominate the refuge and surrounding area.

Uplands are level to rolling prairies dissected by intermittent streams flowing toward the Missouri River in a generally eastward direction. These are the sagebrush–grassland plains typical of eastern Montana.

The breaks lying along the Missouri River are typified by rough terrain often culminating in spectacular badlands. Badlands are arid, eroded land “breaks” of uplands that are dissected into steep slopes and grassy floodplains. This topography along the Missouri River varies from low, barren hills of the Big Dry area south of Fort Peck to severely eroded coulees of the scenic Seven Blackfoot and Burnt Lodge areas and the juniper, pine, and grassland ridges on the western half of refuge. Approximately 40–50 percent of lands within refuge consist of steep ridges and eroded coulees.

Floodplains occur along the Missouri and Musselshell Rivers at upper extremities of Fort Peck Reservoir and along some of the larger drainages. These developed from preglacial river and stream alluvium and are characterized by heavy clay soils, deciduous trees, sagebrush, and grassland. These floodplains are comparatively flat and vary in width from 25 yards to 2 miles.

The Judith River formation outcrops west of Rock Creek in Phillips County in major stream valleys. It comprises several hundred feet of interbedded shale, siltstone, and sandstone with scattered beds of lignite and bentonite. This formation has good stability, but its outcrop area is limited to steep slopes.

Bearpaw shale underlies more of refuge than any other formation. The breaks west of UL Bend Refuge are almost entirely composed of this shale as are lower slopes east of UL Bend, except in the central and southern parts of Big Dry Arm. Bearpaw shale is almost entirely composed of dark gray, clayey shale and includes thin beds of bentonite. The predominant particle size of this formation is clay, and the predominant clay mineral found in Bearpaw shale is montmorillonite. As a result, this unit swells when exposed in steep slopes and erodes rapidly at many locations.

Fox Hills sandstone comprises yellowish gray sandy shale, claystone, siltstone, and very fine-grain sandstone and grades upward into relatively thick beds of resistant fine and medium-grain yellowish

brown sandstone. This formation is generally found in areas of high relief along Fort Peck Reservoir such as Larb Hills, Harper Ridge, and much of Garfield County. Along Big Dry Arm, Fox Hills sandstone is found south to Rock Creek (east).

The Hell Creek formation is generally found above 2,500 feet in elevation in the central and eastern parts of refuge. It comprises unconsolidated fine sediments such as claystone, shale, siltstone, and sandstone. Some of the clay and silt-rich zones of the formation tend to shrink and swell during excavation or when exposed to water. The Fort Union formation is found in Garfield and McCone Counties, east and west of Big Dry Arm and south of Rock Creek (east). It is also found in the highest parts of Larb Hills. Tullock member, most widely found subunit of the Fort Union formation of refuge, is light gray to dark gray shale alternating with sandy shale and gray to buff sandstones. Lignite beds are also found in association with this member. This formation responds similarly to the Hell Creek formation to most development activities.

Glacial till is found at scattered locations, particularly between Rock Creek (west), Phillips County, and Valentine Creek. This is dense, clay-like material with characteristics similar to Bearpaw shale. Outwash and related deposits are found west of UL Bend on low benches and in the Missouri River Valley, in the lee of bedrock ridges. These latter deposits are porous and stable.

Exposed rock found on the refuge dates to almost 80 million years B.P. (before present, present=1950) or Late Cretaceous. Sedimentation dominated the area until about 58 million years B.P. For the next 55 million years, sediments were successively eroded away as the plains and surrounding areas were sporadically uplifted. In the past 3 million years, glaciers advanced over the area, the most recent retreating northward about 20,000 years B.P.

Ice jams caused the highest levels of flooding on major streams such as the Missouri River, Big Dry Creek, and Musselshell River. Snowmelt runoff causes the greatest flood flow volumes on these same streams. High flows can occur on these streams any time from January to August. Rainstorms cause major flooding on smaller drainages.

All stream channels flowing through unconsolidated material meander over time. The Missouri River upstream of Fort Peck Reservoir has shifted as much as 2,000 feet over about 65 years, at average rates up to 30 feet per year. The Fort Peck Reservoir delta is the area of greatest channel change and sedimentation; other areas of channel change and bank erosion are found on most upstream parts of most stream bottoms.

Areas of current and past landslide activity cover about one-third of the surface area of the refuge.

Steeply sloping areas in the western Bearpaw breaks, Garfield County, Larb Hills, and Harper Ridge have the most significant number of landslides. Landslides are of several types; slump-earth flows are the most common. Rapidly moving debris flows also occur, especially in the western Bearpaw breaks. Piping is an important erosional process in the Hell Creek formation and in landslide deposits. Pipes may collapse or create general ground instability.

Mineral Development

There are no known gravel deposits on the refuge. Gravel used for road improvements in the Hell Creek area was hauled a considerable distance, making transportation costs a significant issue for future road improvements. Results of a mineral report (USGS, U.S. Bureau of Mines 1979) show that parts of the area have a low to moderate bentonite potential and low diatreme gem potential. These located minerals have no economical mineral potential. The mineral estate was withdrawn in 1993 (Public Land Order 6997) for 20 years on the Charles M. Russell Refuge and was permanently withdrawn on the UL Bend Refuge in 1970 (Public Land Order 4826). There is no oil or gas development occurring on the refuge. The Service is currently seeking an extension of the 20-year mineral withdrawal for locatable minerals on Charles M. Russell National Wildlife Refuge.

WATER RESOURCES

Water resources on the refuge include large rivers like the Missouri River, Musselshell River, and many smaller streams and tributaries, many of which are intermittent (see figure 10). In addition, there are livestock ponds scattered across the refuge.

Hydrology

The watershed of the Missouri River defines the Charles M. Russell and UL Bend Refuges. The river and its tributaries create a series of badlands or “breaks” consisting of rolling uplands, steep bluffs, and grassy floodplains. The river flows easterly through the refuge, with an average mean daily discharge of 8,915 cubic feet per second (cfs) at the entrance of the refuge above the Fort Peck Dam (USGS station Missouri River near Landusky, Montana, number 06115200). Peaks at this site since 1934 have ranged from 8,460 cfs (2000) to 137,000 cfs (1953). The Missouri River leaves the refuge below Fort Peck Dam with an average mean daily discharge of 9,284 cfs. Peaks since 1934 have ranged from 7,200 cfs (2009) to 51,000 cfs (1946). The river itself flows about 300–500 feet below the refuge’s uplands.

Upland areas on the refuge are drained by perennial (flows generally 90 percent of the time), inter-

mittent (flows during wet months, generally only 50 percent of the time), and ephemeral (flow only in response to storms) streams. The channels are deeply entrenched with floodplains being 15–20 feet above the water during low-water dry periods, and exhibit steep gradients in many areas. Clay from the Bearpaw and Lance shale erodes easily from the stream action: breaking, collapsing, and rolling into flows creates turbid waters and dynamic channels. Stressed riparian areas erode rapidly, with active gullying and active headcutting present in many watersheds. In 1995, the riparian area health of 113 reaches on 75 separate streams was assessed (refer to “Riparian Areas and Wetlands” under section 3.2 for more information). All of the reaches assessed on 50 of the 75 streams were found to be “nonfunctional.” Only six streams had all parts of the riparian zone at proper functioning condition. The water statistics in table 3 are from streams on or near the refuge.

The Musselshell River flows northerly through the refuge into the Missouri at Fort Peck Reservoir. USGS’s station at Mosby, just upstream the refuge, has an average mean daily flow of 253 cfs. Peak flows during 1929–2010 range from 90 to 18,000 cfs. Being a snowmelt-fed stream, the Musselshell River floods in the spring until mid-June, when flow begins to decrease. The low discharges in late summer and fall are dependent on ground water base flow and releases from reservoir storage. Occasional summer peaks appear in response to thunderstorms. MFWP lists 40 miles of the river from Mosby to its confluence with the Missouri as chronically dewatered each year. Water quality can also be an issue, as irrigation return flows bring salts flushed out of the irrigated fields.

Due to the vastness and remoteness of most of the refuge watersheds, studies have been done to obtain better estimates of stream discharge and hydrograph behavior. USGS published several studies describing surface-water statistics for gauged and ungauged basins in and around the refuge. Parrett et al. (1983) used regional gauging station data to develop regression equations that describe mean annual streamflow for ungauged basins. Parrett and Johnson (2004) developed regression equations to estimate peak flows having recurrence intervals of 2, 5, 10, 25, 50, 100, 200, and 500 years for ungauged sites for all of Montana. Sando et al. (2009) used data more specific to the refuge and published, “Estimation of Streamflow Characteristics for Charles M. Russell National Wildlife Refuge, Northeastern Montana.” By using data from five gauging stations on the refuge, as well as long-term gauging stations near the refuge, the publication provides methods of estimating the long-term median streamflow, 2.33-year peak flow thought to be bankfull or “channel-

Table 3. Average daily discharge and peak flows for six U.S. Geological Survey water stations on or near the Charles M. Russell and UL Bend Refuges, Montana.

<i>Name and location</i>	<i>USGS station number</i>	<i>Average daily discharge (cubic feet per second [cfs])</i>	<i>Lowest peak on record (cfs)</i>	<i>Highest peak on record (cfs)</i>	<i>Period of record (cfs)</i>
Armells Creek near Landusky, Montana	06115270	8.5	192	2910	2001–04
Duval Creek near Landusky, Montana	06115300	0.09	0	640	2001–04 (mean daily) 1963–2007 (peaks)
Rock Creek near Landusky, Montana	06115350	2.36	12	1660	2001–04
Hell Creek near Jordan, Montana	06130650	2.23	120	1700	2001–04
Nelson Creek near Van Norman, Montana	06131200	1.5	5	1750	1976–2008
Big Dry Creek near Van Norman, Montana	06131000	47.9	47	24600	1940–2006

forming,” and maintenance flows, as well as monthly and annual 90-, 80-, 50-, and 20-percent exceedence streamflows. (An exceedence flow means there is an “x” percent chance the actual flow will exceed the given value. For instance, an 80-percent exceedence monthly flow for July is low in value and represents a “dry” year, because there is an 80-percent chance the actual July value will be higher.) In addition, the study provided monthly and annual mean streamflows for ungauged watersheds.

Higher streamflows typically occur from February through August, and lower flows occur September through January. The highest mean monthly volumes generally occur in March and April, due to snowmelt runoff. April and May flows decrease as snowmelt amounts diminish. Late spring and summer rainstorms create fast rising and diminishing flood peaks in June and July. Flows in August and autumn are low or zero, and frequently are only a result of ground-water base flow.

Ground water occurs at shallow depths in the Hell Creek–Fox Hills Sandstone Strata. The hydrostratigraphic sandstone intervals yield small quantities of water suitable for livestock and wildlife. These strata occur north of Fort Peck Reservoir and in the southeast part of Phillips County. At lower depths,

ground water occurs in the Judith River Formation. Water-bearing sandstone strata can yield fair amounts of ground water; however, quality can be an issue due to salinity levels. Artesian pressure created by the thick layer of impervious Bearpaw Shale overlying the formation allows wildlife and stock wells to flow without the aid of pumps.

Water Rights

The United States holds Federal reserved water rights appurtenant to land withdrawn pursuant to Executive Order 7509, dated December 11, 1936, which established the refuge. The reserved right has the priority of the 1936 withdrawal.

The United States also holds Federal reserved water rights appurtenant to land withdrawn pursuant to Public Land Order 4588, dated March 25, 1969, which established UL Bend National Wildlife Refuge. This order removed some reserved lands from the refuge and included them within the UL Bend Refuge, and also withdrew additional lands from the public domain for the new refuge. The reserved right has the priority of the 1969 withdrawal.

The United States is in the process of quantifying these reserved rights with the Montana Reserved Water Rights Compact Commission. The Commis-

sion was created by the Montana Legislature in 1979 to “conclude compacts for the equitable division and apportionment of waters between the State and its people and the several Native American tribes claiming reserved water rights within the State (MCA 85–2–701), and between the State and its people and the Federal Government claiming non-Indian reserved waters within the State (MCA 85–2–703).”

The United States has already successfully achieved compacts for the Black Coulee, Benton Lake, and Red Rocks Lakes National Wildlife Refuges. The United States anticipates the compact for the refuge including UL Bend National Wildlife Refuge will be modeled in a similar manner, with protection of existing private rights, protection of enough water to carry out the primary purpose of the refuge, and dovetailing in refuge water protection with operations of the Service’s sister agency, and largest landholder upgradient of the refuge, BLM. The Service’s 1936 Federal reserved water right is senior to most BLM water rights. The United States has until July 1, 2013 to complete the compact.

In addition to Federal reserved water rights, the United States also holds State-based water rights. Before July 1, 1982, and in accordance with the Montana Water Use Act, the Service filed Statements of Claim to water rights appurtenant to the refuge and with priority dates earlier than July 1, 1973. Claims were filed for water rights vested on acquired land as well as land reserved from public domain. Since 1982, the State of Montana has proceeded with examining and adjudicating many of these claims. The basins the refuge covers and each basin’s adjudication status are as follows:

- 40EJ, Missouri River between Musselshell River and Fort Peck Dam; claims are being examined
- 40E, Missouri River, between Musselshell River and Fort Peck Dam; temporary decree
- 40O, Milk River, below Whitewater including Porcupine Creek; preliminary decree
- 40S, Missouri River, below Fort Peck Dam; preliminary decree
- 40C, Missouri River, Musselshell River, below Roundup; temporary decree
- 40D, Dry Creek; preliminary decree
- 41S, Judith River; temporary decree

Temporary (decrees for areas that have Federal or tribal reserved water rights but where the rights have been left out until they are affirmed) and preliminary decrees (decrees for areas that do not have Federal or tribal reserved water rights) are issued to allow for interested parties to file objections if they disagree on the merits of a claim. Objections to Statements of Claim are resolved by the Montana Water Court, which then issues a final decree.

Entry of the final decree begins the appeal-filing period where appeals are decided by the Montana Supreme Court. Some very small areas of the refuge are in basins with preliminary decrees but the United States has not waived its Federal reserved rights in those basins. The following are the number of claims filed by the United States:

Charles M. Russell National Wildlife Refuge

Basin 40C: 10 claims
 Basin 40D: 4 claims
 Basin 40E: 142 claims
 Basin 40EJ: 128 claims
 Basin 40O: 4 claims
 Basin 40S: 4 claims
 Basin 41S: 2 claims

UL Bend National Wildlife Refuge

Basin 40E: 36 claims
 Basin 40EJ: 14 claims

Most of the claims were for small, water storage impoundments used for wildlife and stock watering. Two hundred forty-eight claims were filed for ponds, which hold 2,138 acre-feet of water. Ninety-eight claims were filed for other pre-1973 water diversions such as wells, springs, dikes, instream flow, and stream and lake pumps.

Private individuals also filed claims to pre-1973 stock water rights on refuge lands. The United States filed objections against all of these claims, asserting prior case law and statutes precluded and preempted the establishment of such rights. In June 2005, in Case No. 40E–A, the Montana Water Court ruled private State-based stock water rights could exist on Federal land. Since this ruling, the United States has reviewed the validity of each claim and is in the process of settling. Prior court decisions have affirmed the United States’ position that ownership of these stock water rights appurtenant to Federal land does not grant grazing access to Federal land, nor does being refused grazing privileges constitute a taking of the private property water right.

In addition to claims for pre-1973 water rights and Federal reserved water rights, the refuge also holds permits or certificates to post-1973 water rights. In addition, the refuge filed late claims on some pre-1973 developments. The number of pre- and post-1973 ponds only on the refuge is 265; these ponds hold 2,207 acre-feet of water.

Water Quality Monitoring

Water quality on the lower Musselshell River exceeds State Water Quality Standards for total dissolved solids including sodium and alkalinity (Musselshell River Basin Water Management Study; U.S. Bureau of Reclamation 1998). This study was established to monitor changes in water quality, quantity, and aquatic habitat as they relate to management.

Best management practices were carried out on a watershed-wide basis along the Lower Musselshell River: offsite stock water tanks, riparian area fencing, rotational grazing, and improved irrigation efficiencies including land smoothing and installation of gated pipe and sprinkler systems.

Long-term monitoring sites were established along the 72 miles of river from 8 miles south of Mosby, Montana to the refuge at Fort Peck Reservoir (Hollow et al. 2001). Nine water quality sites were established and samples were taken three times per year for 2 years. Of the 71 miles of river, 20 miles were inventoried. The Musselshell River was listed by the Montana Department of Environmental Quality 303(d) list a “moderate” priority waterbody in need of total daily maximum loads development for the 1998–2000 biennium. The Lower Musselshell River was listed as a “high” priority waterbody under the 2000–02 biennium 303(d). It was listed as impaired for chronic dewatering and riparian habitat alteration and in need of total daily maximum loads development. DNRC has found that the Musselshell River meets the criteria for designation as a chronically dewatered watercourse. Lower part of the Musselshell River is a fourth order, perennially flowing waterbody. Flow peaks in spring after snow-melt and diminishes by late summer.

The Montana Department of Environmental Quality has also listed several other surface waters besides the Musselshell River that run through the refuge as water quality-impaired under section 303(d) of the Clean Water Act. Segments of Rock Creek and Nelson Creek, as well as the Missouri River and Fort Peck Reservoir, are listed as water quality impaired by Montana Department of Environmental Quality and require an assessment of the total maximum daily load (commonly called TMDL) of a pollutant a waterbody can receive and still meet water quality standards (Montana Department of Environmental Quality 2011).

The Missouri River within the refuge boundary is listed as water quality impaired. Likely causes of impairment are arsenic and copper, probably from abandoned mine sites, none of which are located on refuge lands. Alteration in streamside or littoral vegetation cover is also listed as a potential cause of poor water quality. Of the 49 miles of the Missouri River within the refuge boundary, approximately 95 percent of the stretch of river has been excluded from livestock grazing since 1995. This management action has improved riparian habitat on the Missouri, particularly on the refuge. The Missouri River riparian area corridor on the refuge, above Fort Peck Lake, is one of the few areas where the riparian habitat is functioning to its fullest potential.

Rock Creek in Phillips County is also listed as water quality impaired with lead, mercury, selenium,

zinc, cadmium, copper and pH as probable causes (likely from abandoned mine lands.) Fecal coliform is also listed as a probable cause of water quality impairment, likely from grazing in riparian zones. Rock Creek drainage is approximately 39 miles long, with the lower 7 miles inside the refuge boundary. The riparian zones on the refuge’s 7-mile stretch of Rock Creek are fenced to eliminate livestock grazing to protect the riparian area and water quality. There has been tremendous improvement to the riparian area health on the refuge on the lower 7 miles of Rock Creek drainage. Where it has jurisdiction, the Service will continue to manage to improve riparian area health on these streams and rivers.

Nelson Creek in McCone County is listed as water quality impaired with sulfates, nitrates, copper, and cadmium and the altered streamside or littoral vegetative cover listed as probable causes. The heavy metals source is unknown, while the nitrates, sulfates and streamside or littoral vegetative cover alteration are likely caused from grazing in riparian zones. Nelson Creek runs 37 miles, 2 miles of which are on refuge lands and fenced to exclude livestock grazing.

Fort Peck Lake is listed as water quality impaired with lead and mercury from various sources listed as causes. Native aquatic plants from agriculture are also listed as a probable cause of water quality impairment. Fort Peck Lake is surrounded by the refuge lands, but drains an immense area and inherits water quality problems from contributing rivers and streams.

Riparian health on a national wildlife refuge is of utmost importance because of the high value to wildlife. Many of the water quality impairments originate upstream of the refuge.

In 1999–2000, the refuge contracted with the University of Montana’s Riparian and Wetland Research Program and Dr. Paul Hanson to conduct water quality analyses for nutrients, fecal coliform, total dissolved solids, total suspended solids, and flow on the refuge. Conductivity, pH, and temperature were also measured at each of nine established water quality sites. Macroinvertebrate sampling and periphyton sampling were performed. The analyses of periphyton populations showed no impairment and full support of aquatic life uses. In particular, the siltation index showed that sediment was not a cause of impairment. Periphyton is considered a good indicator of water quality because of the naturally high number of species and their ability to respond rapidly to both exposure and recovery from pollution events. The siltation index evaluates the percentage of diatoms that are mobile. Their abundance is thought to reflect the amount and frequency of siltation. The Lower Musselshell River had a siltation index of 32.84–49.26. The causes of pollution in the

Lower Musselshell River are attributed to flow alteration and riparian area degradation. The Water Quality Restoration Plan includes voluntary implementation for irrigators and landowners to use best management practices by land smoothing, converting flood systems to sprinklers, improving irrigation ditches, and installing gated pipe, upgrading management of irrigation water and installing flow measuring devices, and using soil moisture monitoring methods. Grazing operations' and landowners' recommendations include implementing best management practices by installing cross fencing, stock water pipeline with offsite water facilities and developing grazing plans on rangelands.

On the refuge, the Riparian and Wetland Research Program's Lotic Inventory form was used to evaluate and characterize the function and present condition of selected reaches of the Musselshell River within the riparian area corridor. Health scores range from 77 percent (functional at risk) to 44 percent (not functioning). The Riparian and Wetland Research Program's Lotic Health Assessment for Large River Systems was used to evaluate the general functioning condition of 20 miles of the river. Ninety-two percent of reaches inventoried showed a range of ratings from 60–80 percent (functioning at risk), and 8 percent scored less than 60 percent (not functioning). Reasons for low health score included low cover of woody species, presence of invasive plants, lack of native graminoids, and dewatering. Some positive findings included lack of human-caused bare ground, few exotic woody species, high shrub regeneration and high cottonwood regeneration as well as high densities of dead or decadent woody species.

Healthy riparian systems enhance water quality by filtering out organic and chemical pollutants (Ehrhart and Hansen 1997). Water quality is closely related to soil erosion and sedimentation. These can be associated with vegetation cover, concentration of livestock grazing, and geologic erosion. High concentrations of sediment loads, and fecal coliforms can have a major effect in altering an existing stream ecosystem or even creating an entirely new ecosystem (Kauffman and Krueger 1984).

3.2 BIOLOGICAL RESOURCES

The following sections describe the biological resources that may be affected by implementation of the CCP. Biological characteristics include vegetation communities (often referred to as habitats) and wildlife including big game, furbearers, small predators birds, American bison, other wildlife (amphibians, reptiles, fish, and small mammals), and threatened and endangered species and species of concern. Unless otherwise noted, much of the fol-



Purple Prairieclover

Larry Allain / USDA-NRCS PLANTS Database

lowing information is from unpublished Service data located in files at the refuge office.

Habitat for wildlife is the combination of vegetation and topography that provides the water, food, and protection that is necessary for their survival. The diverse vegetation provides thousands of habitat types supporting hundreds of wildlife species (see figure 12) across the nearly 750,000–800,000 acres of land found on the refuge. Habitat needs for some species are very general, while others are very specific. This section initially discusses the distur-

bance factors that have affected the major ecological processes on the refuge. Following this, the discussion is organized into four broad categories of vegetation: uplands, river bottoms, riparian areas, and shoreline vegetation. Invasive species are discussed at the end of this section.

Vegetation types are traditionally classified into plant communities with specific characteristics and defined boundaries. While plant communities are useful for describing dominant vegetation types and constructing maps, they do not illustrate the complexity, integrity, and management needs of individual areas. For example, general plant community descriptions do not adequately represent subdominant plant species that are more sensitive to change and disturbance, are more difficult to detect yet are more important for biological integrity (refer to “Focal, Target, and Sentinel Species” under section 4.1 in chapter 4). Recognizing the complexity of vegetation and habitats and the importance of sentinel species as an indicator of environmental health, the Service strives to manage the refuge for biological integrity, diversity, and function rather than generalized plant communities. For this reason, the Service does not classify vegetation into traditional plant communities. Refer to appendix G for a list of important sentinel species.

DISTURBANCE FACTORS AFFECTING MAJOR ECOLOGICAL PROCESSES

Fire, herbivory (grazing by all ungulates), and predation (including hunting) are key factors that have affected the plant species’ populations on the refuge. Other disturbance factors include invasive species, roads, and other public use activities such as hunting. The legacy of these natural and human caused disturbances has resulted in the vegetation and habitat mosaic that exists today. Understanding these factors, their history, and their influences on the landscape is a key component of the CCP and its implementation. The following discussion includes a brief history of ecological change on the refuge, followed by descriptions of the key disturbance factors.

The Great Plains have evolved over time through ecological disturbances like fire and grazing. These disturbances can be described as “pulse” and “press.” A pulse occurrence occurs sporadically but still occurs; whereas a press disturbance is constant. Historically on the refuge, the interaction between fire and grazing can be viewed over the following periods (see figure 13).

- *1700–1882*: Fire and wild ungulates interacted to create constantly shifting mosaic patches of land influenced by grazing and abandonment. Predation by wolves, grizzly bears, and humans occurred yearlong. There was a decrease in pred-

ators and wild ungulates during the last years. The last large wild bison herd was destroyed in 1882 (FWS 2010d).

- *1882–1910*: This period saw the end of free-ranging wild ungulate herds and the shifting mosaic of grazing and abandonment with the beginning of fences and constant excessive grazing by cattle and sheep (no more periods of abandonment), the end of large predators, and a great reduction in fire.
- *1910–86*: This period saw a constant grazing by livestock with no abandonment, a continued low fire frequency due to suppression and lack of fuel, and an increase in wild ungulates; in later years, there were no large predators.
- *1986–present*: This period has seen a reduction in livestock grazing, an increase in wild ungulates, continued fire suppression, few large predators, an increase in fine fuel, and an increase in wildfire size and intensity after 2000.

Fire

Wildfire, historically a pulse or sporadic disturbance, occurs over much of the refuge. Depending on the site, the average frequency of occurrence of fire in pre-European settlement times ranged from every decade or less (in many sites) to once a century in a few sites (Frost 2008). As shown in the timeline above, since European settlement, the frequency of fire has been dramatically reduced because of a lack of fuel (due to livestock grazing) and fire suppression. Fire-intolerant plant species such as big sagebrush and Rocky Mountain juniper have spread from their original fire refugia (areas with longer fire-return intervals and periods of drought) and now occupy a much larger part of the landscape. Exceptions have been the recent large fires in 2003 and 2006 in the middle of the refuge. The behavior of these was largely driven by long-term drought conditions and extreme fire weather.

Prescribed fire has been used sparingly on the refuge. Only 15 burns have been ignited since 1992, treating 3,077 acres. Except for the King Island burn in 2008, all have been in the river bottoms, prairie dog towns, or on the lakeshore. The specific prescribed fire objectives were to reduce Russian knapweed infestations and enhance habitat suitability for prairie dogs or piping plover. The King Island burn was the refuge’s initial treatment of a 1,000-acre unit with fire to reestablish a more natural fire regime, enhance upland habitat, and promote pyric herbivory (grazing enhanced by fire).

Herbivory

Like fire, ungulate grazing (herbivory) was originally a pulse disturbance. Before 1882, there were many years with periods of abandonment (rest) by

U.S. Fish & Wildlife Service

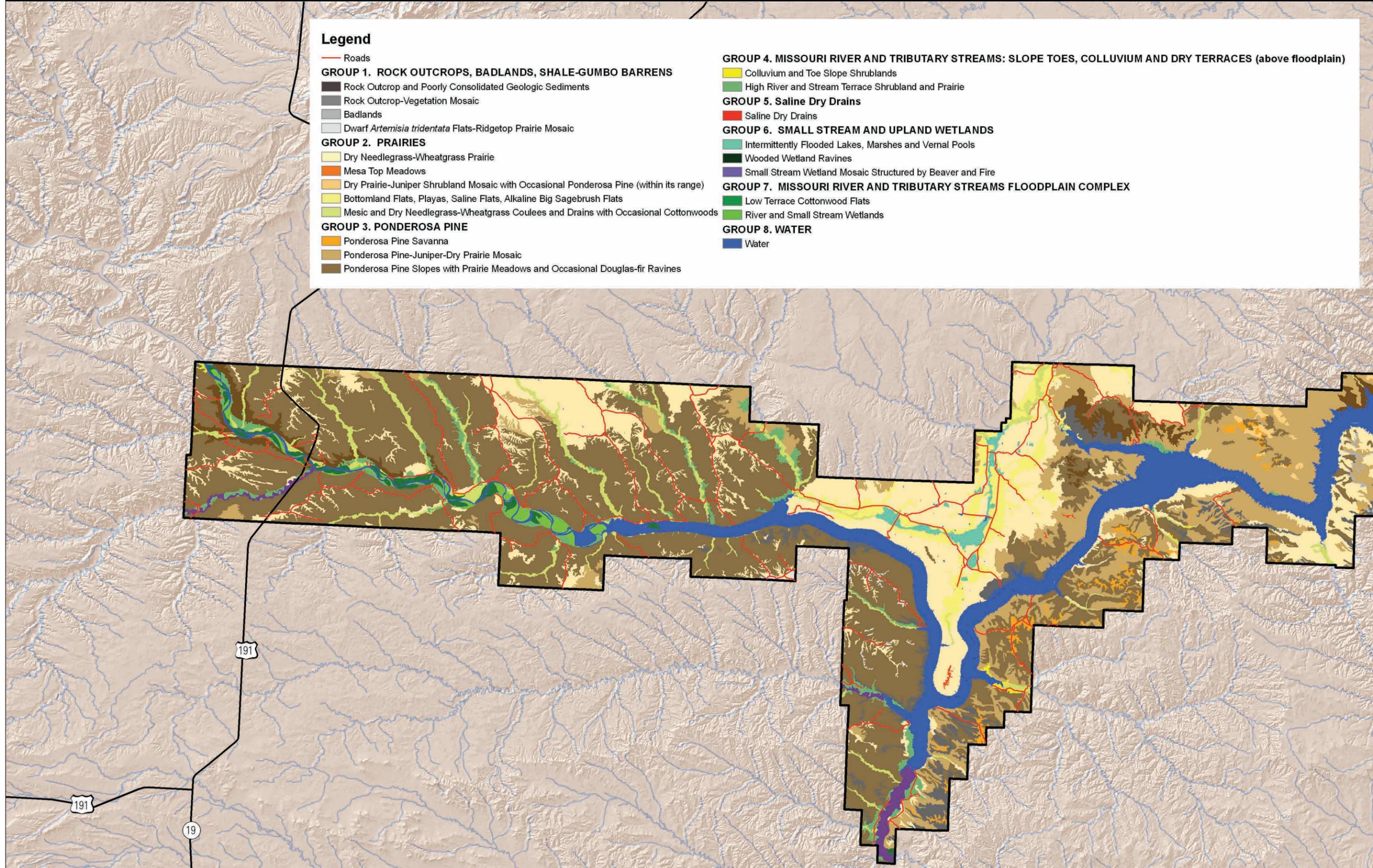


Figure 12. Map of habitat types for the Charles M. Russell and UL Bend Refuges, Montana. Source: Cecil Frost.

Figure 12 (habitat, west)

U.S. Fish & Wildlife Service

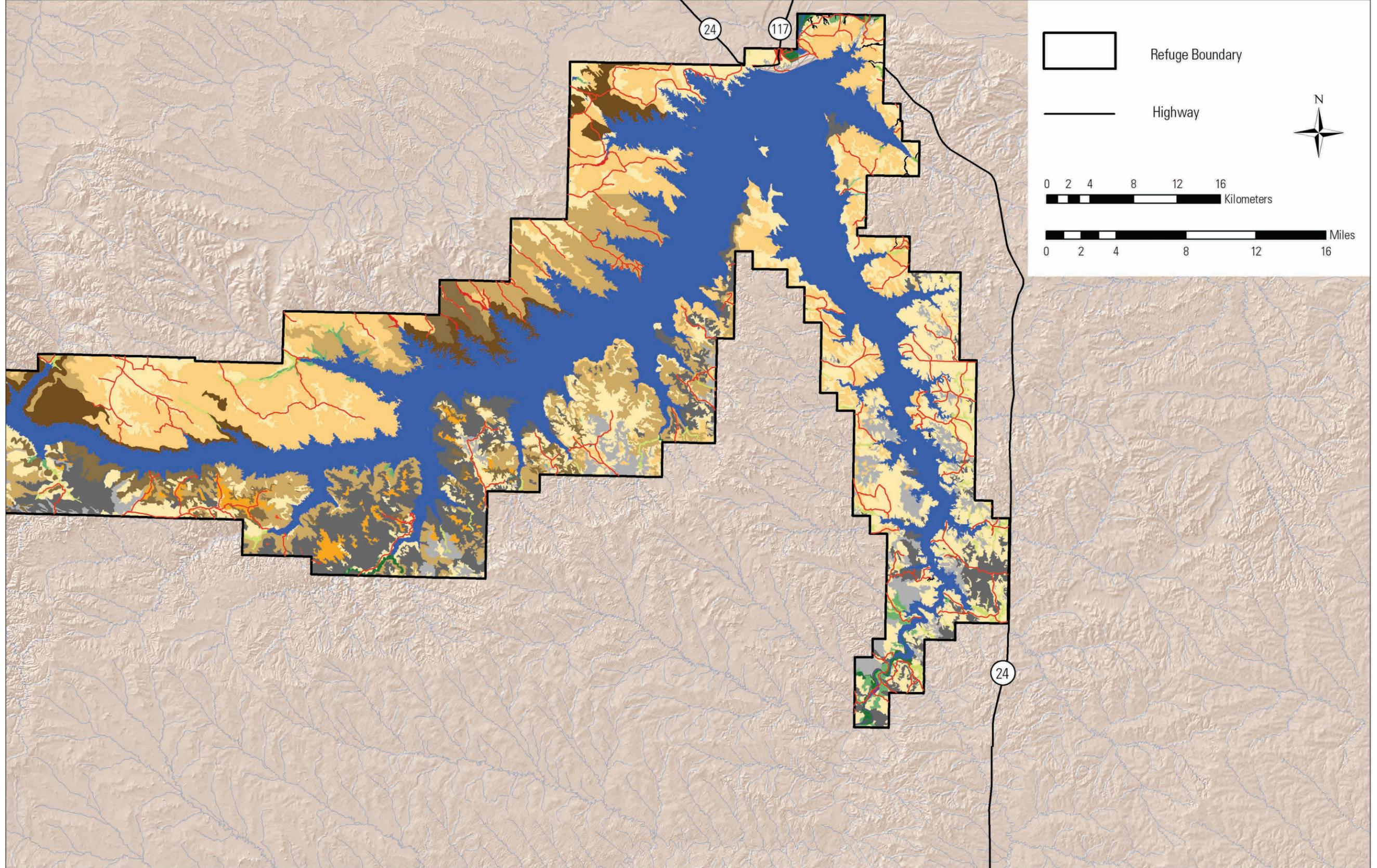


Figure 12 (habitat, east)

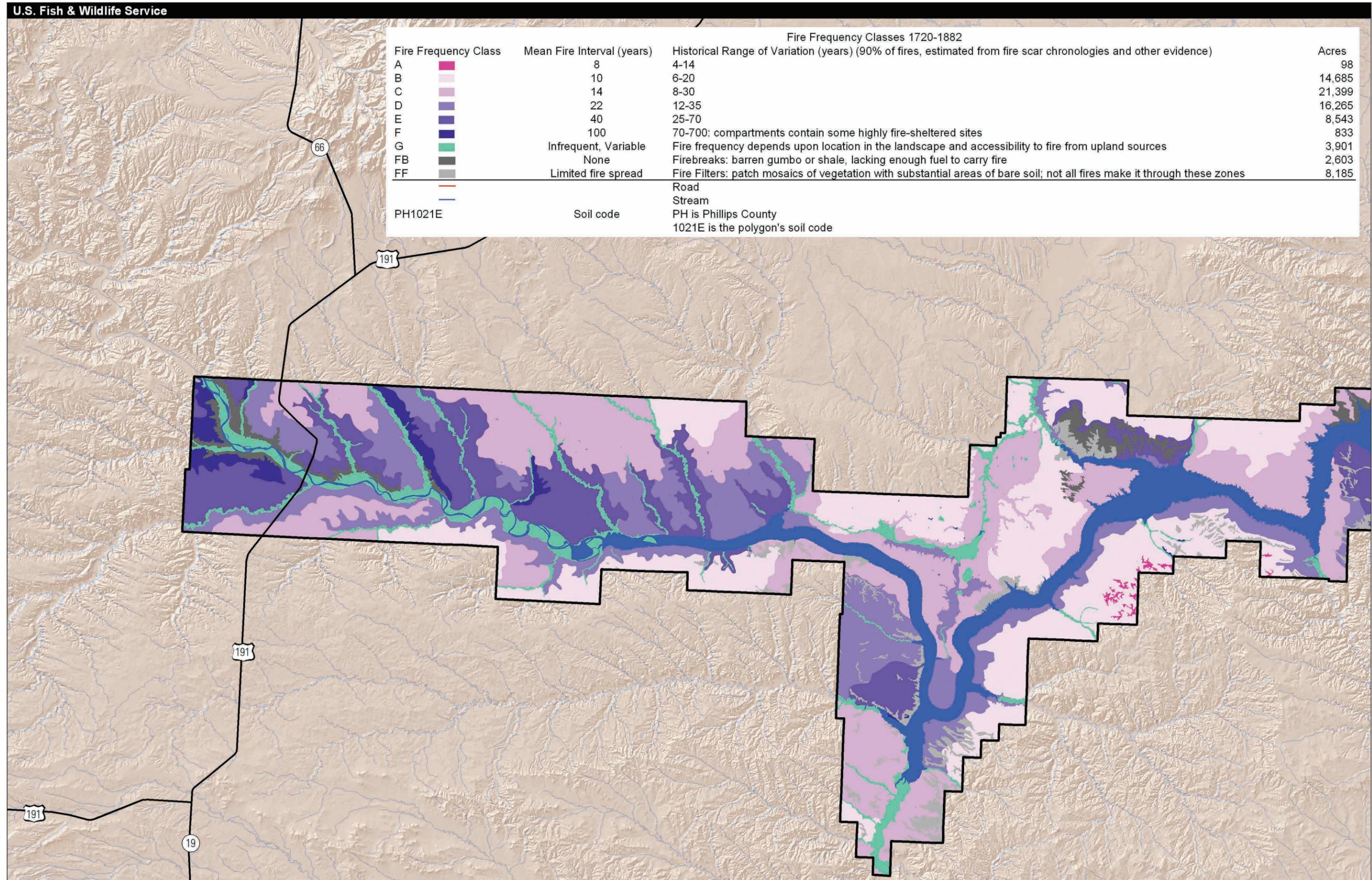


Figure 13. Map of fire frequency for the Charles M. Russell and UL Bend Refuges, Montana. Source: Frost 2008.

Figure 13 (fire frequency, west)

U.S. Fish & Wildlife Service

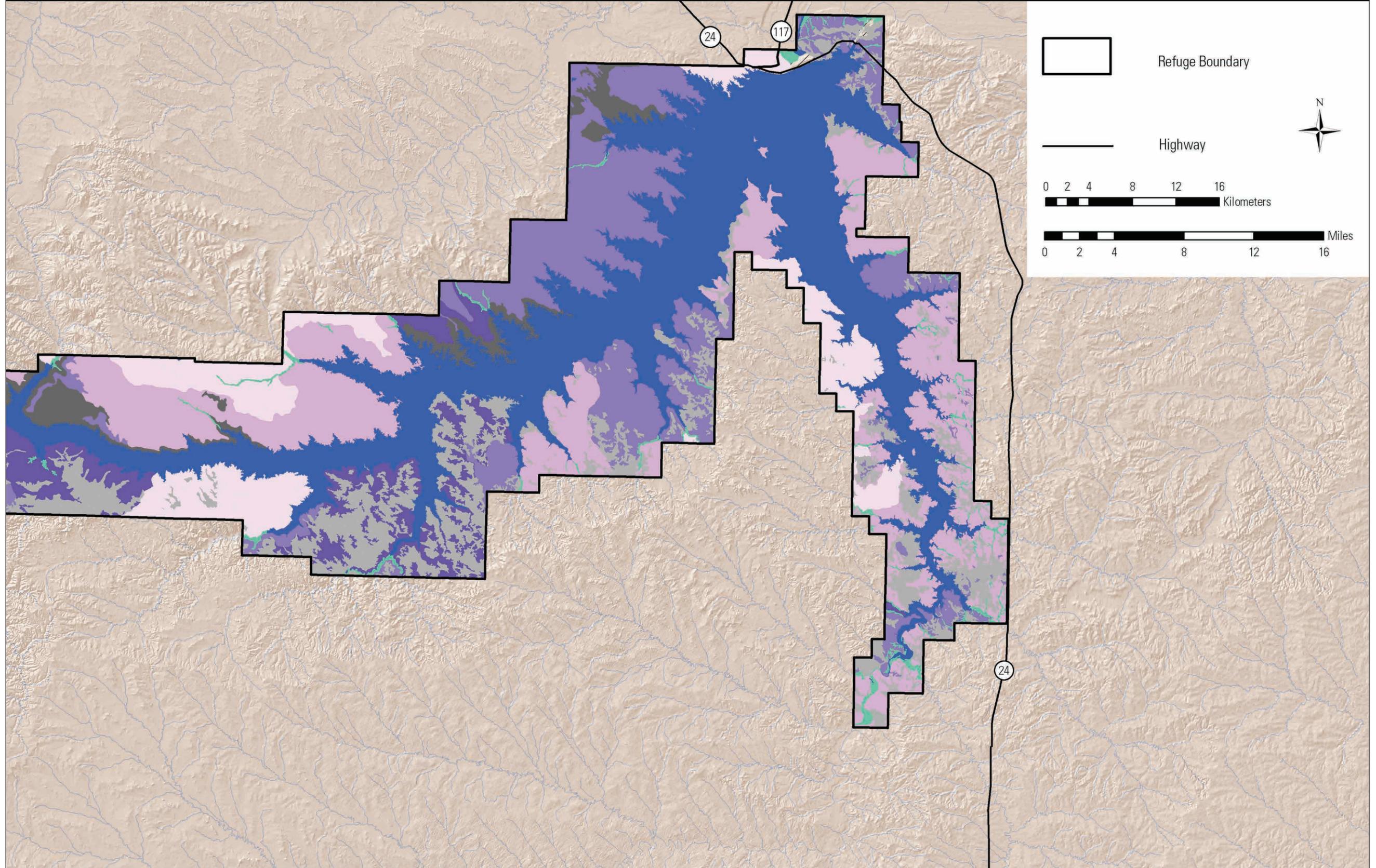


Figure 13 (fire frequency, east)

ungulates where less grazing took place due to its interaction with fire. Since 1882, it has become a constant (press) disturbance because of fences and fire control. As a result, highly palatable species (particularly shrubs and forbs such as chokecherry and white prairieclover) have dramatically declined. These species evolved with and are highly adapted to grazing when combined with several-year periods of abandonment for recovery. Palatable shrubs require several years to grow from seed to seed-bearing maturity and are alive aboveground (or vulnerable to damage from grazing) 12 months of the year. Present-day livestock grazing systems typically only rest pastures for 1 entire year or less from livestock use (with no rest from wild ungulate use).

Livestock and wild ungulate numbers have had an additive negative effect on ecological systems. Even though each herbivore species has a different diet, some plant species such as Maximilian sunflower and saltbush (sentinel species for herbivory) are eaten by all. Thus far, the management of each herbivore species on the refuge and elsewhere has been independent of the others, leading to overuse of sentinel plant species.

Predation and Hunting

When Lewis and Clark first traveled through the refuge in the early 1800s (Moulton 2002), they reported seeing grizzly bears and other predators. Historically, in the Missouri River Breaks ecosystem, wolves, grizzly bears, and Native Americans once slowed the growth rates of ungulate populations in between unfavorable climatic events, which also curtailed population numbers. This helped keep ungulate populations from destroying many plant species. Presently hunting is the only tool used to control the ungulates found on the refuge.

Fencing

As of 2009, more than 700 miles of fence have been constructed on the refuge with about 425 miles constructed since implementation of the 1986 EIS. Fencing is used to delineate the refuge boundary, fence between pastures, fence off riparian areas, or exclude wildlife and cattle for monitoring purposes. Fences have been used to exclude livestock in several riparian areas (for example, Rock Creek in Phillips County and Bobcat Creek in McCone County). Fences are generally about 42 inches high, three strands with 12 inches between wires with bottom wire about 18 inches above the ground to allow pronghorn to pass under. Most cattle exclosures are generally four-strand barbwire, with the bottom wire being 16 inches above the ground and the top wire being about 44 inches high. There are two types of total exclosures used on the refuge. One type is built with woven wire and the second type is built

with modified portable stock panels. Both are about 8 feet tall and designed to keep out all ungulates. There are roughly 40–50 cattle exclosures on the refuge and about the same number of total exclosures.

Fencing is a management tool that can be used to improve the health of landscapes or harm them. It is often an unnecessary impediment to wildlife movement. Fencing, together with heavy grazing, and fire suppression effectively ended the historical fire grazing interaction. Grazing animals were no longer able to move freely to fire and abandon other locations, allowing other areas to rest for multiyear periods. On the refuge, boundary fences have improved the health of many plant species by controlling or eliminating excessive livestock influences from surrounding lands.

Water Development

Impoundments for livestock water have been developed throughout the refuge (refer to the water rights discussion under the previous “Water Resources” section). These impoundments negatively affect riparian areas and prairie stream functions by holding water that would have supplied these areas down to the rivers. These artificial water resources also concentrate livestock, which severely impact vegetation within about 1 mile of these water sources. When livestock are present plant species and thus wildlife habitats are often damaged in large areas surrounding the impoundments. Impoundments are unnecessary for wild ungulates. They can easily travel to stream water sources when they have not been destroyed. Water in streams has been reduced by these impoundments, by irrigation off the refuge, by loss of beaver foods (and beaver) due to livestock grazing, and by livestock trampling and use of riparian stream catchments. As impoundments are removed and natural riparian areas are restored, beaver-created ponds and wetland areas will replace the human-constructed ponds. Wild ungulates and other wildlife can then easily travel to natural stream water sources.

Biologists have long hypothesized that in arid areas of the country, the scarcity of free-standing water limited numbers of game animals. During the 1940s and 1950s wildlife managers in the west spent considerable time and money enhancing existing water supplies as well as developing new water sources (Rosenstock et al. 1999). These same new water sources (such as ponds, catchments, stock tanks, and dugouts) also benefited livestock. Because of human use of water, many of the new, constructed, water supplies for wildlife are actually mitigating the loss of naturally occurring water sources (Krausman et al. 2006). Wildlife water developments are currently being scrutinized as to whether their benefits outweigh the adverse effects caused by concentrating

wildlife in areas and at numbers that would not have normally been found. The use and promotion of constructed water catchments as a wildlife management tool remains controversial (Krausman et al. 2006).

Waterfowl use of stock ponds has been extensively studied (Candelaria and Wood 1981). Migratory waterfowl use constructed stock ponds; however, natural marshes and beaver-created wetlands are better in quality (Brown and Dinsmore 1986). In North Dakota, studies on the distribution of breeding ducks and wetland habitat type showed that the highest number of breeding ducks were found on natural ponds and lakes (76 percent) and the lowest on stock ponds and dugouts (5 percent) (Stewart and Kantrud 1973). The suitability of constructed ponds for waterfowl is influenced by size and characteristics of emergent and bank vegetation. The type of land use around the ponds most determines their use by waterfowl. Grassy shorelines instead of mud shorelines are a deciding factor as to whether ponds are useful for waterfowl breeding. Livestock trample shoreline vegetation, muddy the shorelines and water, which results in a decrease in the amount of aquatic vegetation and consequently wildlife food. Livestock also contaminates shorelines and water with droppings (Candelaria and Wood 1981). Studies do show that restoring wetlands on large tracts of native grassland increases duck productivity much more so than creating more water surface area such as with livestock ponds (Ball et al. 1995, Mack and Flake 1980, Shearer 1960).

Studies in Montana show that the best constructed ponds for waterfowl are larger than 1.2 acres, with irregular shorelines and more than 40 percent of their areas less than 2 feet deep (Ball et al. 1995, Lokemoen 1973). Silted ponds receive less use by all waterfowl at all times of year. When comparing constructed ponds that are fenced and unfenced, little difference in adult pairs or brood use was recorded. Stock ponds are more important to breeding waterfowl than dugouts and diked dugouts, dugouts were the least important (Lokemoen 1973). When comparing stock ponds in South Dakota, waterfowl use was highest when there were natural pond basins near the constructed ponds. Grain fields near ponds are also important for waterfowl use (Rumble and Flake 1983).

Constructed impoundments on the refuge are of little use for breeding, brooding or mig-

ratory waterfowl. Although migratory waterfowl do use constructed impoundments for resting, the refuge pond sizes are smaller than the “large size” ponds recommended in the scientific literature. Stock ponds (excluding the UL Bend) range from 140 to 800 linear feet with the majority smaller than 600 linear feet (refuge maintenance database). Pond sizes convert to approximately 0.03–1.2 acres with most smaller than 0.7 acre, which is about half the size recommended for breeding and brooding waterfowl. The natural pond basins and riparian areas needed close to constructed ponds are also deficient or missing in many areas of the refuge due to impoundments reducing natural waterflows. The refuge is also lacking the important grain fields nearby, which makes constructed ponds useful to migrating waterfowl.

Roads

Roads (also discussed under public use and visual resources) are not a natural part of landscapes and destroy the native plants that were present or could be present on the road site. Roads, because they are artificial firebreaks, have contributed to the reduction in fire frequency and loss of the fire–herbivory interaction. Most invasive plant infestations on public lands are found alongside the roads and adjacent to roads where hunters camp or associated with illegal off-road use (USFS 2003). They also result in habitat fragmentation, which has been shown to exacerbate the problem of habitat loss for grassland birds (Johnson and Igl 2001).

Invasive Plant Species

Numerous noxious or invasive plant species have affected habitats on the refuge. This topic is addressed in detail at the end of the vegetation section.



Roads can become braided and unsightly, particularly during wet periods.

UPLANDS

Uplands make up most of the refuge. The uplands comprise grassland, shrubland, and forest. The grassland and shrubland communities compose more than 60 percent of the upland area, and forest communities cover about 30 percent of the uplands.

Common grass species include western wheatgrass, bluebunch, wheatgrass, green needlegrass, and blue grama. Western wheatgrass and blue grama have increased while the other species have declined over time. With the reduction or elimination of summer grazing, bluebunch, and green needlegrass have responded positively and are increasing. Japanese brome has invaded all grasslands, especially those in poor condition. The forbs associated with grassland and shrubland in excellent condition include white prairieclover, purple prairieclover, dotted gayfeather, purple coneflower, and stiff sunflower. These forbs continue to decline even in the best-condition grasslands and, for the most part, have been eliminated from fair-condition grasslands.

Shrubs important to wildlife include big sagebrush, silver sagebrush, juniper, chokecherry, golden currant, redosier dogwood, and silver buffaloberry. Shrubs across the refuge are not found where they once were. All shrubs—except for big sagebrush and juniper, which are in better health in areas with low herbivory (grazing)—have declined in historical distribution, density, and plant height.

Key upland trees include ponderosa pine, Douglas-fir, and some limber pine. Over time, ponderosa pine and Douglas-fir have increased across the refuge, especially in the western part; some trees are several hundred years old. A few green ash and cottonwood trees are scattered in the upland coulees (ravines), and aspen trees dot the sheltered coulees.

The refuge's total plant community contains more biomass of grasses than of other plant groups. Generally, the land can support a high biomass of large ungulates such as elk, bison, and domestic cattle based primarily on these grasses. However, sentinel shrubs and forbs, which have been affected by ungulate numbers and altered fire-return intervals, disappear long before grasses.

Sentinel Plant Species

Sentinel plant species are early warning indicators for ecosystems: they are the first species to decline or vanish in ecological systems when evolutionary natural processes such as herbivory, predation, and fire change. The Service has been monitoring the health of these important plant species on the refuge since 2003 and has found that some are beginning to diminish due to the changes to natural processes that have occurred. Different species of sentinel plants are adapted to all the temperature, moisture, and physical gradients present on the refuge and are more

sensitive to changes in management or environmental conditions than general plant communities.

The concept of sentinel species monitoring is not new. In 1947, Aldo Leopold discussed diagnostic plant species that were early to respond to ungulate grazing pressure (Leopold et al. 1947). More recently, focal species are understood to be the individual



Golden Currant

Gary A. Monroe / USDA-NRCS PLANTS Database



Winterfat and golden currant, both shrubs, are two of several sentinel plant species identified for refuge habitats.

W.L. Wagner / Smithsonian Institution

wildlife species that have the most stringent limitations for area, dispersal, or resources or are limited by ecological processes (Lambeck 1997). (Refer to “Focal, Target, and Sentinel Species” under section 4.1 in chapter 4.) While animal species are clearly the best indicators of habitat area and dispersal needs, plant species (as suggested by Landsberg and Crowley (2004)) are important indicators of habitat quality and the ecological processes that sustain it. An important limiting component for many, if not most, animals is the availability of quality foods (White 1978). Even generalist herbivores prefer the highest quality plants (Mysterud 2006), which are the first to decline or disappear. Sentinel plant species include the most valuable wildlife forage, fruit, and pollen producing food plants. Sentinel species are also important indicators for monitoring biological diversity (Noss 1991, Gibson and Bosch 1996, Simberloff 1998, Rogers and Biggs 1999, Cousins and Lindborg 2004, Cushman et al. 2008), which are a critical component of wildlife conservation and a defining purpose of the Refuge System. Monitoring for sentinel plants is a key measure of success or failure of the Service’s desire to promote ecological resilience by managing for natural and diverse processes (refer to “Upland Objectives” under section 4.2 in chapter 4).

Sentinel species are early to respond to adverse or beneficial changes in management or environmental conditions, while general plant communities may take decades to respond, which may be too late to understand the implications for the most sensitive plant and animal species. This is why sentinel species are important for monitoring the direct effects of current management on ecological processes and overall habitat conditions. This diagnostic approach to habitat monitoring is an important and valuable tool for the ongoing management of all wildlife habitats, especially when time and money are limited.

Grasses

Grasses are important foods for the largest herbivores, such as domestic cattle and bison. They are not a major food for pronghorn or for bird species such as greater sage-grouse, sharp-tailed grouse, or migratory songbirds. Grasses furnish protection for many species such as Baird’s sparrow and upland sandpiper. Grasses are fire-adapted, returning from roots or seeds. Unlike forbs, shrubs, or trees, grasses have low growing points, making them exceedingly well adapted to herbivory. Grasses are not considered first-to-decline sentinel species.

Two of the taller and most palatable grasses are bluebunch wheatgrass and green needlegrass; these grasses dominate the better soils when grazing is light. Under the current practice of constant grazing, when these two grasses decline from overuse, in localized areas, palatable shrubs and forbs are

reduced to remnants or locally eliminated. In some areas, as bluebunch wheatgrass and green needlegrass have declined, there has been an increase of low-growing grasses such as blue grama and Sandberg bluegrass that now cover much more area than what was described by NRCS for ecological site potentials. This change is probably the result of constant grazing and overuse by ungulates.

Forbs

Forbs are broad-leaved, nonwoody, flowering plants (for example, sunflowers). The leaves and seeds of forbs furnish food for many species of wildlife. Species that depend on forbs include greater sage-grouse (spring and summer food), pronghorn, and goldfinch. Forbs are perhaps the most important hosts for pollinating insects. In turn, insects are essential foods for most migratory and resident birds. Forbs are fire-adapted, meaning they return from their roots or seeds after fire. Unlike grasses, their growing points are on the tips of their stems. Several species are sentinels (among the first to decline from herbivory) and include white prairieclover, purple prairieclover, and Maximilian sunflower.

In some areas of the refuge, palatable forbs including white prairieclover and Maximilian sunflower, have been reduced to remnants or locally eliminated. The reduction in populations is likely due to constant selective grazing, fire suppression, and competition from less palatable native species or invasive species. Palatable forb populations historically benefited from fire and periods of less grazing pressure.

Shrubs and Trees

Shrubs and trees furnish protection and food for many of the refuge’s wildlife species: fruit for sharp-tailed grouse and cedar waxwing, browse for mule deer and pronghorn, and nesting sites for the red-tailed hawk and Bullock’s oriole.

First-to-decline, fire-intolerant species of trees and shrubs were historically confined to places that have little fuel or are difficult for fire to reach (refugia) (Frost 2008). Fire refugia are common due to the refuge’s poor soils and rough topography. Fire suppression and constant herbivory pressure has benefited big sagebrush, junipers, ponderosa pine, and Douglas-fir. Ponderosa pine is usually killed by fire when it is young, but older trees have thick fire-adapted bark that often prevents death in a low-intensity fire that does not reach the crown. Wildfire, after long periods of fire suppression, can burn in these refugia areas due to crowning and spotting caused by the heavy fuel load and ladder fuel. Low-intensity prescribed fire can be used to preserve the heterogeneity that naturally resulted in the fire refugia.

Shrubs and trees that are the first to decline due to grazing and browsing by ungulates (herbivory)

are usually fire-adapted species. These species have the ability to resprout after disturbances such as fire and herbivory. Examples of sentinel shrubs and trees that are suppressed by constant herbivory include saltbush, winterfat, golden currant, green ash, and chokecherry. Furthermore, shrubs and trees are particularly sensitive indicators because they are alive aboveground 12 months of the year and, thus, vulnerable to damage. Also, unlike grasses, their growing points are on the tips of stems. Shrubs and trees are very useful for monitoring because the history of past years' growth is visible and measurable.

In the past, fire and herbivory occurred more sporadically. These natural processes benefited fire-adapted shrubs and trees such as silver sagebrush, green ash, chokecherry, golden currant, and saltbush by reducing competition and providing long periods of abandonment. In addition, historical juniper, pine, and big sagebrush populations were not as prevalent on the refuge as they are currently.

Fire Ecology of the Uplands

The Missouri River Breaks has had a long and rich history of wildfire occurrence; fire was one of the natural forces maintaining northern grasslands. It has long been suggested that treeless grasslands are a product of repeated fire, sometimes as a direct result of human activities. Research within the past few decades has confirmed that fire has been an important natural component of many grassland communities. Before European settlement, fire was the most common and widespread influence on the landscape in the Intermountain West (Gruell 1983). Natural fire replaced fire-sensitive woody species with species that were more fire-adapted (Gruell 1983).

Lightning-set fires were common in the United States and Canada; however, fires set by native peoples were the type mentioned most often in historical journals, diaries, and other accounts including the journals of Lewis and Clark (Moulton 2002, Higgins et al. 1986). The reduction in Native Americans' use of fire after 1875 (Higgins 1986), the break-up and reduction of fuel caused by the livestock grazing and cultivation that came with European settlement, and then the introduction of organized fire suppression have caused a drastic decrease in fire occurrence and size (Gruell 1983, Swetnam and Betancourt 1990).

Lightning is an integral part of climate, and the frequency and return interval of lightning-set fires undoubtedly played an important role in the species composition and ecology of the northern grassland plains. Fire-scar data collected by the refuge in the mid-1990s indicated a fire frequency of 10–20 years in the fire-prone ponderosa pine and Douglas-fir habitats before settlement by homesteaders. These data do not indicate the source of ignition; however, fire-scar evidence dropped off dramatically once the area was settled, which indicates an increased emphasis on human suppression of the numerous lightning starts that occur throughout the summer. (Bill Haglan, former wildlife biologist at Charles M. Russell National Wildlife Refuge; personal communication, fall 2009).

Fire exclusion has had the most marked effect on ecotones between two different vegetation types. With the omission of fire as a dominant ecological factor on some sites, there have been many changes in vegetation; successional changes that have occurred on some sites may not have occurred in the pre-European-settlement environment, where frequent



USFWS

Smoke billows from the Black Polaski wildfire in 2006.

fires suppressed woody vegetation (Gruell 1983). As a result, an increase in density of woody species has occurred on some sites, as well as the invasion of woody species into sites where frequent fire used to preclude their dominance.

As described before, grassland and shrubland compose most of the upland area and the areas devoted to livestock grazing. These are also the primary habitat types for use of prescribed fire. The effects of wildfires on specific species within each habitat type are well documented and can be found in the Fire Management Information System (USFS 2009). In general, the effect of fire on grasses depends on the growth form (low-growing points or stem-tip growth); in addition, the effects depend on how fire influences and is influenced by soil moisture and other environmental conditions. Many grass species are fire resistant and can produce new shoot growth even after moderate- to high-severity burns. When desirable understory plants are present within the sagebrush community, prescribed fire can release the growth of these species. Spring or fall fires are most desirable and effective, because the soils are moist and cool and fire effects are not as severe. Sprouting shrubs such as chokecherry and snowberry respond favorably, and perennial grasses also benefit. Wildland fire can be used to increase edge effect and increase plant diversity (Wright and Bailey 1982).

Shrubs are generally less tolerant of fire than grasses. However, the season and intensity of fire on shrubland also determines the effects of fire. Sagebrush is the most common category of shrubland on the refuge, with Wyoming big sage and silver sage as the dominant species. Fire history of the shrublands has not been firmly established, but fire was probably uncommon on drier sites because of sparse fuel; fire was more frequent, averaging every 32–70 years, on moister sites with more vegetation (Wright et al. 1979).

Recent Fire History

A recent fire history study of the refuge shows fire frequency intervals are extremely variable across the refuge (figure 13), ranging from 8 years to more than 200 years between fires (Frost 2008). About 30 percent of the refuge is a forested conifer community, with Douglas-fir and ponderosa pine being the dominant species. Fire records show this community type to be the most subject to wildfire occurrence. Fire exclusion in this forest type can lead to accumulation of dead woody fuel, as well as the establishment of dense understory regeneration (ladder fuel). Ladder fuel alters fire behavior dramatically, oftentimes creating high-intensity crown fires. Forest succession has been substantially altered due, in part, to fire exclusion. Exclusion of fire allows the

less fire-tolerant species to replace the more fire-tolerant species. This can be seen on the refuge with the increased abundance of juniper and higher densities of Douglas-fir. Low- to moderate-intensity wildfire in this community type sets back succession, promotes establishment of mature ponderosa pine forest, and retards encroachment of juniper and Douglas-fir (Keane et al. 1990).

In the refuge's early annual narratives, staff mentioned large wildfires, but specific information about these fires is lacking. Formal fire records started in the 1960s and have documented great variety in the annual number of wildfires, from 1 fire in 1975 to 44 fires in 1988. Since 1982, when records were initially entered into a national database, about 87 percent of the wildfires have been caused by lightning and occurred from mid-May through the end of September. Fires during that period ranged in size from one-tenth of an acre to as large as 21,967 acres. In 2003 and again in 2006, several lightning-ignited wildfires occurred on and around the refuge, mainly in Garfield County. When finally extinguished, two fire complexes (Missouri River complex and Black Pulaski complex) were in excess of 130,000 acres each. These fires were the direct result of significant, dry lightning storms that ignited multiple fires, followed by cold frontal passages 1–2 days later that produced winds of 40–60 miles per hour.

Most fires are directly influenced by local and general winds and have the potential to exhibit extreme fire behavior. Generally, a large fire will make an initial run until it hits a natural barrier or burns into an area of little or no vegetation. For example, in 1994, the CK Creek fire made a run of 6 miles in one afternoon and burned more than 11,000 acres before burning into sparse vegetation.

Early in the history of the refuge, great emphasis was placed on putting out wildfires at the smallest acreage, regardless of cost, habitat management strategies, or land designation such as wilderness. Not until the Leopold Report of 1963 (Leopold et al. 1963) was the public informed that protecting plant communities from fire can lead to these negative effects: (1) catastrophic, stand-replacing wildfires; (2) decadent shrub and grass communities; (3) encroachment of shrubs and trees into grasslands; (4) increased infestations of disease and insects; (5) lack of diversity in plant and wildlife species; and (6) devastating wildfires that cannot be controlled with any amount of resources (Wright and Bailey 1982).

In the late 1970s and early 1980s, land managers at the refuge began to look at alternatives to putting all fires out at the smallest acreage. With the signing of the record of decision for the 1986 EIS, managers had the option of using modified suppression. Modified suppression is based on an evaluation of each wildfire for the resources at risk, and if the risk

does not justify the cost of full suppression, alternate suppression tactics can be used. Suppression strategies may allow a fire to burn into clay ridges, gumbo knobs, alkali flats, and the Missouri River or Fort Peck Reservoir. As a result, parts of some wildfires might burn for more than one burning period.

Based on fire records for the past 28 years, 364 wildfires have burned 180,230 acres on the refuge (data comes from the 2008 Fire Management Information System database and archived individual fire reports, DI-1202s). Fire size has increased significantly over the past decade as shown in table 4. Possible causes may be changes in land management, climate change, natural wildfire cycles, or a combination of all three.

The Mickey Butte fire burned nearly 3,200 acres of prime habitat for Rocky Mountain bighorn sheep in 2003. The fire burned close to Mickey Butte, which is the core of the home range for upwards of 50 big-

horn sheep. In 2005, the Brandon Coulee, Heartland, Sheep, and Shore fires burned an additional 15,647 acres of sheep habitat on the Mickey–Brandon Butte and Iron Stake Ridges.

Livestock grazing in habitat units is restricted for 2 years following large wildfires. This occurred after the CK fire of 1994, the Missouri Breaks complex of 2003, and the Black Pulaski complex of 2006. In such situations, the Service gives permittees the option of taking nonuse of their permits or temporarily moving their livestock to habitat units that no longer have annually permitted grazing.

Prairie dog towns are effective natural barriers for wildfire during all but the most extreme fire conditions. To promote population expansion, refuge staff applied prescribed fire to 1,435 acres of prairie dog habitat during summer 2007 and 2008 in the Locke Ranch area of the UL Bend Refuge.

Table 4. Historical fire data for the Charles M. Russell and UL Bend Refuges, Montana.

<i>Timeframe</i>	<i>Number of fires</i>	<i>Acres burned</i>	<i>Average acres per fire</i>
1981–89	132	25,642	194
1990–99	120	35,643	207
2000–09	120	118,982	991
Peak number of fires in a single year (1988)	44	12,953	—
Peak number of acres burned in a single year (2006)	22	69,737	—

Livestock Grazing

In 1954, there were 25,673 cattle, 3,365 sheep, and 700 horses permitted on the refuge. Wildlife estimates for the same period were 140 elk, 8,000 deer, 800 pronghorn, and 54 bighorn sheep. Records report that livestock wintered on river bottoms from December to March, and they grazed in the uplands in the summer. As a result, the river bottoms were heavily impacted. Although BLM did not issue winter permits, according to a refuge report, “BLM was aware of the fact that it had been the practice for a number of large ranches to run cattle on the range during the winter months.” After considerable urging by refuge staff, BLM did not stop winter grazing but added it to the permit. Since the passage of Executive Order 7509, livestock grazing has been a tool to manage habitat on the refuge. The specific application of it on the refuge is discussed below. For more information refer to section 2.1 in chapter 2 and “Upland Objectives” under section 4.2 in chapter 4.

History of AUMs on the Refuge. The first range survey of actual livestock numbers was conducted in 1953–54. Initially, there were few limits on the number of AUMs grazed on the refuge. Following the

first range surveys conducted by BLM, the number of AUMs slowly decreased. However, the number of AUMs permitted were not the same number as actual AUMs. By 1962, there were 26,820 cattle, 11,481 sheep, and 950 horses. The bighorn sheep herd reported in 1954 had vanished by 1962. By this time, the Service and BLM relationship was strained. The record from a 1962 inspection of the refuge by the Service’s Washington office staff stated, “The land of the Fort Peck Game Range has literally been raped and this despoiling is accelerating.” Although much of this past use came from BLM-managed lands, about 150,000–200,000 AUMs were grazed annually on the refuge in the 1950s. At least part of the overuse of grazing on the refuge was a result of how the program was carried out; for example, in one BLM unit management plan that included a refuge pasture, there were 3,400 AUMs permitted, which was equivalent to the 1953–54 range survey numbers. However, BLM allowed flexibility of up to 10,000 AUMs to be permitted yearly without application. The numbers permitted on paper did not equate to what was occurring on the ground.

The 1986 record of decision established new livestock grazing levels. Of the 100,000 AUMs estimated

to be supported by available forage, about 40 percent of this forage is allocated for livestock on 62 different habitat units through 73 grazing permittees. Livestock forage allocations range from 0 to 78 percent of the available forage. These allocations were based on a 1978 range survey. All lands were stocked at the recommended stocking rate of the then-Soil Conservation Service (now the Natural Resources Conservation Service). Slope and distance-to-water deductions were applied to Service lands but not to State or private lands. This resulted in a 33-percent reduction in overall livestock AUMs on the refuge, an almost unprecedented action on western grazing lands. Generally, the livestock capacity of State and private lands increased. In pastures such as the West Indian Butte Habitat Unit (see figure 11) that includes non-Federal lands, this increase totally offsets the Federal reduction. Livestock stocking rates on the eastern part of the refuge typically are higher, reflecting the flatter terrain and nearness to Fort Peck Reservoir, as compared to the western part of the refuge that has steep, rugged coulees and where the distance to water is greater. Livestock allocations in Fergus and Petroleum Counties are the lowest (number of AUMs), McCone and Garfield Counties have the highest number of AUMs, and Valley and Phillips Counties have intermediate levels of AUMs. Garfield County is stocked at twice the level per acre as Petroleum County. There is a direct correlation between the forage allocation for livestock and conflicts with wildlife habitat.

Permitted use in 2003 was 22,304 AUMs, which was 17,000 AUMs less than the 1986 record of decision level and 36,000 less than the 1976 level. The lower AUM levels are due to a variety of reasons including higher grazing fees and not automatically transferring permits (refer to “Issues not Addressed” in section 1.9 in chapter 1). Additionally, livestock supervision and permit enforcement have ensured that actual use approaches what is permitted today. Livestock numbers on the refuge are currently lower than anytime in the past century.

Transition to Prescriptive Grazing. Since 1986, the Service has gradually been making the transition to prescriptive grazing (refer to “Upland Objectives” under section 4.2 in chapter 4). Today, there are approximately 740,030 acres of potential grazing acreage on the refuge; current livestock grazing units are shown in figure 11. About 409,849 acres are lands grazed under annual permit. Prescriptive grazing occurs on about 252,706 acres, and 77,475 acres are not grazed. Under annual grazing, a permittee can graze a set number of AUMs every year. There are some limits placed on when and where they can graze. Under prescriptive grazing, the Service determines the habitat objectives for an area, and then sets the num-

ber of livestock needed to achieve those objectives. (Refer to the prescriptive grazing explanation in section 4.2 in chapter 4.) This does not include grazing on other State or private lands (inholdings) within the refuge boundary.

About 86 percent of the forage is allocated to livestock within 0.5 mile of water on slopes of less than 10 degrees. Extensive water development has resulted in many upland sites, moist areas, and riparian areas being heavily impacted by livestock. Forage in riparian areas is almost exclusively allocated to livestock. Because of gentle terrain and available water, some habitat units along Big Dry Arm have as much as 50–78 percent of the forage allocated to livestock. In one unit, 40 percent of the livestock forage comes from 18 percent of the land—those lands within 0.25 mile of the creek. Riparian habitats reflect the livestock allocation; fieldwork conducted by the University of Montana in 1995–96 documented the poor state of riparian habitat on the refuge.

Benefits of Prescriptive Grazing. Although there have been many issues associated with livestock grazing on the refuge, when prescriptive grazing is used with careful consideration of its compatibility with habitat and wildlife and other land management goals, it can be an effective tool (FWS 2011b). For example, it can be used to control invasive species or to accomplish other restoration and conservation objectives (refer to “Upland Objectives” under section 4.2 in chapter 4). When applied correctly, it can address some of the challenges and issues of domestic grazing systems to create effective and ecologically beneficial results (FWS 2011b).

State and Private Lands

There are about 36,000 acres of State school lands within the refuge (figure 11). The CCP only directly affects lands under the management authority of the Service. However, the implementation of prescriptive grazing could have indirect negative effects on DNRC in meeting its statutory obligation of generating revenue for local schools.

Private lands make up about 41,000 acres on the refuge (figure 11), although this acreage changes when there are willing sellers and money exists to acquire more lands within the authorized boundary. Private landowners are also affected by wildlife migrations, and at times large ungulates have negatively affected private lands. In the past, the refuge has worked with MFWP who controls harvest levels as well as the community to address these issues (see table 10 under “Big Game”). As with DNRC, the continued transition toward implementing prescriptive grazing on the refuge has negative effects on landowners who are also permittees who graze on refuge lands. More information about the socioeconomic environment is in section 3.7 in chapter 3.

Vegetation Monitoring in the Uplands

The Service has been monitoring residual grass cover since 1986, and has also been increasingly emphasizing sentinel plant monitoring in recent years. As described above, sentinel plants are the first to decline in response to changes to the evolutionary pattern of ecological processes and provide an indicator of landscape-scale biological integrity and health. The combination of poor and highly erosive soils, a century of historical overuse by livestock, current livestock grazing, and current use by wild ungulates (elk and deer), has compromised the health of upland habitat on the refuge. Monitoring of residual cover and sentinel species has shown that wild ungulate populations alone are negatively affecting sentinel plant species (causing negative growth rates and low to no seed or fruit production), and residual cover objectives are not being met. Livestock use compounds the problem. Several examples of upland monitoring results that show this current condition of upland habitat are described below.

Residual Cover. Since 1986, one of the primary purposes of monitoring residual grass cover has been to ensure nesting and roosting cover for sharp-tailed grouse and other grassland obligate birds. Livestock exclosures have been developed in many of the existing 65 habitat units. The goal of habitat management on the refuge has been to provide, outside the exclosures, at least 70 percent of the grass cover that is inside the exclosures. Measurements are taken after the grazing season. A cover pole or height–density pole is observed from set distances and angles at points along transects, in and out of the exclosures, to measure the comparison.

Habitat monitoring across the refuge has varied annually. Several units were not monitored in the late 1990s to early 2000s. Since 2005, almost all units grazed by livestock have been surveyed for residual grass cover. In 2008, Service personnel conducted 27 height–density plot (HDP) surveys across the refuge: 8 for Jordan (5 failed), 10 for Fort Peck (4 failed) and 9 for Sand Creek (all 9 failed). Eighteen of the 27 units failed to meet objectives established in the 1986 record of decision. Most of the habitat units that failed in 2008 have not met objectives or improved since monitoring began. All three of the habitat units in Jordan that passed were not grazed in 2008.

Figure 14 provides an example of one habitat unit, East Indian Butte, that failed to meet objectives for residual cover in every year between 1990 and 2007. Figure 14 displays residual cover information collected from the East Indian Butte Habitat Unit (see figure 11). The monitoring data show that this unit does not meet the baseline objective of 70 percent residual cover (red line on graph). This hab-

itat unit is grazed by livestock in common (no separating fences) with private, State, and BLM land.

Residual cover monitoring has shown that many habitat units, like the East Indian Butte example, are not meeting objectives and are showing negative effects from long-term ungulate grazing.

Sentinel Species. The Service is increasingly emphasizing sentinel plant monitoring as an indicator of biological integrity and health. The refuge has been monitoring sentinel plant species populations in and out of exclosures since 2003. Since 2004, biologists have been working on new survey methods to incorporate with current HDP monitoring to fully assess habitat conditions. Sentinel plants (plants that are the first to decline due to grazing pressure) will be identified and monitored across the refuge to determine overall grazing pressure on these plants. Subsequently, the refuge staff uses this information to influence planning and adaptive management of ecological processes.

Currently, the Service is working with West, Inc., and Dr. Sam Fuhlendorf from the University of Oklahoma to develop a statistically sound standard operating procedure for monitoring sentinel species' response to the adaptive management of fire and herbivory, and these are anticipated to be completed in 2010. Below are detailed descriptions of results from a chokecherry site and an aspen site, as well as brief descriptions of monitoring results for other sentinel species (silver buffaloberry, grey rubber rabbitbrush, and saltbush). All of these examples show the effect of grazing pressure on sentinel plant species on the refuge.

Chokecherry. Chokecherry is a sentinel species of riparian zones and moist, north-facing slopes across the refuge. Formerly, this species was much more common. Populations of this shrub have been reduced by herbivory (chokecherry is highly preferred by all ungulates) and by competition from juniper and pine (see figure 15).

Chokecherry fruit is important to many species of resident and migratory birds. Fruit production is perhaps more affected by herbivory than height growth; many species including chokecherry produce fruit only from stems not browsed the year before. Furthermore, fire often stimulates chokecherry growth, resulting in fruit production a few years after a fire.

In 2006, refuge staff constructed two types of exclosures to monitor chokecherry fruit production on a site that burned in 2005: (1) one type excluded both large ungulates and cattle; and (2) the second type excluded cattle but not other large ungulates. In 2009, the average chokecherry plant in the total ungulate exclosures produced 312 berries; chokecherries in the cattle exclosure averaged 103 berries;

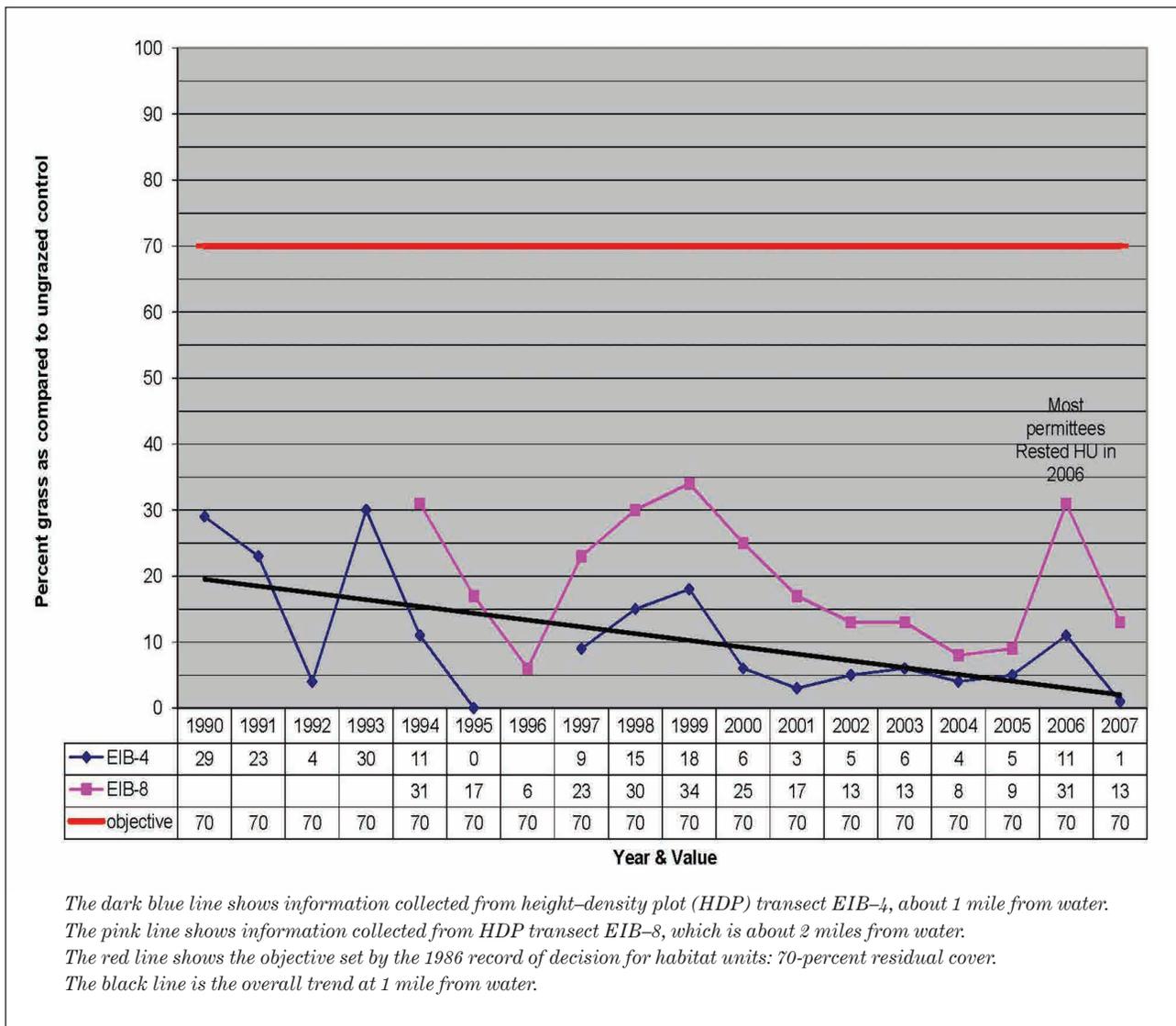


Figure 14. Graph of residual cover after grazing in the East Indian Butte Habitat Unit of the Charles M. Russell Refuge, Montana (1990–2007).

and chokecherries outside of exclosures averaged 5 berries.

In addition, monitoring showed that grasses in the exclosures were mostly not grazed. Even the most palatable grasses are not first-to-decline sentinel species.

Aspen. Aspen, a sentinel species, is one of the first species affected by herbivory. Occurring in scattered relict groves, aspen is highly preferred by livestock and all species of wild ungulates. In addition, aspen is fire-adapted and dependent on fire to occasionally remove fire-intolerant conifers, which are more competitive over long periods without fire. Within the refuge, aspen is also a climate-sensitive sentinel. It only occurs in pockets of the landscape such as coulee bottoms that are moister than the landscape in general. Aspen will likely be affected first by a warming climate with less soil moisture.

In 2005, the refuge staff constructed an exclosure within an aspen site in a coulee in the Soda Creek watershed. At that time, the new growth of plants both in and out of the exclosure was similar (about 14 inches) and the plants were heavily impacted by browsing and were unable to grow taller. This site burned in a wildfire in 2006, eliminating all above-ground growth both in and out of the exclosure. In subsequent years (2007, 2008, and 2009), aspen growth within the exclosure has exceeded the growth outside of the exclosure, with averaging about 7, 34, and 52 inches, respectively, compared to about 4, 12, and 15 inches outside of the exclosure. Current browsing levels prevent the plants outside the exclosure from growing taller. Figure 16 displays these results.

It is likely that aspen will disappear from this aspen site in the future except for those in the exclo-

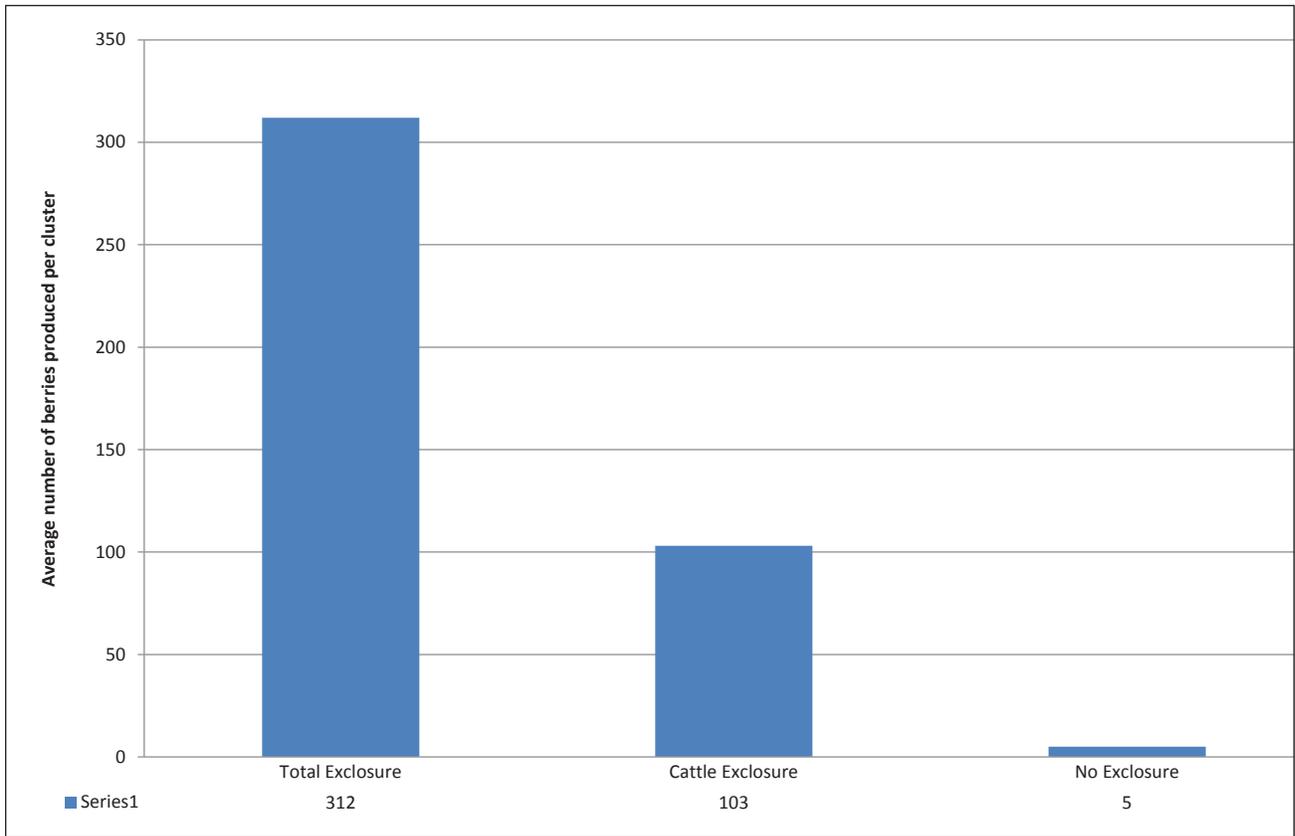


Figure 15. Bar graph of monitoring results for chokecherry fruit production 4 years after fire at the Charles M. Russell Refuge, Montana.

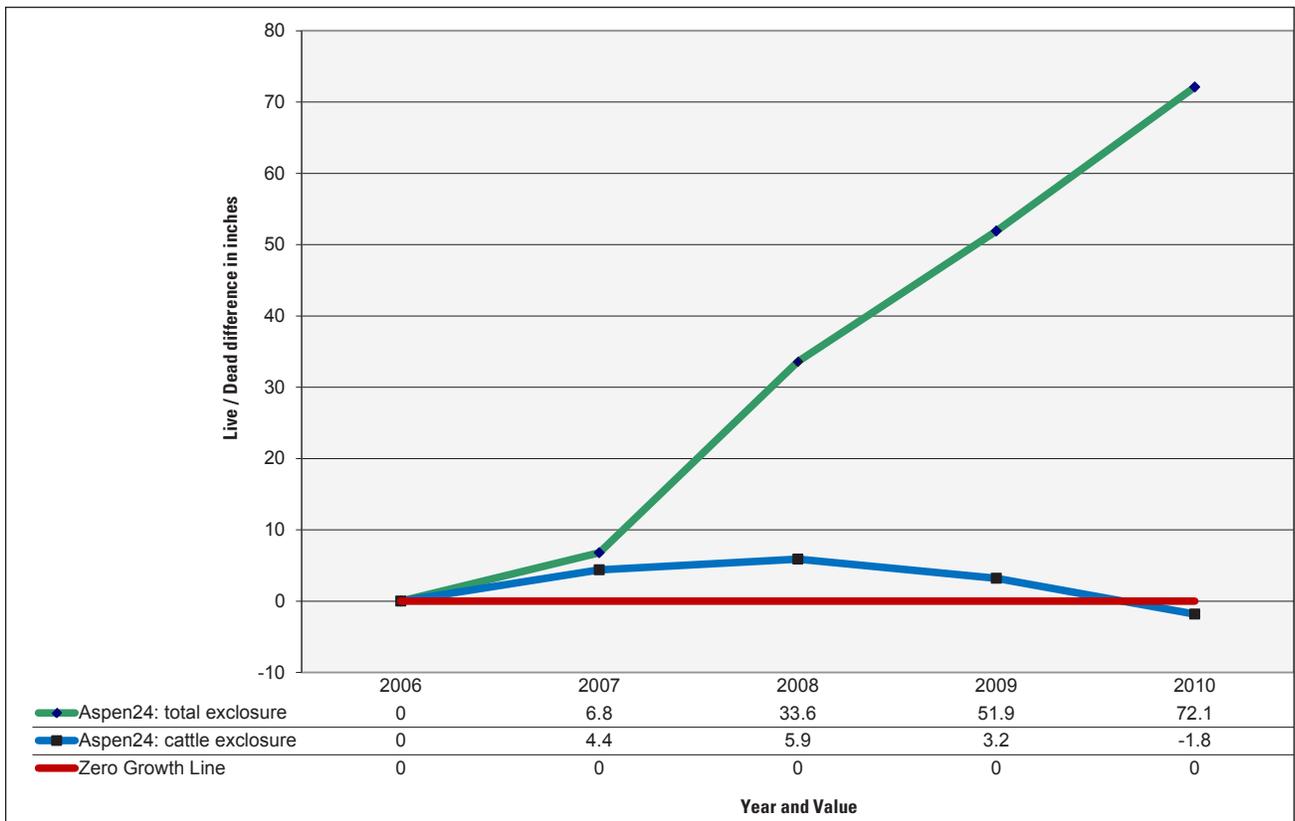


Figure 16. Graph of monitoring results for aspen growth at the Charles M. Russell Refuge, Montana (2006–10).

sure and possibly a few in highly protected locations, areas that are steep and covered with fire-killed juniper. It is likely that other relict aspen sites disappeared after constant grazing by all ungulates and a lack of fire.

Other Sentinel Species. Other examples of sentinel species monitoring include a silver buffaloberry site in the Rock Creek West Habitat Unit, a grey rubber rabbitbrush site in the East Indian But Habitat Unit, and a saltbush site in the Rock Creek East Habitat Unit. Results of monitoring the average annual plant growth (height to base of current year’s growth) at these sites are summarized below.

- *Buffaloberry* (2005–09): About 9 inches within the enclosure, compared to about 6 inches with no enclosure
- *Rabbitbrush* (2003–09): About 10 inches within the enclosure, compared to about 2 inches with no enclosure
- *Saltbush* (2004–09): About 10 inches within the enclosure, compared to about 3 inches with no enclosure (figure 17)

RIVER BOTTOMS

Bottomlands or river bottoms are found in the floodplains of the Missouri River above maximum lake level. They occur only on the west end of the refuge.

There are about 16 river bottoms on the west end of the refuge (see figure 18). The total area covered by these river bottoms is estimated at between 5,000 and 7,000 acres. A diverse mixture of native trees, shrubs, forbs, and grasses characterizes the river bottom plant community. Trees and shrubs present are green ash, boxelder, redosier dogwood, silver buffaloberry, golden currant, western snowberry, Woods’ rose, chokecherry, sumac, plains cottonwood, sandbar willow, peachleaf willow, and a couple of other willow species. Native forbs present include Maximilian sunflower and American licorice. Native grasses present are bluebunch wheatgrass, green needlegrass, prairie cordgrass, basin wildrye, western wheatgrass and reed canarygrass.

The most significant threat to river bottom health is from exotic species such as tamarisk (saltcedar), Russian olive, smooth brome, crested wheatgrass,

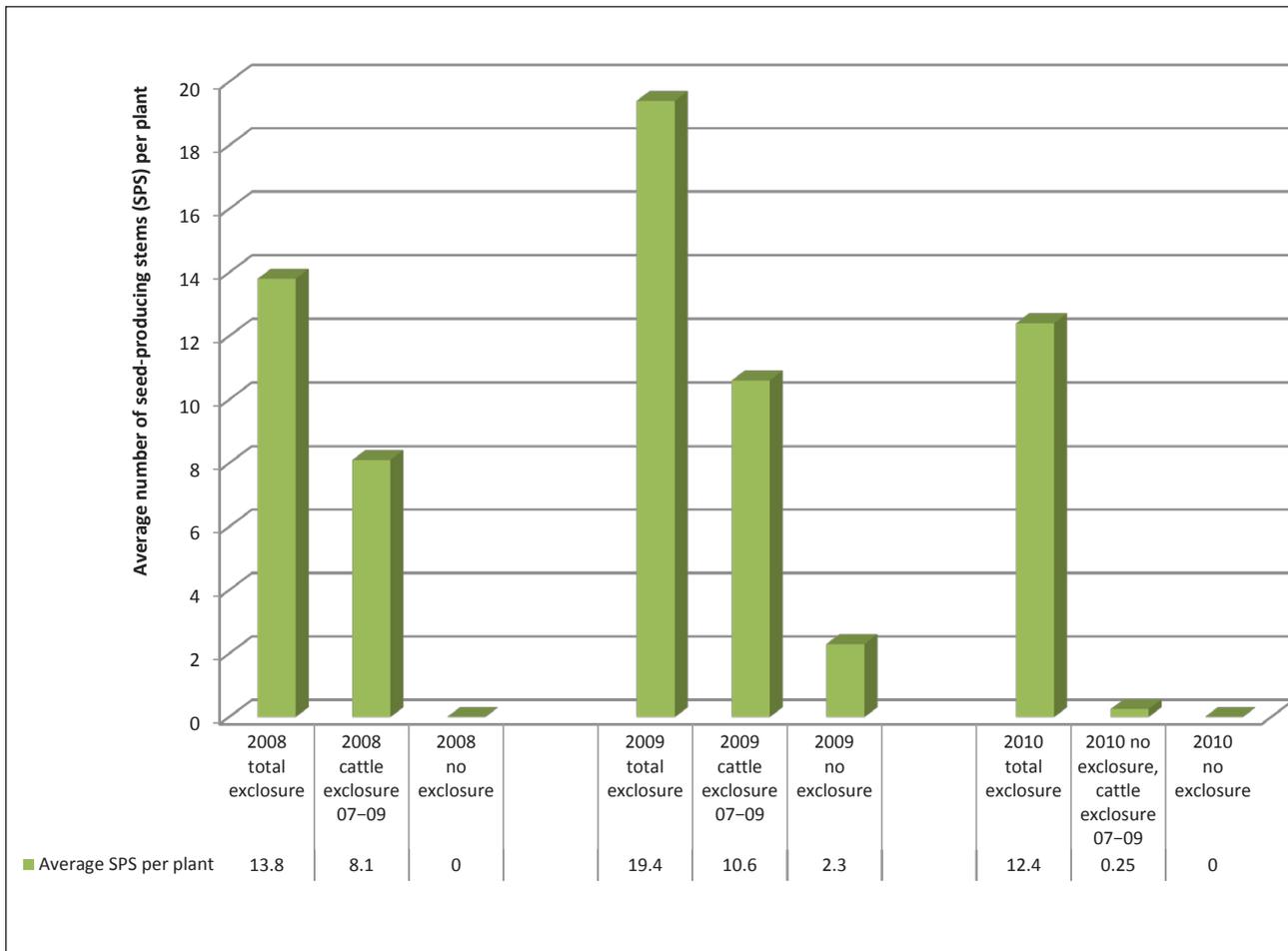


Figure 17. Bar graph of monitoring results for saltbush growth at the Charles M. Russell Refuge, Montana (2008–10).

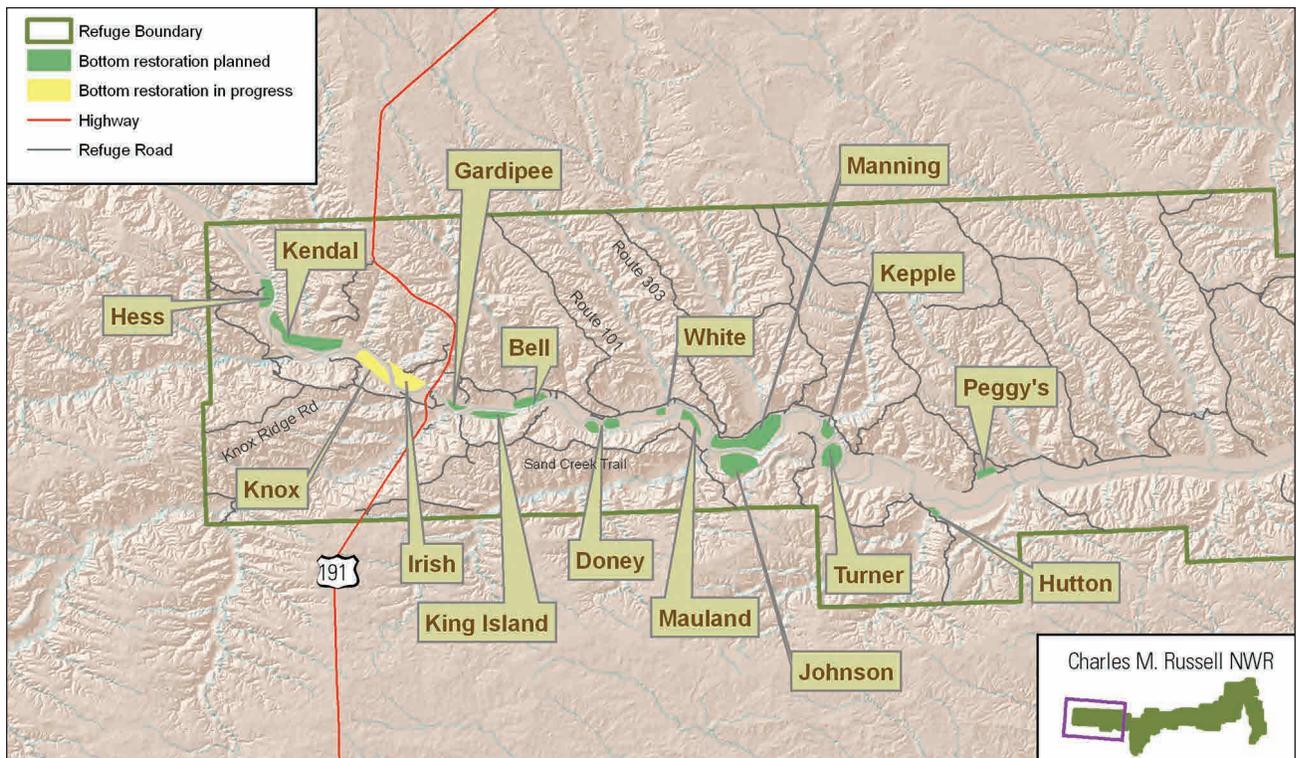


Figure 18. Map of river bottoms in need of restoration at the Charles M. Russell and UL Bend Refuges, Montana.

quackgrass, leafy spurge, Russian knapweed, and Canada thistle. Invasive species have been increasing in many areas largely because of two reasons: (1) lack of seed source to establish native plants that can compete with or outcompete the invasive weeds; and (2) extensive browsing on sentinel plants that are established.

Historically many of the river bottoms on the refuge were cleared. Native plant communities were plowed, and nonnative agricultural crops were planted because these were the most productive areas. Farming the river bottoms occurred for decades, but has now been eliminated. The last homesteader on the refuge stopped farming in 1983–84, and the last two bottoms to be planted to crops have not been farmed since 1985–86. The plant communities left existing on the river bottoms have now mostly been invaded by Russian knapweed, leafy spurge, smooth brome, and quackgrass, which have very little value to wildlife. Native plant communities that once existed on these bottoms have been unable to reestablish themselves. The Service is currently consulting with experts from NRCS and State agencies to determine the best methods to restore these bottomlands back to healthy native plant communities. Establishing and maintaining healthy native plant communities is an important way to slow or prevent reestablishment of weeds after they have been treated mechanically, chemically or with biological control. The Service has begun restoration

work on two bottomland areas (Irish and Knox Bottoms already). Figure 18 shows the river bottoms in need of restoration.

Use of Prescribed Fire

Prescribed fires were used to treat Kendall Bottoms (55 acres) and Leclair Bottoms (74 acres) in 1992. In 1993, Forchette Creek (50 acres), Doney Bottoms (8 acres), Manning Dog Corral (50 acres), Hawley Creek (200 acres), Irish Bottoms (110 acres), Mauland Bottoms (30 acres), and White Bottoms (30 acres) were treated as well. The objectives were to reduce invasive plant invasion and reestablish native vegetation. Prescribed fire continues to be used as a tool to treat river bottoms and has proved to be very effective in preparing the seedbed for native planting.

RIPARIAN AREAS and WETLANDS

Riparian habitat areas include wetland and upland vegetation associated with rivers, streams, and other drainage ways. The riparian areas of the refuge occupy a relatively small part of the landscape, but wildlife and livestock use these areas disproportionately more than any other habitat type (Kaufman and Krueger 1984, Johnson et al. 1977, Ames 1977). Riparian and wetland areas provide important habitat for a wide variety of wildlife species, ranging from reptiles and amphibians that are solely dependent on streams and wetlands, to upland mammals that depend on riparian areas as a source of water,

foraging habitat, and cover. Riparian areas are also important for many bird species, providing nesting and breeding habitat for migratory songbirds, open-water habitat for waterfowl, and foraging and nesting habitat for some raptors. Besides wildlife habitat, riparian and wetland habitats also provide important functions that sustain the ecosystem including sediment filtering, streambank development, water storage, aquifer recharge, and energy dissipation from streams (Hansen et al. 1995).

Riparian systems play an important role in maintaining the ecological function of the entire refuge, from aquatic habitats to uplands. This section describes the general composition of riparian habitats, the historical influence of beaver, wildlife diversity, ongoing riparian area monitoring, the influence of livestock grazing, and water quality considerations.

Riparian Habitat Composition

Riparian vegetation and habitat has historically been found along most of the small streams and rivers on the refuge. Vegetation within the larger riparian systems (such as the Missouri and Musselshell Rivers) is dominated by mature forests of plains cottonwood with an understory of shrubs, grasses, and wetlands. Other trees and shrubs include green ash, redosier dogwood, common chokecherry, and silver sagebrush, while the riparian area understory includes grasses (redtop, inland saltgrass, western wheatgrass, and foxtail barley) and a variety of forbs, sedges, and rushes. Smaller streams and coulees with a healthy riparian area are generally similar in species composition but at a smaller scale.

Many of the cottonwood riparian areas along the Missouri River are in a degraded condition, with limited shrub understory, limited cottonwood regeneration, and an overabundance of monotypic nonnative grasses (such as smooth brome). This change in riparian area structure along the Missouri River is likely due to a combination of livestock grazing and changes in riverflows. Hansen (1989) found the overall ratio of replacement to mature trees is 54 percent, suggesting a future decline in the riparian forests and the habitat they provide.

Several studies have been done on the riparian vegetation along the Missouri River from west of the refuge boundary to Fred Robinson Bridge (Auble et al. 2005; Auble and Scott 1998; Dixon et al. 2009; Scott and Auble 2002; Scott et al. 1993, 1994, 1997). Flows in this reach of river are influenced by several dams and diversions, most importantly, Canyon Ferry and Tiber Dams. While the timing of the average high and low riverflows has not been substantially altered, their relative magnitudes have. Scott et al. (1993, 1994) found that cottonwood establish-

ment occurred in years with a peak mean daily flow greater than 49,434 cfs (1,400 cubic meters per second) or in the 2 years following such a flow. These years include 35 out of the 111 years of record and account for establishment of 47 of 60 trees examined.

Seedlings become established most years on bare, relatively low surfaces deposited by the river. The high elevation for establishment of all trees dating to before 1978 (relative to the normal river stage elevation) indicates that only individuals established on high flood deposits are able to survive subsequent floods and ice jams. Highest flows almost always occur during the ice-free period and establishment is more likely to occur during ice-free flooding. Mortality is higher for those cottonwoods established in relatively low channel positions.

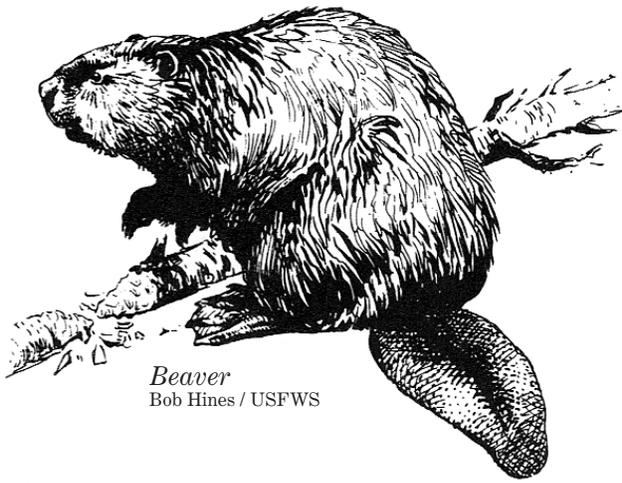
Bovee and Scott (2002) developed a flow model to reconstruct unregulated daily peak flows in the national wild and scenic reach of the Missouri River. To maximize establishment of cottonwoods, a threshold of 65,333 cfs is necessary. Floods this size lead to establishment of cottonwood seedlings above the zone of ice-drive disturbance. Cottonwood is a pioneer, disturbance-dependent species that establishes from seed on bare and moist surfaces during a brief period following seed dispersal.

Three human-caused factors have contributed to the riparian area changes on the refuge: (1) beaver have been eliminated from tributary streams; (2) cattle have been stocked at high densities in riparian areas during the growing season; and (3) upland reservoirs have altered the waterflow in major drainages (FaunaWest 1996).

Many of the smaller streams on the refuge are in a degraded condition due to the combined effects of these factors, which have, in general, resulted in narrower riparian area corridors, fewer wetlands, and less robust riparian vegetation across the refuge. In some areas, riparian vegetation has disappeared from extended reaches of stream. However, the construction of fencing to exclude livestock from several important riparian areas (such as Rock Creek and Bobcat Creek) has allowed conditions in these areas to improve.

Influence of Beaver on Riparian Areas

Historical literature suggests that beaver were a dominant feature in parts of the original bottomland landscapes of the refuge before trapping reduced them to numbers too low to support their wetland mosaic. Trapping on the refuge dates earlier than 1840 when trappers worked in the area. Hundreds of thousands of "wolf and beaver skins and pelts of the deer and elk were brought to Fort Benton by Indian and white from the far North, from the South, from the Rockies and the vast extent of plains surround-



Beaver
Bob Hines / USFWS

ing it, and were later shipped down the river to St. Louis” (Schultz 1902). Sometime between 1877 and 1882 Schultz worked at a fur trading post on the refuge at Carroll bottom (Turkey Joe) where one winter he mentions that they took in 300 beaver skins. By 1901, beaver were so scarce that trapping was illegal, but this did little to stop the continued exploitation. There are historical records of beaver system collapse after trapping. In addition to trapping, much of the water from the upper watershed of Armells Creek was used for agriculture by 1900 (Frost 2008). It is likely that they maintained a now-collapsed wetland system along at least three major streams, (1) Armells Creek with headwaters in the Judith Mountains; (2) Musselshell River with headwaters in the Crazy, Little Belt, and Judith Mountains; and (3) Big Dry, which has a much smaller watershed. Beaver also maintained wetlands in the lower ends of several minor streams on the refuge (Frost 2008).

Beaver change second- to fifth-order streams by as much as 20–40 percent by (1) changing channel geomorphology and hydrology; (2) retaining sediment and organic matter; (3) creating and maintaining wetlands; (4) changing nutrient cycling and decomposition dynamics; (5) changing plant species composition; (6) influencing the timing, rate, and volume of water and sediment movement downstream; and (7) through the creation of pools and backwaters generating new fish and wildlife habitats, which results in significant increases in biodiversity (Ohmart 1996). Currently, water quickly runs out of beaver impounded water streams like Armells Creek. The more beaver wetland created, the longer the water is held after snowmelt and rain events. As a result, these systems acted as sponges, slowly releasing water from one pond to the next below, and certain streams should have been sustained as permanent wetlands. These systems, lying in the lowest and coolest parts of the landscape, would not have been expected to dry up (Frost 2008).

Importance of Riparian Areas for Wildlife

Wildlife use riparian zones disproportionately more than any other habitat type, and fish, depend on the structure and inputs to this zone (Fitch and Adams 1998, Hubbard 1977, Ohmart 1996). In a study within the Great Basin of Southeastern Oregon, 82 percent of the terrestrial species known to occur are either directly dependent on riparian zones or use them more than other habitats (Thomas et al. 1979). There are similar findings for nesting bird species (Johnson et al. 1977, Kauffman and Krueger 1984). In a recent study on the refuge, riparian forest edge habitat accounted for the highest bat activity (Stewart 2007) and might be a limiting factor to bat distributions and abundance on prairie landscapes.

Closer to the refuge, Tewksbury et al. (2002) compared deciduous riparian areas with surrounding upland communities, and repeatedly found breeding bird diversity and density to be greater in riparian communities. The ungrazed Missouri River sites were located on the refuge and grazed survey locations were in a 25-mile stretch of river bordering the refuge to the west. In grazed locations, about 70 percent of species were less abundant, 13 species were significantly less abundant, and only one species was more abundant (Tewksbury et al. 2002). Knowles and Knowles (1994) found twice the abundance of birds in the ungrazed area of Rock Creek on the refuge compared to grazed area of Siparyann Creek. They found birds that have an affinity to grasslands do well in a grazed area, whereas those birds associated with riparian forests were more abundant in the ungrazed area. The most common bird in Rock Creek was the yellow warbler, and in Siparyann it was the mountain bluebird.

Bats serve a variety of ecological roles such as insect predators, prey, pollinators, and seed dispersers. Because of their sensitivity to pollution and habitat disturbance, they also serve as indicators of habitat health. Several species of bats use rock crevices and caves next to riparian area corridors for maternity colonies and possible year-round roosts, and use the riparian area corridor to forage (Lausen and Barclay 2002). In addition to providing important foraging habitat, cottonwood riparian zones along the Missouri River most likely provide important roosting habitat. Along the Missouri River on the refuge, Stewart (2007) detected a high intensity of use next to all riparian forest habitat types from big brown, silver-haired, and hoary bats as well as the “40 kHz group” made up of long-legged myotis, little brown myotis, small-footed myotis, and eastern red bat. Stewart (2007) also found riparian habitat and complexity were significant factors influencing bat activity. Activity and foraging attempts were highest for the entire bat community next to ripar-

ian forest edges compared with more open habitat and Russian olive stands. Overall bat activity was also high next to the center of riparian forest habitat.

Livestock Grazing and Riparian Monitoring

Historical grazing by large herds of bison and other ungulates included long periods of rest after intensive disturbance such as drought, fire, and grazing. Wild bison did not linger in riparian areas (Fuhlen-dorf et al. 2008, Van Vuren 1981) and did not use an area all season long. Cattle spend a disproportionate amount of time in riparian areas, 5–30 times longer (Ehrhart and Hansen 1997).

Streams and their watersheds function as units and are inseparable. Riparian area health is affected by offsite factors operating at the landscape level, including upland range conditions that affect run-off timing and sediment delivery to the channel and headwater impoundments that divert water from the channel downstream (Thompson and Hansen 1999, Belsky et al. 1999). The desired riparian-wetland habitat of a watershed should dictate the grazing management of the surrounding uplands.

The proper management of livestock grazing in riparian-wetland areas requires a recognition that (1) grazing management practices that improve or maintain upland sites may not be good management practice for riparian-wetland areas, and (2) season-long grazing is not a viable option to improve deteriorated riparian-wetland areas or to maintain a healthy riparian-wetland zone. To maintain necessary riparian function, grazing management must provide for adequate cover and height of vegetation on the streambanks and overflow zones to permit the natural stream functions to work successfully (Ehrhart and Hansen 1997). Currently, the refuge is working with cooperators above the refuge to

enhance riverflow, which will potentially aid riparian area restoration.

Over the past 15 years, several studies were conducted to evaluate riparian area conditions on the refuge. These include a broad-scale stream assessment from 1995–97 with followup assessments in 2009, exclosure monitoring on Rock Creek, monitoring along the Lower Musselshell River, restoration recommendations along Telegraph Creek, a 5-year USGS study to gage streams on the refuge, and water quality sampling conducted on the refuge by the Montana Department of Environmental Quality in 2006–07 (Cook et al. 1996, Parker et al. 1996, Sando et al. 2009, Thompson et al. 1999). The findings of some of these key studies are described in detail below.

From 1995 to 1997, the Riparian Wetland and Research Program assessed 82 streams across the refuge, selecting 203 segments representing 79 river miles. Of the selected segments, 10 percent were found to be functioning as healthy riparian areas, 31 percent were functioning at risk, and 59 percent were scored not functioning or unhealthy (Thompson and Hansen 1999). The designation of “unhealthy” signified that those river segments could no longer properly filter out sediment from the water, build and retain erosion-resistant streambanks, and store adequate amounts of water throughout the summer (Thompson and Hansen 1999). In 1997, Nepl surveyed 2,000 feet of Duck Creek and Brown Pass Coulee using the Riparian and Wetland Ecological Evaluation Form (Hansen et al. 1993), and both were found to be not functioning.

Ecological Solutions Group (2009) resurveyed most of the same locations in 2009 as in 1995–97 (see figure 19). However, the Service requested more survey areas where management changes have occurred such as Armells Creek, Rock Creek (west), and Bob-

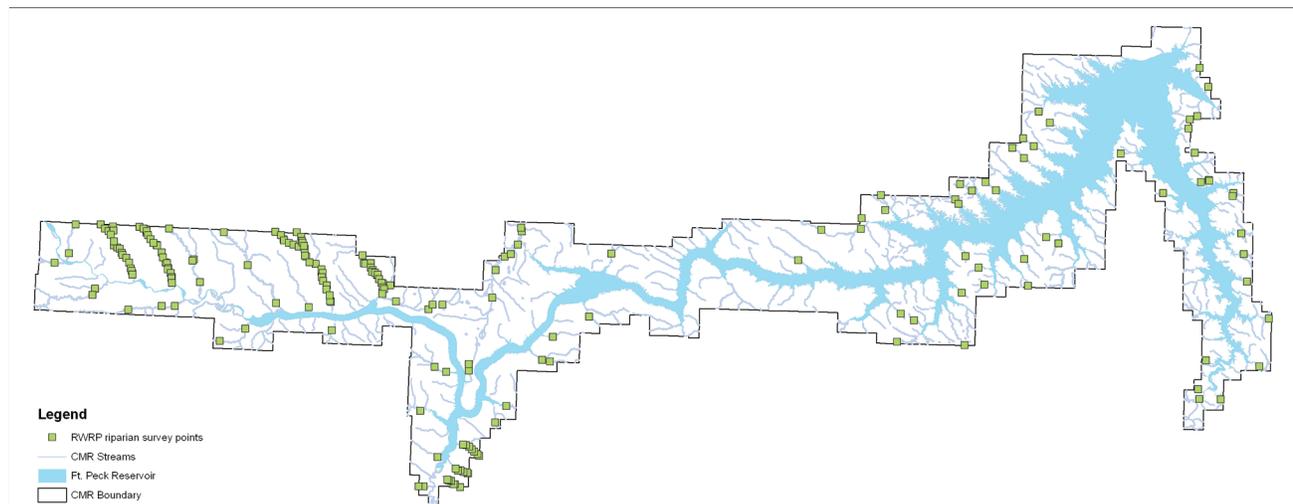


Figure 19. Map of Riparian and Wetland Research Program survey locations at the Charles M. Russell and UL Bend Refuges, Montana.

cat Creek Habitat Unit and reduced survey points in habitat units where management changes have not occurred such as CK Creek and Beauchamp Creek. Ecological Solutions Group (2009) found riparian area health has greatly improved since 1995. Most of the gains have come on physical site factors (soil and hydrology). Increased precipitation promoted vegetation growth and sediment for floodplain building. Additionally, changes in management (most notably the removal of livestock) have allowed the increased vegetation cover to remain onsite. This is due to the capture and anchoring of sediments by recently improved herbaceous vegetation on streambanks. However, much of the gain in health rating due to increased vegetation cover is offset by the negative further invasion by noxious weeds. Recruitment of woody plant species (for example, willows and taller shrubs and cottonwoods and other trees), including riparian sentinel species, has been limited over time due to the browsing effects of both wild and domestic ungulates. Therefore, woody riparian plant recruitment has not been widespread enough to affect the overall average riparian area health ratings.

While the overall average of riparian area health across the refuge has improved, not every stream or local area has shared this improvement. Woody draws located east of the Big Dry on the eastern edge of the refuge, have suffered significant decline. Streams that remain in the lower edge of “Functional At Risk” category include CK Creek and the Pines Recreational Area. Table 5 summarizes the riparian area health assessment findings and compares these to 1995–97.

A contracted firm, Riparian Resources, was hired to establish monitoring locations and collect vegetation data in three areas along Rock Creek (1996 and 2005) and two areas along Siparyann Creek (1996 only) (Miles 1996). Area 1 was on BLM land with normal livestock grazing densities, area 2 was on the refuge within a livestock enclosure built in 1991, and area 3 was on the refuge with spring-only livestock grazing. Siparyann (area 4) was located on BLM land inside and outside a limited fall-grazing pasture.

The monitoring between 1996 and 2005 documented an uneven, unexplainable distribution in cottonwoods and willows that was not tied to river geomorphology. Over the 9 years, the areas all experienced a 55-percent decrease in number of young cottonwoods (98 percent, 59 percent, and 35 percent decrease in areas 1, 2, and 3 respectively). This showed that the older plants are not being adequately replaced by young cottonwoods, due to browsing by wildlife and livestock. Timing of use is critical with winter use probably removing the most plant biomass and causing the most damage to the young cottonwoods. Average age of recruitment is 3 years suggesting that cottonwood replacement did not equal loss.

Browsing use by wildlife and livestock is high throughout the entire project area. Sixty to ninety-two percent of the second-year stems had been browsed on the young cottonwoods and willows. In area 1, this was likely due to livestock; in area 2, it was likely due to elk and possibly deer; and in area 3, it was due to both elk and livestock. These results were not expected. Studies have shown elk avoid areas with large concentrations of cattle and without security cover (Knowles and Campbell 1982, Stewart et al. 2002). Siparyann Creek (area 4) was monitored in 1996 for willows because only eight cottonwood seedlings were found along 8,000 feet of stream. The number of willows found inside the fence was 110, and 30 willows were found outside. Essentially, by excluding cattle in area 2, a highly attractive area was created, concentrating high numbers of elk. It is believed that quality riparian habitat will not be as heavily impacted if more riparian areas are improved or created by excluding cattle and keeping elk at lower numbers.

It is important to work closely with lessees to manage livestock. A few weeks of unauthorized use or overgrazing can set back years of progress in improvements of riparian-wetland systems (Duff 1983). A few head of unauthorized livestock throughout most of the hot season can negate any positive riparian-wetland habitat response (Myers 1981). According to the guide, Best Management Practices for Grazing in Montana (1999), it is the amount of time livestock spend in the riparian area that determines the amount of grazing impact. Success in maintaining or enhancing riparian area health is dependent more on the commitment and involvement of the manager (both refuge staff and livestock operator) than on what grazing system is employed (Ehrhart and Hansen 1997).

SHORELINE

The nearly 1,520 miles of shoreline is a highly dynamic area found along the lakeshore areas of the refuge. The habitat is defined as the vegetation found between current lake levels and high pool elevation (about 2,250 feet). USACE has primary jurisdiction for management of the lakeshore areas, and the Service cooperates with USACE to meet habitat needs of several threatened and endangered species (piping plover, least tern, and pallid sturgeon).

An interesting observation recently is the influence of lake levels and livestock use. When lake levels are low, livestock spend most of their time in the zone between the low-watermark and the high-watermark, thus reducing grazing pressure on refuge uplands. When lake levels return to high pool, refuge uplands will again take the brunt of the grazing pressure.

Table 5. Comparison of riparian area health of 82 streams across the Charles M. Russell and UL Bend Refuges, Montana (1995–2009).

<i>Year</i>	<i>Number of polygons</i>	<i>Miles of stream</i>	<i>Riparian acres</i>	<i>Vegetation score* (%)</i>	<i>Soils and hydrology score (%)</i>	<i>Overall score (%)</i>	<i>Health category</i>
All polygons on Charles M. Russell Refuge: assessed in 1995–97 and resampled in 2009							
1995–97	188	88	1,284	63	55	59	Nonfunctional
2009	155	81.8	1,303.5	70	86	78	Functional at risk
All one-to-one exact match polygons on Charles M. Russell Refuge: assessed in 1996 and resampled in 2009							
1995–97	114	53.6	681.2	62	52	56	Nonfunctional
2009	114	53.6	773.4	65	83	74	Functional at risk
Slippery Ann (Siparyann) habitat unit 2: assessed in 1996 and resampled in 2009							
1996	34	27	282.7	63	54	58	Nonfunctional
2009	33	27.1	329	72	89	81	Functional
Germaine Coulee habitat unit 55: assessed in 1996 and resampled in 2009							
1996	19	8.8	74.7	55	51	53	Nonfunctional
2009	19	8.8	111.6	60	83	73	Functional at risk
UL Bend Refuge: assessed in 1995 and resampled in 2009							
1995	7	1.1	24.3	65	46	55	Nonfunctional
2009	7	1.1	27.5	84	91	87	Functional
Rock Creek (northwest end of refuge): assessed in 1995 and resampled in 2009							
1995	4	0.5	13	67	61	64	Functional at risk
2009	17	13.8	228.1	84	97	91	Functional
Nichols Coulee habitat unit 4: assessed in 1995 and resampled in 2009							
1995–97	6	3.4	33.5	63	36	49	Nonfunctional
2009	6	3.4	34.3	70	72	71	Functional at risk
CK Creek: assessed in 1997 and partially resampled in 2009							
1997	18	20.7	379.5	63	55	59	Nonfunctional
2009	2	3.1	49	63	66	65	Functional at risk
Armells Creek: comparison of two small polygons assessed in 1995 with two larger polygons assessed in 2009 that contain them							
1995	2	0.3	4.1	50	31	40	Nonfunctional
2009	2	2.2	35.9	80	91	86	Functional
Armells Creek, all 15 polygons: assessed in 2009							
2009	15	9.9	187.4	74	89	82	Functional
Pines Recreation Area (South Fork of Duck Creek to Sutherland Creek): assessed in 1995 and resampled in 2009							
1995	7	0.9	18.9	68	63	65	Functional at risk
2009	7	0.9	20.3	60	63	61	Functional at risk
Woody Draws (Rock Creek area and north to Fort Peck Dam): assessed in 1995 and resampled in 2009							
1995	3	0.5	6.9	92	91	91	Functional
2009	9	3.5	74.2	59	78	69	Functional at risk

*Average scores, weighted on polygon size. Scoring values: 80–100%=Functional (healthy); 60–79%=Functional at risk (healthy, but with problems); <60%=Nonfunctional (nonhealthy).

Fire occurrence along the Fort Peck Lake shoreline is almost nonexistent. In 1992, 35 acres of shoreline at the Fort Peck Dam were prescribed burned to provide suitable nesting habitat for piping plover.

An occasional wildfire may burn into the sparsely vegetated shoreline but quickly goes out for lack of burnable fuel.

INVASIVE SPECIES

Invasive species continue to be one of the greatest challenges for managers in the Refuge System including the refuge (FWS 2007c). Service-wide, according to the Service's 2007 Refuge Annual Performance Planning database, 2.4 million acres of refuge lands are infested with invasive plants. In addition, there are 4,423 invasive animal populations on refuge lands. To combat this growing problem on refuges, Invasive Species Strike Teams were set up in several Service regions including region 6. They are mobile response units designed to rapidly respond to the detection of new infestation and eradicate them. The strike team for region 6 is based out of Benton Lake near Great Falls, Montana, and the team helps the refuge in combating invasive plants.

Although there are several types of invasive species of existing or potential concern including weed species, aquatic invasive species such as zebra mussels, and other pests that could be an issue in the future (pine beetle), weeds are the primary issue of concern for the refuge. MFWP monitors for the detection of aquatic nuisance species in Montana.

Weed Species

Figure 20 shows the areas treated from 1997 to 2008. In 2008, the strike team treated five primary weed species: Russian knapweed, saltcedar, spotted knapweed, and whitetop (hoary cress) (see table 6). Additionally, the strike team conducted several other activities centered on prevention and education efforts, inventory and monitoring, and coordination and cooperation with other agencies. For example, the team participated in the Zortman weed rodeo and conducted a weed wash of hunters' vehicles. More than 70 miles of road were surveyed. Because of the need to cover as much ground as possible, other invasive species like Canada thistle were not mapped. Other invasive plant threats found on the refuge include Russian olive, smooth brome, crested wheatgrass, and quackgrass (refer to "River Bottoms" above). In the uplands, the two common invasive species are Japanese brome and yellow sweetclover. Both species have increased as native plant species diversity has decreased in response to

the press (constant) herbivory and fire suppression practices of the refuge (refer to "Disturbance Factors Affecting Major Ecological Processes" at the beginning of section 3.2). The healthier landscapes on the refuge (places where native plant species populations are diverse and viable) have less Japanese brome and yellow sweetclover.

Invasive plant seeds are easily picked up and transported by vehicles. Because the refuge experiences much of its vehicle traffic during the hunting seasons, in 2007 the Rancher's Stewardship Alliance in Phillips County organized a hunter-vehicle weed wash. This has proven to be an excellent education program, and several hunters reported washing their vehicles before coming to the refuge in 2008.

USACE also manages for invasive species on the refuge. Generally, they concentrate their efforts on treating saltcedar below the high-watermark on Fort Peck Reservoir while the Service focuses primarily in the river bottoms and upland areas. The Service maintains close cooperation and coordination with USACE. For example, in 2008 the strike team combined contractor spray efforts in areas important to both agencies. The strike team also cooperated with BLM and Valley County to conduct an extensive invasive plant survey, recording weed infestations along 2,900 miles of road across several jurisdictions.

Several methods are currently used or could be used to combat invasive plants, including noxious weeds, on the refuge (FWS 2011b). Mechanical methods like hand pulling, power tools, and mowing and tilling are more effective for controlling annual or biennial pest plants. For perennial plants, the root system has to be destroyed, or it will continue to resprout and grow. Biological control agents involve the deliberate introduction and management of natural enemies to reduce pest populations. There are advantages and disadvantages to biological controls. Some biological control efforts have begun on the refuge. Herbicides (for example, Milestone™) are also used to treat weed-infested areas. For long-term prevention and proper maintenance of refuge habitats, restoration including revegetation with desirable (native) plants is essential (refer to "River Bottoms" above for more information).

Saltcedar or tamarisk is the most prolific invasive species along the river. Canada thistle and knapweed are also common. Saltcedar plants are spreading shrubs or small trees, 5–20 feet tall, with numerous slender branches. They are an aggressive colonizer, able to survive in a variety of habitats. Often they form monotypic stands, replacing willows, cottonwoods, and other native riparian vegetation. The stems and leaves of mature plants secrete salt that inhibit other plants and changes soil chemistry. Saltcedar is an enormous water consumer, and a single

Table 6. Acreage of treated weeds at the Charles M. Russell and UL Bend Refuges, Montana (2008).

<i>Weed species</i>	<i>Treated acres</i>
Leafy spurge	2.47
Russian knapweed	72.90
Saltcedar	30
Spotted knapweed	0.71
Whitetop (hoary cress)	6
Total	112.07



USFWS

In collaboration with others, the Service runs a weed-wash station during hunting season.

large plant can absorb 200 gallons of water per day. Infestations can have detrimental effects on wildlife. Large infestations of saltcedar occur along the 1,520-mile-long shoreline of the reservoir. Most infestations occur along the south shore in bays and inlets where drainages enter the reservoir (Lesica and Miles 2004). Pearce and Smith (2003) estimated the presence of 24,500 plants on the Musselshell River of a river distance of 240 kilometers with concentrations at three nodes close to Roundup, Melstone, and the mouth of the river at Fort Peck Reservoir. The oldest plants on the reservoir were estimated at 21 to 33 years in 2001. It is believed that saltcedar arrived on the south shore in the mid to late 1960s and most likely dispersed from the Yellowstone River system soon after it became established in southern Montana. Many people believe that the most effective way to treat saltcedar is to inundate them by raising water levels to drown them for a substantial length of time (Lesica and Miles 2004). During the winter and spring of 2010–11, historic rain and snowpack levels resulted in lake levels returning to above record high water levels. How the elevated lake levels will affect future treatments along the shoreline is unclear. As stated in chapter 1, raising water levels is controlled by USACE and is an issue outside the scope of the planning process.

BIRDS

More than 250 species of birds have been documented on the refuge. The unique combination of

native prairies, sagebrush shrublands, forested coulees, pine–juniper woodlands, riparian areas and river bottoms, and badlands makes the refuge a haven for migrant and breeding birds. The refuge is also extremely important for year-round residents such as sharp-tailed and sage-grouse. This section discusses sharp-tailed grouse (which is specifically mentioned in Executive Order 7509) in addition to other important bird species not mentioned before.

Grassland Birds

Some grassland birds found on the refuge are among the fastest and most consistently declining birds in North America due to the loss of native grasslands and the management of remaining grasslands (Cunningham and Johnson 2006, North American Bird Conservation 2009). Each grassland bird species has a unique set of habitat needs, which may include plant species present as well as plant structure and development. Some birds prefer extremely shortgrass heights (upland sandpiper) whereas others prefer tall (Baird's sparrow). Some avoid areas of woody vegetation (short-eared owl) and others do not (McCown's longspur). Needed food plants may be present but may not produce needed seed or fruits due to herbivory or timing of fire. Needed insect foods may be dependent on specific plant species that may or may not be present. Raptor prey items (rodents and small birds) may depend on individual plant species and plant structure or insects on an individual plant species. Nesting requirements may be different than brooding requirements and

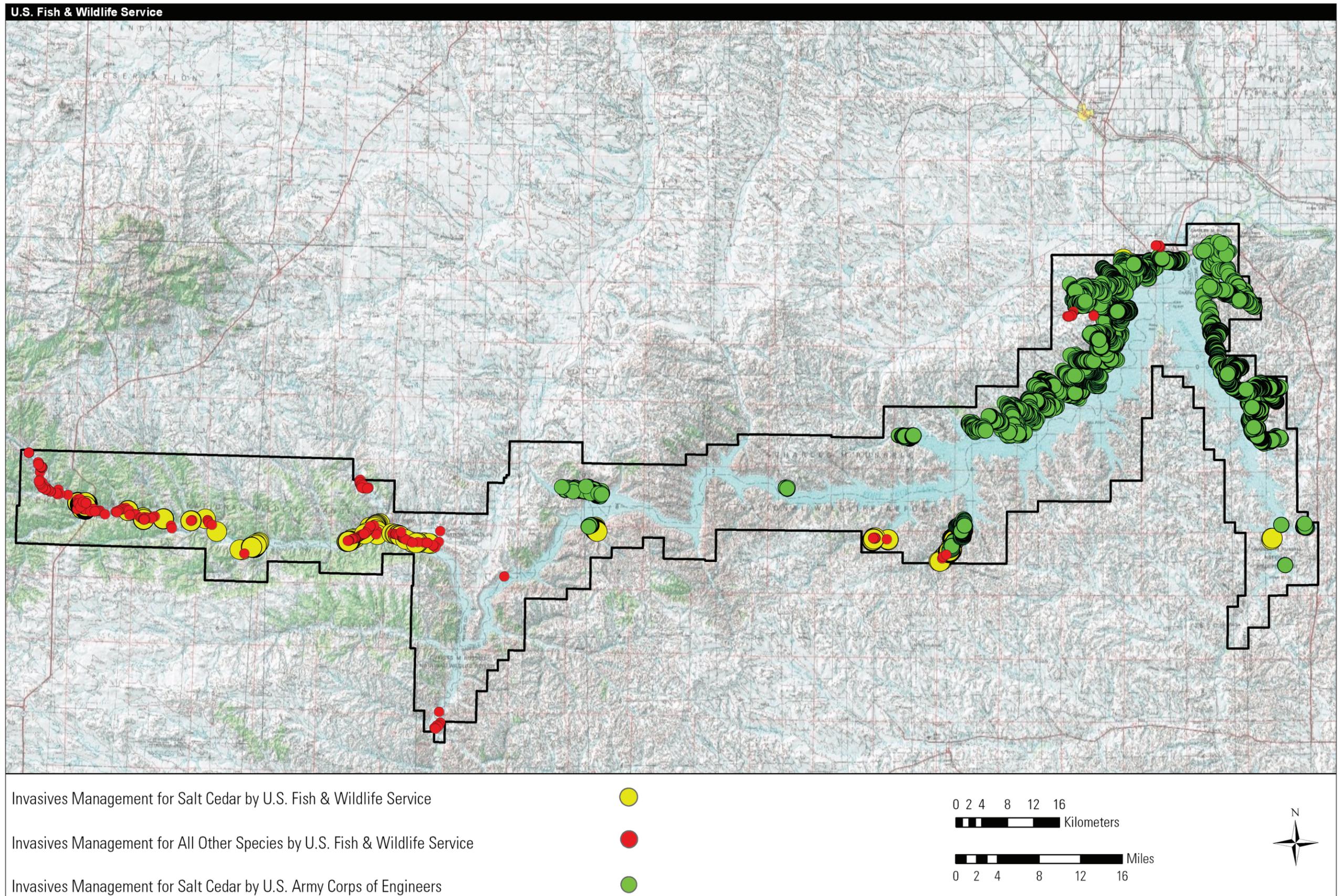


Figure 20. Map of invasive species occurrence at the Charles M. Russell and UL Bend Refuges, Montana.

both might need to be near each other. Bird species may also be dependent on unbroken blocks of grasslands of certain sizes (NRCS 1999).

According to the North American Breeding Bird Survey data from 1966 to 1993, 70 percent of 29 prairie species have experienced population declines (Fuhlendorf and Engle 2001). Resident and documented breeding refuge birds that are in trouble or showing sharp declines include western meadowlarks, short-eared owls, mountain plover, Sprague's pipit, lark bunting, Baird's sparrow, chestnut-colored and McCown's longspurs, and greater sage and sharp-tailed grouse (North American Bird Conservation 2009). Compounding these declines are the current and future effects of global climate change on grassland birds. Global climate change has and will continue to affect ranges of grassland birds by causing changes in summer range such as exclusions (Sprague's pipit), contractions (Brewer's sparrow), expansions (Say's phoebe), or additions (scissor-tailed flycatcher). It could also alter migration behavior and habitat and could ultimately affect their survival ability (Price and Glick 2002).

Sharp-tailed Grouse. Sharp-tailed grouse are distributed throughout the refuge, but similar to other species, habitat suitability varies spatially and seasonally. Sharp-tailed grouse are considered an indicator for large grassland landscapes and other grassland birds. Although Executive Order 7509 specified that the refuge should be managed for a maximum of 400,000 sharp-tailed grouse, those numbers have not been observed on the refuge.

Since the mid-1970s, 177 sharp-tailed grouse leks have been mapped (figure 21) and some 2,100 counts of sharp-tailed grouse attending leks have been counted. Leks are specific areas where grouse gather in the spring for courtship displays and mating. There have been 15,000 sharp-tailed grouse counted

on the refuge (including repeat counts of the same leks within years). Exact lek counts are difficult to obtain because sharp-tailed grouse have lower site fidelity than other species (such as sage-grouse), and multiple counts within a season are challenging due to the size of the refuge. Because of these logistical challenges, an annual listening survey was started in 1989 as an index to track regional sharp-tailed grouse population levels. Some 330 stations were established in potential sharp-tailed grouse habitat, each spaced about 1 mile apart on roads. An observer listens for sharp-tailed grouse breeding sounds early in the morning and records presence or absence at each station. When populations are high, more birds make more sounds and new satellite leks become established, all contributing to hearing birds at a higher proportion of listening stations. The opposite is true when populations are low. Figure 22 summarizes listening data collected since 1990.

Other Birds

Other bird groups found on the refuge include colonial-nesting birds, waterfowl, raptors, and owls. Early refuge narratives document the declines of colonial-nesting birds and waterfowl as water levels rose after the Fort Peck Dam was completed. Pelicans, great blue herons, and cormorants were common nesters in the large cottonwoods along the river but these birds gradually disappeared as the cottonwoods were drowned out and covered by water.

Ducks and geese were also documented as common upland nesters along the Missouri River before the lake rising. Most goose nests were located in the dense underbrush found along the river whereas duck nests were located in the grassy uplands. Nesting waterfowl numbers seem to have fluctuated early on with the rise and fall of the lake. Refuge personnel noted that the lake provided little food to waterfowl,

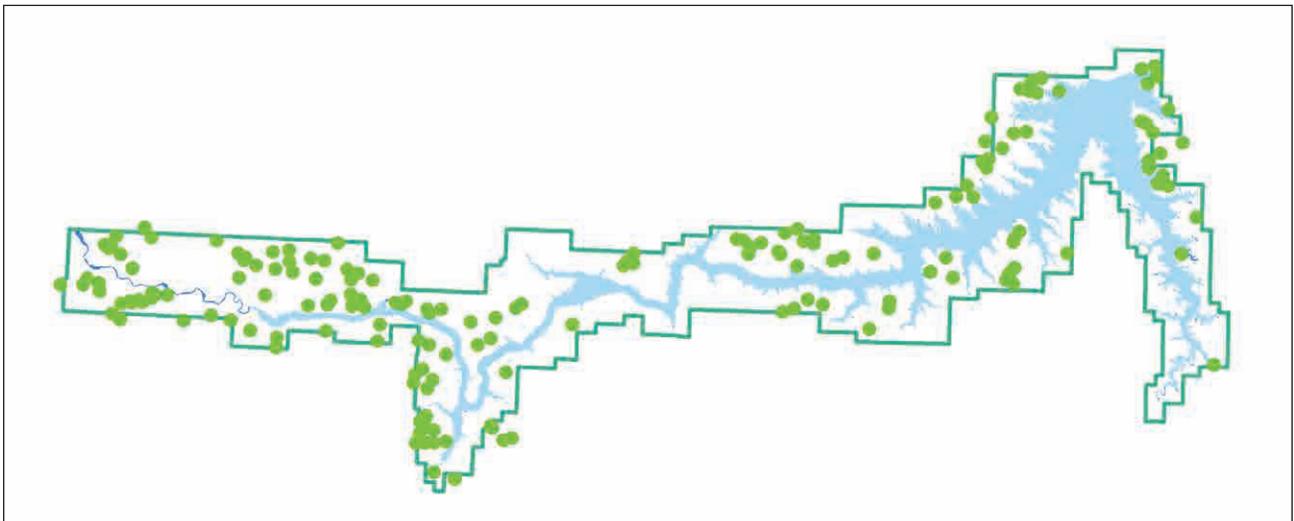


Figure 21. Map of lek locations for sharp-tailed grouse on the Charles M. Russell and UL Bend Refuges, Montana.

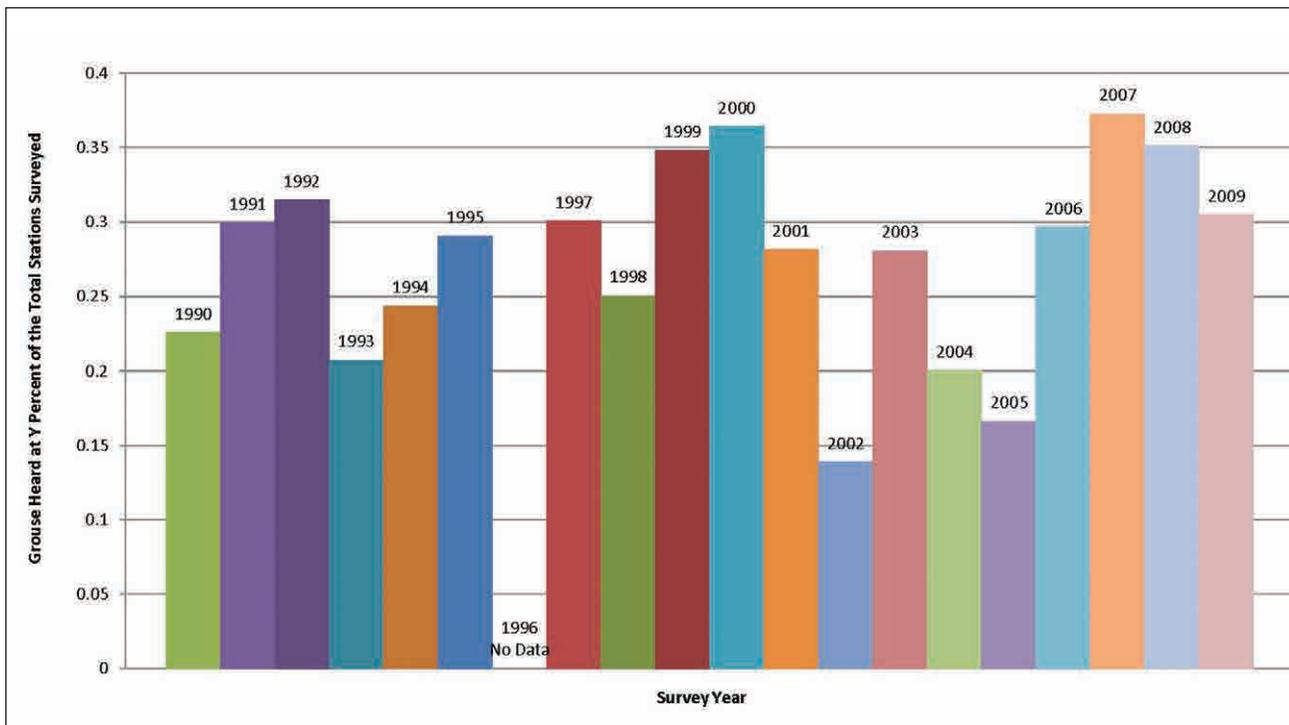


Figure 22. Chart of survey results for the listening route for sharp-tailed grouse on the Charles M. Russell and UL Bend Refuges, Montana (1990–2009).

and over time the refuge became more of a migratory loafing area than a nesting area. Winter flocks of waterfowl used the refuge during times when area farmers stockpiled cereal crops such as barley and oats for winter livestock feed. Supplemental feeding of wintering waterfowl on the refuge was also quite common during the 1940s and 1950s. Currently, waterfowl remain in the river below the Fort Peck Dam during fall and winter months.

In the mid-1950s, refuge personnel began documenting raptors and owls mainly because they counted the numbers of both that had been killed by refuge employees. It was also noted that local residents and hunters also shot these birds on sight. Both golden and bald eagles were commonly shot as well as great horned owls (crows and magpies were also shot on sight). Other raptor species documented included northern goshawk, prairie falcon, rough-legged hawk, and northern harrier (“marsh hawk”). Ospreys were first recorded along the lake in 1958. Their numbers have increased due to nesting platforms being built by refuge employees. Eagle numbers have also increased due to the elimination of strychnine poisoning and shooting.

Neotropical migratory birds use the refuge both as nesting habitat but also as a stopover area during spring and fall migrations while heading both north and south of the refuge. The millions of neotropical birds using the refuge primarily as a stopover area are also negatively affected by grazing for

many of the same reasons as nesting birds. Foraging habitat (multiple layers of plant species) needs to be protected along with the food-producing plants (seed and berry producers) and food-sheltering plants (plants insects feed on) (Pool and Austin 2006).

Although riparian zones make up less than 1 percent of western landscapes, they harbor the most species-rich avifauna of all the major habitats in the western United States (Young et al. 2001). In the western United States, more species of breeding birds are found in these limited riparian zones than the far more abundant adjacent uplands. More than 60 percent of neotropical migratory birds use riparian areas as stopover areas while migrating north and south or as breeding habitat (Krueper 1993). They are also the most modified suffering a loss at greater than 95 percent. Shorebird species found on refuge wetlands, shoreline habitats and grasslands are also in decline (Brown et al. 2001).

The National Audubon Society has recognized the refuge as an Important Bird Area. The program recognizes that coupled with global warming, habitat loss and fragmentation are the most serious threats facing populations of birds across American and around the world (National Audubon Society 2009). The refuge has been recognized as a Global Important Bird Area based on three criteria: (1) the site regularly holds significant numbers of a globally threatened species or other species of global conservation concern; (2) Montana State holds species of

State Conservation Concern; and (3) Montana State has greater than 1 percent of the State's population. Of the 276 species of birds actually recorded near or on the refuge, there are several species of global or continental conservation concern. The refuge lies directly south of the Glaciated Prairie Sage-Steppe Important Bird Area for Greater Sage-Grouse and northeast of the Musselshell Important Bird Area for Greater Sage-Grouse (Montana Audubon 2008).

Focal Bird Species

The Service has identified several species as focal birds, those that serve as indicator species on the refuge. These are species that regularly nest on the refuge, species of conservation priority or concern, Service's target species, stewardship species under the North American Landbird Conservation Plan, species of concern under the North American Landbird Conservation Plan. Following are the focal birds for the major habitat types on the refuge.

- *Uplands*: long-billed curlew, Sprague's pipit, Baird's sparrow, brown creeper, sharp-tailed grouse, and greater sage-grouse
- *River bottoms*: red-eyed vireo, Brewer's blackbird, and veery
- *Riparian areas and wetlands*: ovenbird, Cordilleran flycatcher, black-billed cuckoo, and western wood pewee

For more information about focal bird species, refer to "Bird Objectives" under section 4.2 in chapter 4.

Grazing and Fire Effects

Management tools such as livestock grazing and fire can cause profound changes in the composition and abundance of plants, which in turn affects bird species composition and numbers (Bock et al. 1993, Murphy 2008, Fuhlendorf et al. 2006). Refuge narratives as early as 1942 noted the negative effects grazing was having on grouse species: "Locally, the upland game depends largely on habitat and weather, the habitat in turn depending on grazing pressure." When ungrazed and grazed streamside riparian areas were compared on the refuge, almost twice as many individual birds were found on the ungrazed areas than grazed (Knowles and Knowles 1994, FaunaWest Wildlife Consultants 1996). Bird species composition showed a higher number of grassland species (sparrows) on the grazed areas, whereas the ungrazed areas had species more commonly found in forested riparian areas such as flycatchers, warblers, and cavity nesters including kestrels.

Bock (1993) states, "the principal means by which livestock grazing affects bird populations is by altering habitat structure and food availability." Relationships between birds and grazing—whether by bison, wild ungulates, prairie dogs, or domestic livestock—

are complex because there are such wide ranges in intensity, season, duration, and style of grazing. Individual bird species such as horned lark and mountain plover may respond positively to grazing, although they still require shade plants to survive summer heat (Shackford 1996). Other birds such as Baird's sparrow may respond negatively, and some birds such as grasshopper sparrow have a mixed response. These same species may respond differently in the taller grasses of the Midwest versus the response in the shorter grasses of the Great Plains. Adding seasonal changes in precipitation and possible long-term changes in climate only complicate things further.

Grassland birds can be affected by fire in several ways. Fire can eliminate trees and shrubs, which negatively affects some bird species that are adapted to nesting in prairie grasses. Although birds and nests decline immediately after a fire, within a few years they can exceed preburn levels. Short-term loss of breeding habitat is often outweighed by long-term benefits to the changes in vegetation (Murphy 2008). Using a management tool such as patch-burn grazing results in a mosaic of habitats that consistently shifts. One benefit is that it provides needed habitat for the full range of year-round resident, migratory, breeding, and nonbreeding birds (Churchwell et al. 2007). The severity of fires can also influence bird abundance and species, which suggests a need for all kinds of fires and not just the low-severity fires used most in prescribed fire plans (Smucker et al. 2005).

The short- to midgrass prairies of the Great Plains evolved with frequent disturbances including intense grazing by prairie dogs and bison. Grassland birds also changed with these grazing effects on the vegetation. Birds selected a variety of different grass heights created by the intense grazing by prairie dogs and bison. Native grazers created a natural patch ecosystem, and each patch had different site characteristics that favored the entire prairie bird fauna. When contrasted with current grazing patterns, now there is less of a patchwork of habitat because more of the grassland is the same. This change has contributed to a decline in native birds (Vickery et al. 2008). Increasing the disturbances in grasslands through patch burning and grazing can, in time, reverse this decline by increasing diversity in both food and structure (Fuhlendorf et al. 2006).

Road and Public Use Effects

Roads have the potential to fragment wildlife habitat, which can exacerbate the problem of habitat loss for grasslands birds. One of the concerns for bird species is the edge effect whereby birds that live on the edge of an area are able to invade and attack interior species. Understanding the effects of habitat fragmentation is complex and not easy to assess (Johnson 2001).

THREATENED and ENDANGERED SPECIES and SPECIES of CONCERN

There are currently four species found on the refuge that are listed on the threatened and endangered species list: black-footed ferret, least tern, piping plover, and pallid sturgeon. The grizzly bear (threatened) is found in Montana but not on the refuge. Endangered whooping cranes migrate through McCone, Phillips, and Valley Counties. These threatened and endangered species and several species of concern are discussed below.

Threatened and Endangered Species

The Service is following recovery plans for the following listed species found on the refuge: black-footed ferret, least tern, and pallid sturgeon, which are all listed as endangered, and piping plover, which is listed as threatened.



USFWS

Endangered Black-footed Ferret

Black-footed Ferret (Endangered). Black-footed ferrets, listed as endangered, were first reintroduced in Montana in 1994 on black-tailed prairie dog colonies located at UL Bend National Wildlife Refuge. The thinking at the time was that reintroduction techniques could be figured out on the refuge part (10 percent) of the experimental reintroduction area

and, once refined, expand reintroductions north onto what had been about 26,000 acres of prairie dogs as mapped in 1988. There were also hopes to expand even further and try to populate with ferrets another 25,000 acres of prairie dog colonies on the Fort Belknap Indian Reservation.

Black-footed ferrets require at least a few thousand acres of healthy prairie dog colonies to provide habitat and prey because they are obligate predators of prairie dogs and they live in the tunnel systems created and maintained by prairie dogs. Many public land managers and landowners have a general intolerance for very many acres of prairie dogs and throughout the black-footed ferret's historical range, generally small and fragmented prairie dog occupied landscapes are limiting ferret recovery. In addition to limited human tolerance of prairie dogs, epizootics of sylvatic plague can eliminate thousands of acres of prairie dogs in a few weeks, thus eliminating expansive areas of black-footed ferret habitat. In addition, ferrets exposed to plague die within 3 days. Plague was first ever detected in Phillips County, Montana in 1992 when many prairie dog colonies suddenly disappeared. By 1996, nearly 80 percent of 26,000 acres of prairie dog colonies had died out. Epizootic plague (high level of mortality over a short period) was never observed at the UL Bend Refuge until 2007.

Sylvatic plague is a nonnative disease foreign to the evolutionary history of North American species. Plague was inadvertently introduced into the United States around 1900. Sylvatic plague is a bacterial infection transmitted primarily by infected fleas. It can affect the black-footed ferret directly via infection and subsequent mortality or indirectly through the disease's effects on prairie dogs and the potential for dramatic declines in the ferret's primary prey. Plague can be present in a prairie dog colony in either an enzootic state (persistent, low level of mortality) or epizootic state (high mortality). Recovery efforts for the ferrets are hampered because both ferrets and prairie dogs are extremely susceptible to plague.

Despite these obstacles, a huge amount of effort has gone into trying to establish black-footed ferrets in north-central Montana. There have been 229 captive-reared ferret kits released in three areas of the UL Bend Refuge, 95 north of the refuge on BLM lands and 167 in two areas of the Fort Belknap Indian Reservation. In addition, at least 236 wild-born kits have been observed at the UL Bend Refuge. The last confirmed sighting of a ferret on Fort Belknap was in 2003, 2006 on BLM lands and six ferrets (two male and four female) were observed at UL Bend during April 2009. The following graph (figure 23) illustrates the population history of black-footed ferrets at UL Bend National Wildlife Refuge.

During 2007 and continuing in 2008, epizootic plague eliminated about 60 percent of the prairie dog

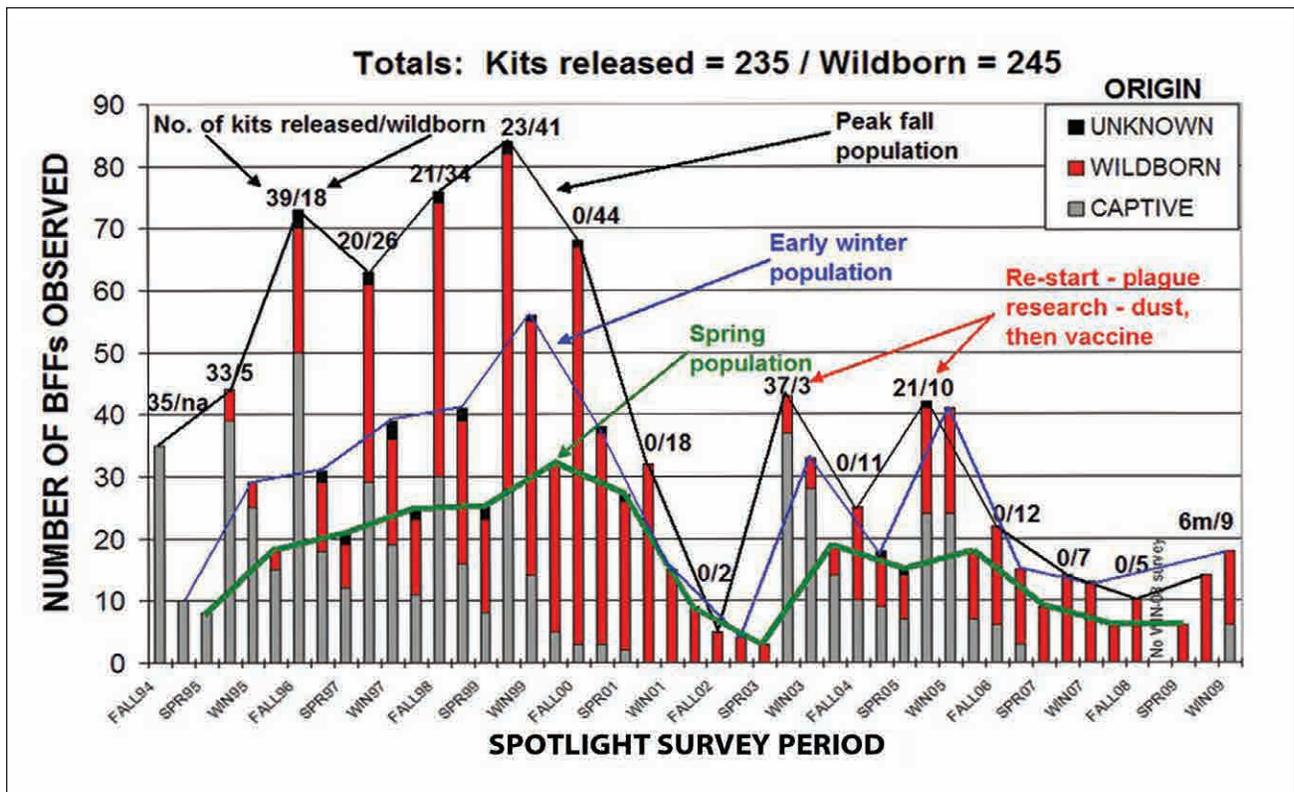


Figure 23. Graph of data for the black-footed ferret population at the UL Bend Refuge, Montana (1994–2009).

acreage where ferrets had resided at the UL Bend Refuge. Plague was also reported to be widespread north of the refuge and was eliminating a substantial number of remaining prairie dogs throughout Phillips County. To protect the remaining prairie dogs and resident ferrets (six ferrets present in April 2008—four male and two female), all remaining active parts of prairie dog populations in the Locke and Hawley area were treated with 0.05 percent deltamethrin during early summer 2008 to kill fleas (a vector for plague and shown to improve ferret and prairie dog survival in plague-prone areas (Matchett et al. 2010 and Biggins et al. 2010). More than 34,000 burrows were treated, and both prairie dog and ferret populations have persisted through fall 2009.

Despite the failure to establish a self-sustaining black-footed ferret population in Montana, the Service remains hopeful that a ferret population contributing to the rangewide recovery of the species will be established in Montana. Already, much has been learned along the way that has greatly helped national efforts for ferret recovery. For example, Matchett et al. (2010) has shown that in addition to epizootic plague affecting ferrets, enzootic plague (that is, the presence of disease-causing *Yersinia pestis* when there is no noticeable decrease in prairie dog abundance) also reduces ferret survival and that both flea control and an experimental plague vaccine for ferrets were effective.

It is likely that if an oral plague vaccine can be developed, prairie dog numbers will increase and stabilize on the refuge, and the area may be able to sustain a population of ferrets that will contribute to its recovery rangewide. If the current ferret population at UL Bend Refuge dies out before prairie dog numbers can increase, the opportunity remains to use the existing expertise and management framework to recover ferrets when more favorable conditions occur. Refuge staff will continue monitoring the remaining ferrets at the UL Bend Refuge. Several wild-born kits were observed during fall 2009, but with a total spring breeding population of only six animals during the last 2 years, the Service expects the population to die out completely in the near future.

As summarized below, MFWP has spent considerable time constructing plans for prairie dog and associated species conservation. Refuge staff and many cooperators have worked diligently for some 20 years trying to maintain and enhance complexes of prairie dogs capable of supporting a viable population of black-footed ferrets in Montana. With the multiple planning efforts and committees established by MFWP, the Service views them as the lead agency for these efforts.

In response to black-tailed prairie dogs becoming a candidate species (warranted, but precluded) for listing under the Endangered Species Act in 2000,

MFWP developed a statewide prairie dog conservation plan that was completed in 2002. They then worked hard to complete a local region 6 (northeast Montana) prairie dog plan in 2006. After completion of that local plan, MFWP established a facilitated "Implementation Committee" to attempt locating and managing for complexes of prairie dogs suitable for black-footed population establishment as called for in the previous two plans (Category I Complexes). That Implementation Committee made its recommendations to MFWP in 2008, but fell short of drawing any lines on maps.

Least Tern (Endangered). The interior population of the least tern was listed as endangered by the Service in 1985. The least tern was first documented in Montana at Fort Peck Lake in 1987. Annual surveys have been conducted since 1988 on both Fort Peck Lake and the Missouri River below the dam. The most successful breeding year for least terns on the reservoir was in 1994 and nesting has been sporadic since then (USACE 2008), as shown in table 7.

Table 7. Least tern nest success at Fort Peck Lake, Montana.

<i>Year</i>	<i>Number of nests</i>	<i>Successful nests*</i>
1994	8	3
2004	0	0
2005	0	0
2006	2	1
2007	2	1

*Number of nests producing fledglings

Source: USACE 2008.

Fort Peck Reservoir is at the northwestern limit of the interior least tern's breeding range resulting in the low numbers of birds in this area. In addition, the amount of available habitat changes with the lake level and affects the number of birds attracted to the reservoir in any given year. The Missouri River below the dam and the Yellowstone River attract more birds than the reservoir. Survey results show that Montana has met or exceeded the recovery goal of 50 adult birds as set forth in the 1990 Interior Least Tern Recovery Plan (Atkinson and Dood 2006a).

Pallid Sturgeon (Endangered). The upper Missouri River above Fort Peck Reservoir is one of the six recovery-priority management areas, identified as RPMA 1 in the Pallid Sturgeon Recovery Plan (Dryer and Sandvol 1993). Historically, pallid sturgeon were found along this 230-mile reach; however, losses of habitat and the migration barrier caused by the completion of Fort Peck Dam in the 1930s, and construction of Canyon Ferry and Tiber dams in the 1950s, has caused their near extinction. Additionally,

the population was found to be senescent and that there had been no significant recruitment in the last 10 years (Gardner 1996). Very few wild pallids now remain in RPMA 1 (probably 10–20). The core area where most of the pallids are now primarily found is a 61-mile reach between Cow Island (river mile 1944) and Beauchamp Creek (river mile 1883).

MFWP, in cooperation with the Service, initiated pallid sturgeon recovery in RPMA 1 with the release of 733 hatchery-reared, yearling pallid sturgeon during 1998. Table 8 shows the stocking history of the Missouri River in Montana.

Table 8. History of stocking pallid sturgeon in the middle Missouri River, Montana (1997–2008).

<i>Year (class)</i>	<i>Year stocked</i>	<i>Stage</i>	<i>Number stocked</i>
1997	1998	yearling	733
2001	2002	yearling	2,058
	2004	age 3	189
2003	2004	yearling	3,113
2004	2005	yearling	706
	2005	larval	33,300
2005	2005	fingerling	2,480
	2006	yearling	4,737
2006	2007	yearling	4,534
2007	2007	fingerling	38,608
	2008	yearling	5,699
2008	2008	larval	62,055
	2008	fingerling	24,980
Total			176,393

The goal for stocking is to restore the population to 1,000 adults, age 15 years or older (including about 20,000 pallids less than 15 years) by 2027. The population of 15-year-old and older adults will be maintained by stocking for one generation. The population of 1,000 adults was selected based on maintaining genetic diversity and reasonable population demographics.

The present habitat condition will be maintained in at least the present form (minimum instream flows, water quality, and riparian areas). Main stem and tributary dams in the area have had profound effects on natural flow conditions and therefore dam operation effects on pallid sturgeon habitat will be evaluated. There seems to be considerable pallid use of the transitional river and reservoir reach (river mile 1867–98) near the river delta in Fort Peck Reservoir. There may be potential for enhancing the riverine habitat here for pallid sturgeon by developing a more favorable water level management plan (Gardner 2003). Gerrity et al. (2008) found pallid sturgeon avoids reaches of river with islands and secondary channels, selecting reaches without islands and main channel habitats. Water level management can influence the amount of habitat available for pallid sturgeon. Fish are the primary prey of juvenile pallid sturgeon, because sturgeon chub and sicklefin chub composed 79 percent of the diet of sampled pallid sturgeons (Gerrity et al. 2006). These two cyprinids are on the species of concern list.

Piping Plover (Threatened). There are three breeding populations of piping plovers in North America, which were listed under the Endangered Species Act in 1985. Plovers nesting on Fort Peck Reservoir are considered part of the northern Great Plains population and are listed as threatened.

Plovers are attracted to gravel beaches on the lakeshore and islands that are exposed during periods of low lake levels. In 2002, the Service designated 77,371 acres on Fort Peck Reservoir as critical habitat (see figure 24). According to the 2006 Montana Piping Plover Management Plan, critical habitat “refers to specific geographic locations that contain features essential for conserving a species and may require special management considerations” (Atkinson and Dood 2006b).

Although plovers were observed in Montana during the 1970s and were known to breed on Fort Peck Reservoir, formal surveys did not begin until after they were listed under the Endangered Species Act. USACE conducts annual surveys of the reservoir and monitors nest success (see table 9). The amount

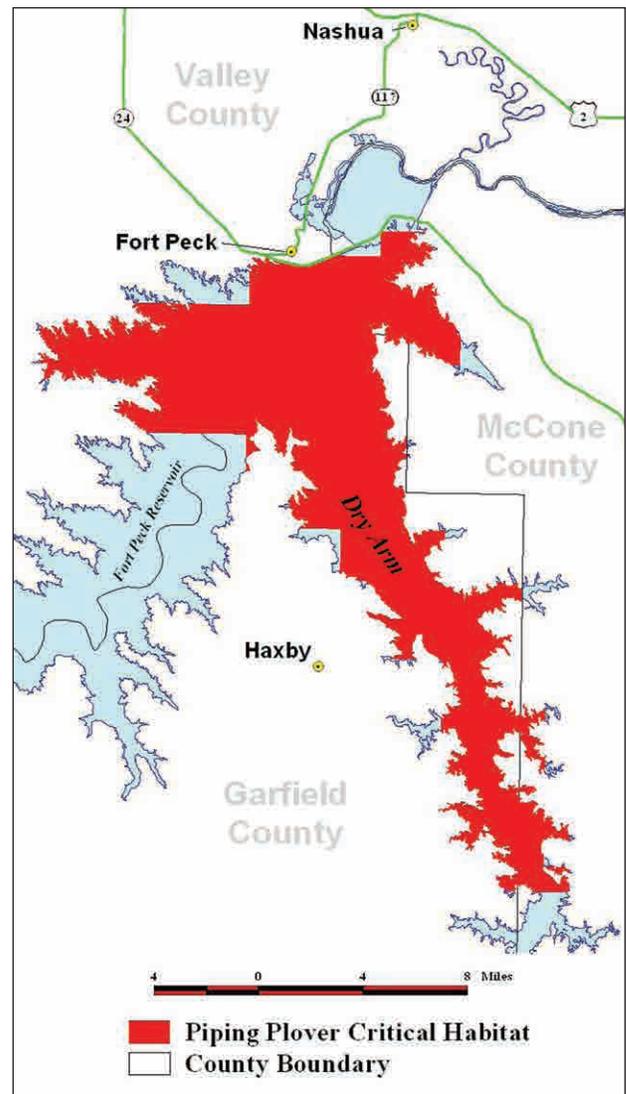


Figure 24. Map of critical habitat for piping plover at Fort Peck Reservoir, Montana.

of available habitat changes with the lake level and affects the number of birds attracted to the reservoir in any given year. However, long-term monitoring shows that most inland sites have failed to reach specified recovery levels and the northern Great Plains population as a whole is declining (Atkinson and Dood 2006b).

Grizzly Bear (Threatened). Grizzly bears are generally larger and more heavily built than other bears, and can be distinguished from black bears by longer, curved claws, humped shoulders, and a face that appears to be concave. When Lewis and Clark explored the West in the early 1800s, an estimated 50,000 grizzly bears roamed between the Pacific Ocean and the Great Plains, across vast stretches of open and unpopulated land. But when pioneers moved in, bears were persecuted and their numbers and range drastically declined. As European settlement expanded over the next hundred years, habitat

Table 9. Piping plover nest success at Fort Peck Lake, Montana (2004–07).

Year	Number of plovers	Number of nests	Nesting success*
2004	9	4	4
2005	26	11	7
2006	20	7	6
2007	16	8	6

*Number of nests producing fledglings. Table taken from Fort Peck Dam/Fort Peck Lake Master Plan (2008).

for these large omnivores, along with their numbers drastically declined. Today, only a few small corners of grizzly country remain, supporting about 1,200–1,400 wild grizzly bears. Of 37 grizzly populations present in 1922, 31 were extirpated by 1975. In 1975, the Service listed the grizzly bear as a threatened species in the lower 48 States under the Endangered Species Act, placing the species under Federal protection.

On March 22, 2007, the Service announced that the Yellowstone Distinct Population Segment of grizzly bears is a recovered population no longer meeting the Endangered Species Act's definition of threatened or endangered. However, on November 11, 2011, the Fourth Circuit Court of Appeals ruled that the Greater Yellowstone Distinct Population Segment of grizzly bears should remain protected under the Endangered Species Act. On April 18, 2007, the Service announced the initiation of a 5-year review of grizzly bear (as listed in the lower 48 States). The Service conducts these reviews to ensure that a classification of each species as threatened or endangered on the List of Endangered and Threatened Wildlife and Plants is correct. A 5-year review is an assessment of the best scientific and commercial data available at the time of the review.

The Service, in cooperation with numerous partners, has purchased several conservation easements along the Rocky Mountain Front to help grizzly bears (and other wildlife species) by conserving corridors for grizzly bears to move to other large blocks of secure habitat. Over the past 2 years, juvenile grizzly bears from the Rocky Mountain Front have ventured toward the Missouri River Corridor. As grizzly bear populations grow and more habitat is conserved, the probability of grizzlies traveling from the Front to the Missouri River and subsequently

onto the refuge increases. As a result, the CCP addresses the Service's response if grizzly bears naturally migrate down the river onto the refuge.

Whooping Crane (Endangered). Endangered whooping cranes migrate through three of the six counties (McCone, Phillips, and Valley Counties). The cranes may pass over the refuge during spring or fall migrations and stop briefly to feed, but there are no resident or breeding populations on the refuge.

Species of Concern

There are several species of concern found on the refuge. They generally rank no greater than G3 or S3 from Montana Natural Heritage Program (2008), or are currently being considered for listing under the Endangered Species Act.

Black-tailed Prairie Dog. Black-tailed prairie dog colonies on the refuge are most abundant in the Phillips County part of the refuge and near the southern end of the Big Dry Arm of Fort Peck Reservoir, along with a single colony of about 1,000 acres in Valley County. The perimeters of prairie dog colonies have been mapped through the years and figure 25 shows the maximum extent of where prairie dogs have been recorded from 1979 through 2007 and totals 15,700 acres. The last time all colonies on the refuge were mapped was in 2003 and totaled 7,300 acres. Epizootic plague was widespread in Phillips County during 2007 and reduced prairie dog acreage there by 50 percent from 5,200 acres mapped in 2004 to 2,600 mapped in 2007.

The vast majority of the refuge is not suitable habitat for prairie dogs and much of the refuge is on the fringe of suitable habitat. Many existing colonies have limited expansion potential because of topography, hydrology and shrub or tree cover limitations.

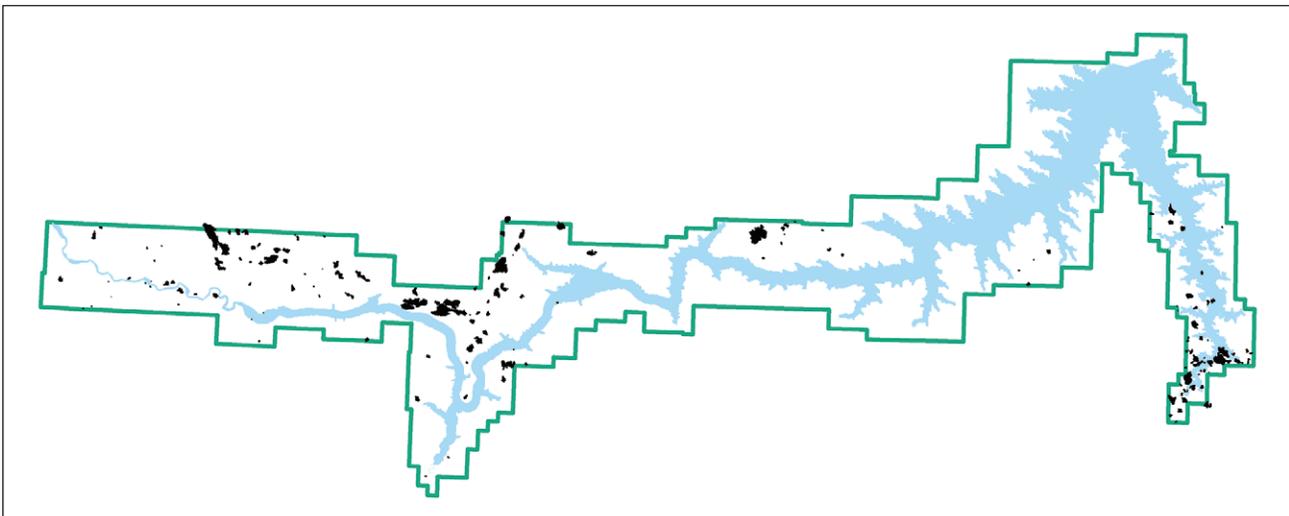


Figure 25. Map of the maximum extent of black-tailed prairie dogs at the Charles M. Russell and UL Bend Refuges, Montana (1979–2007).



© Diane Hargreaves

Watchful prairie dogs atop their mound.

Sylvatic plague was first documented in Phillips County in 1992 after thousands of acres of prairie dogs suddenly disappeared throughout the county. The Manning Corral prairie dog colony on the refuge in southern Phillips County was nearly 1,400 acres in size before being affected by plague in 1992 when it was reduced to 16 acres in about a month. Plague epizootics continued in varying degrees through 1996 and prairie dog populations have slowly recovered since, until 2007 when plague once again eliminated many colonies over a wide area. More discussion about prairie dogs and plague is located under the black-footed ferret section.

Prairie dog range in the early 1900s reached from southern Saskatchewan southward across the Great Plains to northern Mexico. Although prairie dog colonies covered up to 98 million acres (Knowles and Knowles 1994), current estimates place the area occupied at 1–2 percent of historical levels (Miller et al. 1990, Marsh 1994). Prairie dogs have lived on the Great Plains for thousands of years, providing food or habitat for numerous species. The endangered black-footed ferret, for example, depends solely on prairie dogs for food, and on prairie dog burrows for shelter.

Prairie dogs are a keystone species for the Great Plains (Kotliar 2000). Prairie dogs are prey for other species, dig burrows used as nest sites and shelter for invertebrates and vertebrates, and alter nutrient cycling, plant species composition, and plant structure. Sensitive species closely associated with prairie dogs include the mountain plover and burrowing owl. Predator species include black-footed ferrets, raptors, badgers, bobcats, mountain lions, coyotes, and western rattlesnakes. Nine of the 208 species

listed in the literature as observed on or near prairie dog colonies have quantitative evidence of dependence on prairie dogs (Kotliar 2000).

In 1998 the prairie dog was petitioned for listing under the Endangered Species Act. In 2000, the Service found that listing was “warranted but precluded” meaning that listing was warranted but other species had higher priority. In 2004, the Service issued a “not warranted” finding on a resubmitted petition removing it as a candidate species. In 2007, the prairie dog was petitioned again for listing and on December 2, 2008, the Service issued a positive 90-day finding for the prairie dog. Most recently, the Service completed a status review and found that it does not warrant protection under the Endangered Species Act at this time.

Section 87–5–103(1), Montana Code Annotated states that nongame wildlife species should be “perpetuated as members of ecosystems.” The prairie dog itself is listed on the Natural Heritage Program and MFWP “Species of Concern” list (Montana Natural Heritage Program and MFWP 2009), as well as BLM’s “Special Status Species” list in Montana. Several species associated with prairie dogs also are listed by the State and BLM as species of management concern. BLM has a heightened responsibility for species that it designates as “sensitive,” in that it should afford them special protection to ensure that their populations and habitat are conserved.

The refuge has been an active member of the Montana Prairie Dog Working Group that produced MFWP’s “Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana” (MFWP 2002b, 2006b). Refuge staff continue to work with

MFWP and other partners to establish and maintain a complex of prairie dog colonies capable of supporting a viable black-footed ferret population as called for in the plan, but little progress has been made. Prairie dogs remain a controversial species, considered a pest in need of control by agricultural interests, the focus of recreational shooters (not on the refuge), and plague continues to be problematic. All these factors make it difficult to grow and maintain adequate prairie dog acreage to support ferrets. Experience with black-footed ferret reintroductions over the last 19 years across the Nation clearly shows that larger complexes of prairie dog colonies close together have better success establishing ferret populations than areas with small and scattered colonies.

Swift Fox. Swift fox were common throughout central and eastern Montana prairies before poisoning efforts directed at coyotes and wolves in the early 1900s (Foresman 2001). After the large poisoning efforts on the prairies and 50 years without documented observations, Hoffmann et al. (1969) suggested the swift fox was extinct in Montana. Since 1969, sporadic observations have been documented throughout eastern Montana. Reintroduction efforts on the Blackfoot Indian Reservation in northwestern Montana in 1998 and southern Saskatchewan and Alberta from 1983 to 1991 are thought to be the source population of many of these sightings (Foresman 2001). These populations continue to expand to the south and east in Montana, and recent surveys have documented swift fox in many of the counties bordering Canada in north-central Montana (Moehrenschrager and Moehrenschrager 2001). Trapping is not currently allowed in Montana.

Swift fox are not known to regularly occur on the refuge, but there were two reported sightings in the UL Bend area during the late 1990s and one along Bone Trail in southern Valley County during July 2006 along with a couple older sightings along Highway 191 north of the refuge.

Not unlike prairie dog habitat, much of the refuge is topographically too rough for swift fox that generally prefer wide-open areas with gentle topography and generally sparse vegetation. The World Wildlife Fund is planning a camera trapping survey of 16 townships in Phillips County beginning in September 2009 and will include two townships on the refuge. Results of that survey should provide better picture of swift fox abundance in southern Phillips County.

There are no current plans for any swift fox reintroductions into suitable habitat on the refuge, but they have been considered in the past, and could be again. In 2001, the Service found that swift fox should be listed as a threatened species under the Endangered Species Act.

Greater Sage-Grouse. Parts of the refuge provide quality sage-grouse habitat, but similar to other prairie species, much of the refuge is on the fringe of more expansive areas of prime sage-grouse habitat (Doherty et al. 2010). However, recent research by Rebecca Smith, M.S. candidate, University of Montana (FWS 2011f) has shown the refuge provided critical habitat for survival of about 300 sage-grouse that migrated nearly 100 miles from southern Saskatchewan and northern Montana during the harsh winter of 2010–11, which saw record snowfall. The extent of the use and the importance of the refuge to the survival of this international population are just beginning to be better understood, and ongoing research will better quantify the importance of the refuge for sage-grouse. Sage-grouse populations are monitored primarily with counts of birds on breeding leks in the spring (figure 26). Overall population levels fluctuate annually for a variety of reasons. Long-term population levels and trends appear to be stable on the refuge. An important threat to sage-grouse is the effect of West Nile virus, an exotic disease first introduced to sage-grouse in Montana during 2003.

The refuge staff monitored more than 100 radio-marked adult female sage-grouse during late summer and fall 2003 and measured a 16-percent mortality rate in about a month (Moynahan et al. 2006b). During the two summers before this West Nile virus outbreak, mortality among radio-marked hens averaged 1 percent. It is very difficult to confirm West Nile virus as the cause of death as carcasses degrade rapidly in the summer heat, but West Nile virus was confirmed as the cause of death in four birds. Subsequent monitoring of radio-marked sage-grouse through 2006 also detected West Nile virus-caused deaths, but mortality rates were lower.

In March 2010, the Service found the greater sage-grouse was “warranted, but precluded” for listing under the Endangered Species Act. Greater sage-grouse are now considered a candidate species and will be managed on the refuge as if they were listed as threatened. The refuge has been an integral part of several graduate research studies on sage-grouse in recent years (Battazzo 2007; Moynahan 2004, Moynahan et al. 2006a, 2006b; Sauls 2006). In addition, refuge staff has collaborated with many others throughout the West on sage-grouse conservation and the effects of West Nile virus (Naugle et al. 2004, 2005).

The Service has found that public harvest of sage-grouse can continue provided that habitat remains in good condition and populations are healthy. In areas where populations have declined, it may be prudent to close the season. Conditions could vary across national wildlife refuges. On the refuge, sage-grouse populations are generally robust and healthy. Har-

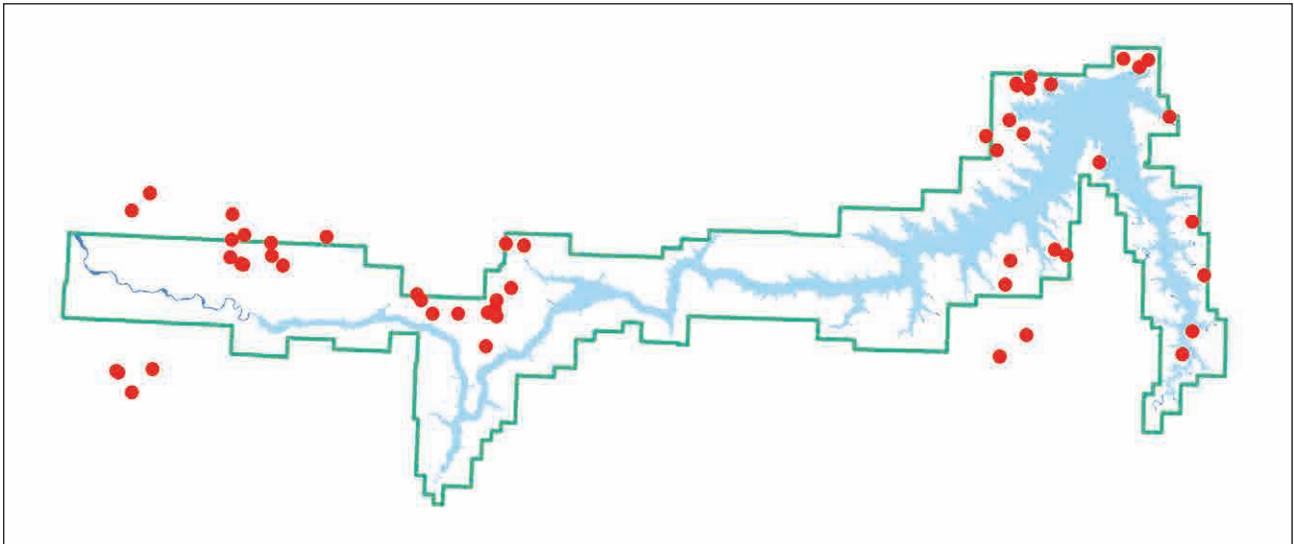


Figure 26. Map of lek locations for greater sage-grouse on and near the Charles M. Russell and UL Bend Refuges, Montana.

vest levels likely have limited, if any, influence on population dynamics. In the absence of new information, the Service has adopted State-recommended harvest management strategies for sage-grouse.

Mountain Plover. In May 2011, the Service found that the mountain plover does not warrant protection under the Endangered Species Act. Loss or degradation of mountain plover habitat has generally been identified as the greatest potential threat to the species. Black-tailed prairie dogs create favorable breeding habitat for the mountain plover in several States including Montana. Efforts to maintain prairie dog colonies and the prairie ecosystem will, in turn, benefit mountain plover. Mountain plover occurrence on the refuge is primarily associated with nesting habitats located on prairie dog colonies. Many prairie dog colonies on the refuge are not selected by mountain plovers for nesting (for example, most of the prairie dog colonies on the UL Bend Refuge), but others, primarily located on upland ridges and often with glacial till and desert pavement substrates, are prime nesting areas. Researchers have conducted long-term mountain plover monitoring efforts, primarily in Phillips County. Mountain plover populations and nesting success closely parallel black-tailed prairie dog abundance and like prairie dogs, are greatly influenced by the effects of sylvatic plague. Once plague effectively eliminates a prairie dog colony, within a year, that colony is no longer suitable for mountain plover nesting habitat as vegetation heights become too high without prairie dog activity.

Sicklefin Chub, Sturgeon Chub, and Blue Sucker. Sicklefin chub and sturgeon chub were proposed for listing as an endangered species in 1994, and in 2001, the Service found they do not warrant listing as threatened or endangered. Sicklefin chub is currently a Cate-

gory 1 species (Grisak 1998), and is ranked S1 on the Montana species of concern list. MFWP conducted a population survey on the Missouri River starting in 1996. Distribution around the refuge includes the middle Missouri River from Cow Island downstream to the headwaters of Fort Peck Reservoir. The sicklefin chub lives to 4 years of age and becomes sexually mature at 2 years old. Spawning occurs in main channel areas of large turbid rivers during the summer. Early life history is unknown. They prefer deeper water and sandy substrate. The major threat is habitat alteration by dams and irrigation development. Further reductions in streamflows associated with irrigations could degrade existing habitat.

Sturgeon chub is common in eastern Montana but is listed as a Montana species of concern (S2S3). Recently, surveys have found it to be more widely distributed than previously thought. It is indigenous to the Missouri–Mississippi river basins. The sturgeon chub spawns from June to July, reached sexual maturity at 2 years, and few live to 4 years old (Gould 1998). They are adapted to turbid water, associated with moderate currents and depths and prefer sand or rock substrates. They require riffles and runs in turbid shallow waters or deeper running waters. The major threat is habitat alteration by dams and irrigation development. Further reductions in streamflows associated with irrigations could degrade existing habitat (Gould 1998).

Blue sucker (S2S3) populations are healthy in Montana, but it is listed as a species of concern. It is adapted for life in swift currents of large rivers, migrating in spring upriver and congregating in fast rocky areas to spawn. They can live 17 years but seem to have very low reproductive success. The species is considered an indicator species for ecosystem health because of its habitat-specific requirements. Habitat

protection includes establishment of more natural seasonal flows on rivers (Williams et al. 1989).

Northern Leopard Frog. Northern leopard frogs were proposed for listing as threatened under the Endangered Species Act in 2009. A positive 90-day finding was published in the Federal Register on July 1, 2009, and a 12-month status review of the species was completed in October 2011. The Service found that the leopard frog does not warrant Federal protection as a listed species. While the species has experienced reductions in its historical range, particularly in the western United States and western Canada, the species is still considered to be widespread and relatively common in the eastern United States and eastern Canada. It is considered uncommon throughout western States including Montana. They breed in a variety of habitats including slow-moving or still water along streams and rivers, wetlands, permanent or temporary pools, beaver ponds, and stock tanks (Rorabaugh 2005). These areas do not contain predaceous fish or other predators and contain emergent vegetation for breeding and tadpole habitat (Smith 2003). Subadults migrate to feeding sites along the borders of larger, more permanent bodies of water (Merrell 1970). Adults require stream, pond, lake, and river habitats for overwintering and upland habitats next to these areas for summer feeding. In summer, adults and juveniles commonly feed in open or semi-open wet meadows and fields with shorter vegetation, usually near the margins of waterbodies, and seek escape cover underwater. During winter, leopard frogs are found inactive underwater on the bottom of deeper streams or waters that do not

freeze to the bottom and are well-oxygenated (Stewart et al. 2004). Males call in shallow water during breeding season. Eggs are laid in breeding habitat and are attached to the vegetation, just below the water surface. Larvae develop in shallow, still water exposed to sunlight. Tadpoles are generalist herbivores, eating attached and free-floating algae (Hoff et al. 1999). Adult and subadult frogs are generalist insectivores (Merrell 1977, Smith 2003). During spring and fall migrations and juvenile dispersals, leopard frogs have been tracked 5 miles from original locations (Werner et al. 2004).

Incidental observations of northern leopard frogs on the refuge have been recorded in early narratives. Sightings of between one and three individuals are common but on two occasions, two areas on the refuge have had more than 50 individuals recorded. In 2009 at the UL Bend Refuge, 50 individuals were found south of Dry Lake; in Valley County, more than 100 leopard frogs were found in ponds by Duck Creek (see figure 27).

Sprague's Pipit. In September 2010, the Service reviewed the conservation status of the Sprague's pipit to determine whether the species warrants protection under the Endangered Species Act. The status review found that listing Sprague's pipit as threatened or endangered is warranted, but listing is precluded by the need to complete listing actions of a higher priority. Sprague's pipit has been documented on the refuge, and it has been identified as a focal bird species of the uplands (refer to chapter 4, "Bird Objectives" in section 4.2 and "Threatened and Endangered Species and Species of Concern Objectives" in section 4.3).

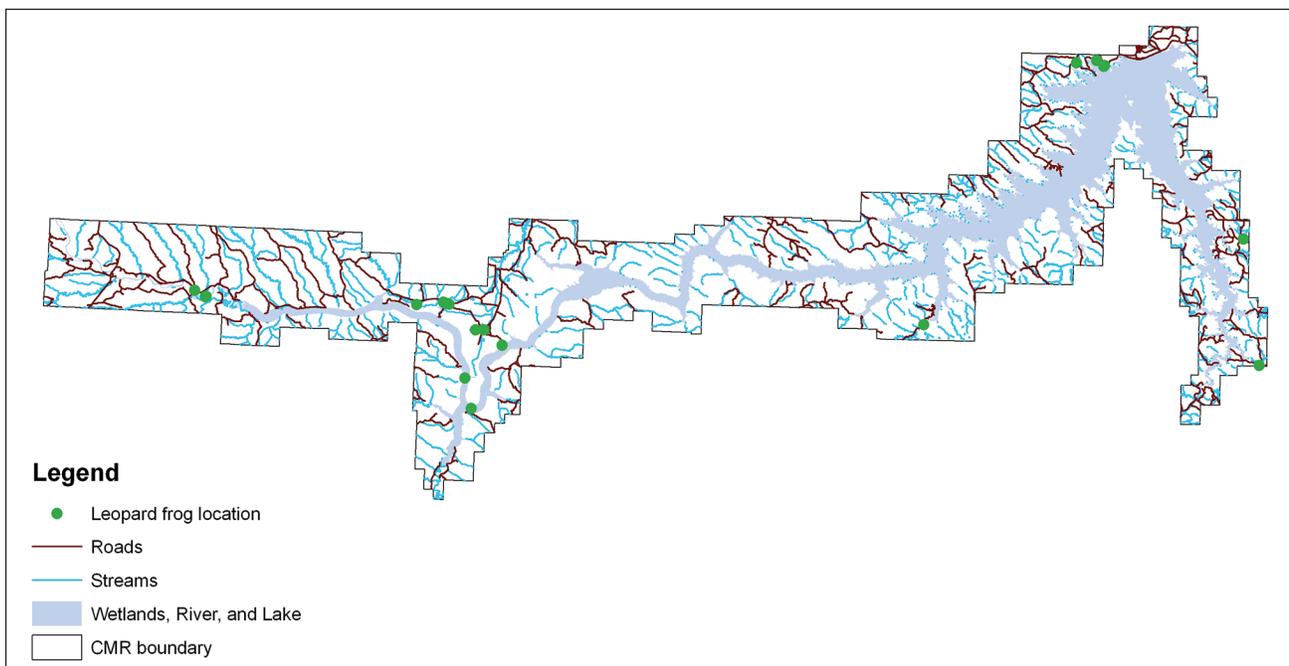


Figure 27. Map of leopard frog locations on the Charles M. Russell and UL Bend Refuges, Montana (1996–2009).

FURBEARERS and SMALL PREDATORS

Little is known about the populations of furbearing species on the refuge. There have been few studies or inventories conducted on the refuge on the abundance or ecology of furbearer species regulated by MFWP (muskrat, beaver, mink, and swift fox [discussed under Species of Concern], bobcat, and river otter) or unregulated by MFWP (least weasel, long-tailed weasel, short-tailed weasel, striped skunk, badger, raccoon, red fox, and coyote). Beaver and bobcats are the only two furbearers that have been studied or inventoried on the refuge. Beaver and muskrat sightings on the refuge are numerous enough to suggest well-established populations on the Missouri River and Fort Peck Lake. However, occurrence of these species on associated tributaries within the refuge is relatively unknown except for anecdotal observations. Expanding suitable riparian habitats will provide the basis for increased populations of muskrat, beaver, river otter, and mink. Current population numbers of the remaining furbearer species is unknown, most have undocumented observations by staff and other visitors; however, continued restrictions will be beneficial to maintaining viable populations.

A research project on bobcats conducted in 1979–80 indicated illegal hunting to be the largest mortality factor among radio-collared bobcats on the refuge (Knowles 1981). Current population numbers on the refuge remain relatively unknown; however, continued restrictions will help support a viable bobcat population in the Missouri River Breaks as areas around the refuge continue to be trapped.

The market for beaver fur in the 19th century played a major role in the exploration of western North America (Wilson and Ruff 1999). Throughout North America and Europe, beaver populations were trapped to near extinction by 1900; however, the response by game management agencies in the last century prevented total elimination (Foresman 2001). Beaver populations have since recovered and even considered a nuisance in some areas due to their gnawing of trees and dam construction. Beginning in 1949, but more consecutively 1960–87, refuge staff inventoried beaver caches along the Missouri River within the refuge boundary. Total beaver caches varied from 18 to 115 with an average of 55 per year. The last inventory was completed in 1992, with 64 caches from the west boundary of the refuge to the Musselshell River bottom. Although observations of beaver are quite common along the Missouri and Musselshell Rivers, current population numbers on the refuge remain relatively unknown.

AMERICAN BISON

Wild bison (Adams and Dood 2011) have been eliminated from the Missouri River Breaks for more than

100 years. One permittee in the Grass Coulee Habitat Unit has grazed bison as a form of livestock in recent years. The American Prairie Reserve now has about 200 bison that came from Wind Cave National Park and are currently classified as domestic livestock. Those animals graze primarily on private and BLM land next to the refuge, although some grazing does occur on the refuge in an exchange of use for AUMs that the American Prairie Reserve holds on State leases within the refuge.

Currently, there is no proposal to reintroduce wild bison on the refuge, but there has been considerable discussion about the possibility of the refuge participating in a restoration effort. Should such a proposal be developed, there will be multiple agencies, partners, and cooperators involved and a public process for consideration and evaluation of any bison restoration proposal (Adams and Dood 2011). The Service is willing to participate with others if such an effort develops and emphasizes the need for cooperation, coordination, and public input (refer to “American Bison Restoration Objectives” under section 4.2 in chapter 4).

NORTHERN GRAY WOLF

There have not been any confirmed sightings of wolves on the refuge since they were extirpated in the late 1800s or early 1900s, although refuge staff have received a few unconfirmed sightings in recent years. There was a hybrid wolf killed in northern Garfield County after several livestock depredations in 2007. Scattered reports of wolves on the refuge have been received for the past couple of years, but neither the Service nor MFWP staff has documented any packs on the refuge.

Wolf reintroductions into Montana and Wyoming occurred in 1995 in Yellowstone National Park. Populations increased rapidly and spread to surrounding lands in both States and Idaho. In recent years, populations have declined slightly as packs and prey densities become more established. There have been wolves observed in eastern Montana during the last 20 years, but they have all been transients and no packs have been established.

In May 2011, the Service published a final rule reinstating the terms of the 2009 rule that removed part of the Northern Rocky Mountain Distinct Population Segment of gray wolves from the endangered species list. This included gray wolves found in western Montana. The Service has also delisted the biologically recovered gray wolf population in the Western Great Lakes. There are no plans to reintroduce wolves on the refuge but, given their dispersal capacity and the established population in western Montana, eventually wolves could immigrate to the refuge (refer to “Northern Gray Wolf Objectives” under section 4.2 in chapter 4).

BIG GAME

The primary big game species found on the refuge include Rocky Mountain elk, mule deer, white-tailed deer, pronghorn, Rocky Mountain bighorn sheep, and mountain lion.

When the Fort Peck Game Range was established in 1936, elk, bighorn sheep and mountain lions were absent, mule deer populations were depressed and pronghorn were quite scarce. Conservation of wildlife was in its infancy at the time and setting aside a large block of land, specifically for game, was a bold and novel move. Through the years, reduced big game harvest, reintroductions and management with a wildlife emphasis has resulted in the relatively abundant big game resources present today. The emphasis to manage primarily for wildlife was reaffirmed when the Game Range became a National Wildlife Refuge in 1976 and was strengthened even further with the 1997 passage of the National Wildlife Refuge System Improvement Act (refer to chapter 1 for more details on refuge establishment and the purposes of the refuge).

Rocky Mountain Elk

Considered abundant in 1805 when Lewis and Clark traveled through what is now the refuge, elk were extirpated from the Missouri River Breaks 100 years later. Some 50 years after that, elk were reintroduced on the refuge during winter of 1951–52 with the transplant of 161 animals from Yellowstone National Park. A refuge report (unpublished report on file at refuge headquarters) from December 1964 described the game counts on the south side of the Missouri River on the refuge:

“The primary purpose of this portion of the survey was to census and locate elk in the area prior to a State-opened permit hunt. The area from Highway 191 east to Crooked Creek [the refuge portion of hunting district 410] was transected at 2-mile intervals north and south. A total of 39 elk were sighted in an area approximately 300 square miles; 117

elk could be projected providing that the elk were distributed throughout the entire area. [equates to 0.39 elk per square mile] On the basis of these surveys, it is estimated that elk number not less than 64 or more than 76 in the area between Highway 191 and the Musselshell River.”

In comparison, some 40 years later, 712 elk were counted during aerial surveys of 79 square miles in five sample blocks of the refuge in this same area during December 2005 (observed 9 elk per square mile). Total harvest of elk in the Missouri River Breaks was estimated to be 291 during 1987 and peaked in 2006 with 2,235 elk harvested. The current population of elk in the Missouri River Breaks is thought to be substantially above objective levels that MFWP established in its 2004 Elk Management Plan (MFWP 2004). Therefore, elk permit quotas and seasons have been relatively liberal in the Missouri River Breaks during the last several years. More than 9,000 elk were harvested in Missouri River Breaks hunting districts from 2004 through 2008, averaging 1,850 annually (MFWP 2009b). The refuge has a relatively small and variable proportion of administrative hunting district boundaries as established by MFWP. Those hunting districts contain continuous wildlife habitat on and next to the refuge.

Table 10 lists MFWP's elk objectives by hunting district, their most recent population estimate, and the degree of population reduction needed to achieve the upper end of their population objective range.

Mule Deer

Mule deer populations across the refuge fluctuate for a variety of reasons and densities are highly variable (figure 28). One of the oldest and continuously monitored mule deer study areas in Montana is located on and adjacent to the refuge and is known as the Sand Creek study area on the southwestern part of the refuge. Mule deer investigations and monitoring began there in 1960 and continues today. In addition, refuge staff has conducted a variety of aerial mule

Table 10. Montana Department of Fish, Wildlife and Park's elk population objectives, estimates, and needed herd-size reductions for hunting districts covering the Charles M. Russell and UL Bend Refuges, Montana.

<i>Hunting district</i>	<i>County</i>	<i>MFWP maximum objective in 2004 elk plan</i>	<i>Most recent MFWP population estimate</i>	<i>% Reduction needed to meet MFWP objective</i>
410	Fergus, Petroleum	2,300	2,300	0
417	Fergus	400	600	33
620, 621, 622	Phillips	1,650	2,868	42
630, 631, 632	Valley	350	650	46
700	Garfield	1,100	1,676	34
	Total	5,800	8,094	28

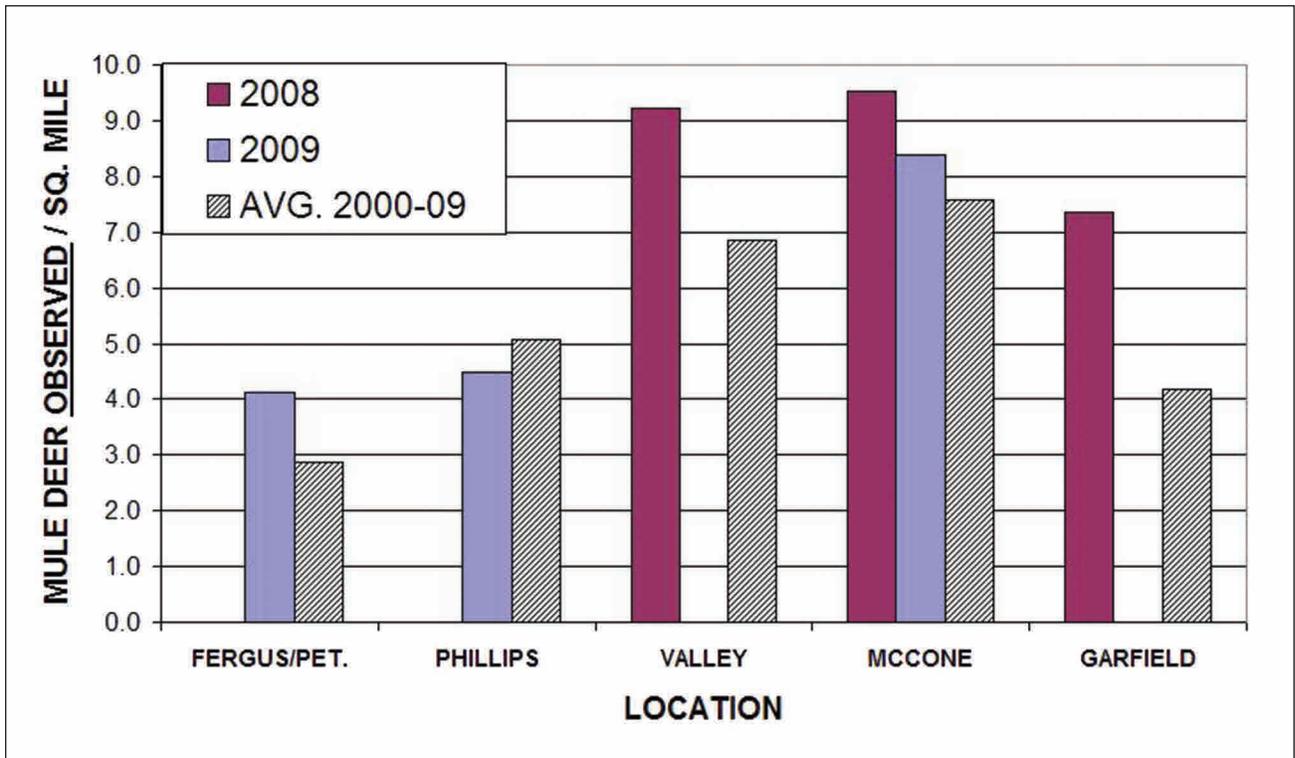


Figure 28. Chart of mule deer densities within six counties covering the Charles M. Russell and UL Bend Refuges, Montana (2000–09).

deer surveys over the years. A standardized sampling design (figure 29) for aerial surveys covering 430 square miles was implemented in 2000 and has been conducted annually after the hunting season since then. Observations from survey blocks of like colors are combined to produce mule deer density and ratio estimates for county areas.

The total number of mule deer estimated on the refuge has varied from around 7,000 to more than 14,000 over the last 10 years. Mule deer are a highly

sought game animal in northeastern Montana. The refuge has managed the population so that older aged bucks are well represented in the posthunting season population (figure 30). The Service feels it is appropriate to have the older-aged bucks as an indicator for achieving naturally functioning ecological systems and for providing quality recreation experiences for the public on a national wildlife refuge (refer to “Visitor Services” in section 3.4 below for more information about quality wildlife-dependent uses).

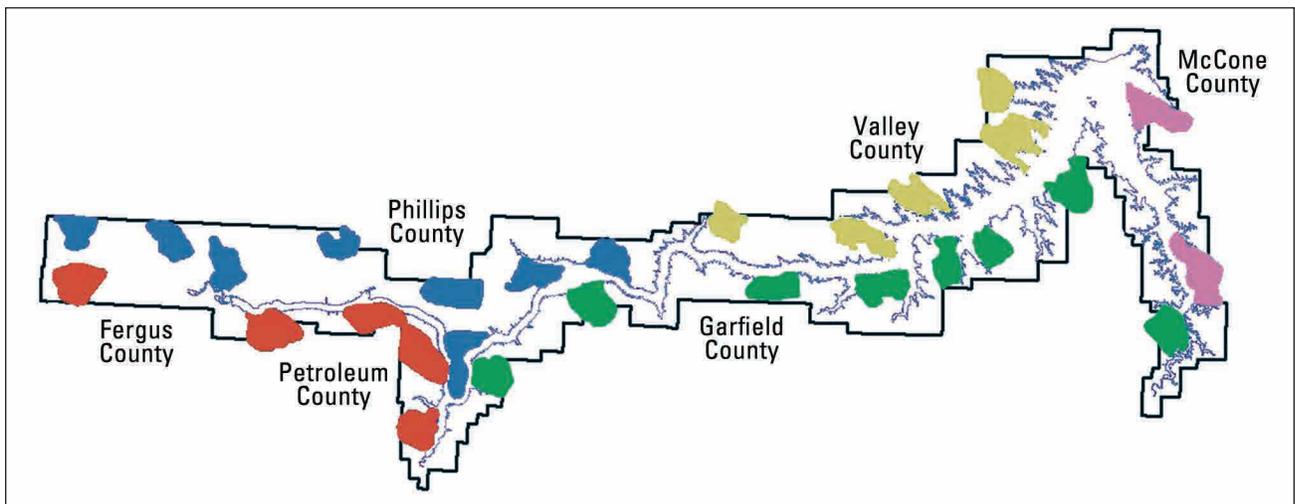


Figure 29. Map of the aerial survey blocks for mule deer and elk at the Charles M. Russell and UL Bend Refuges, Montana.

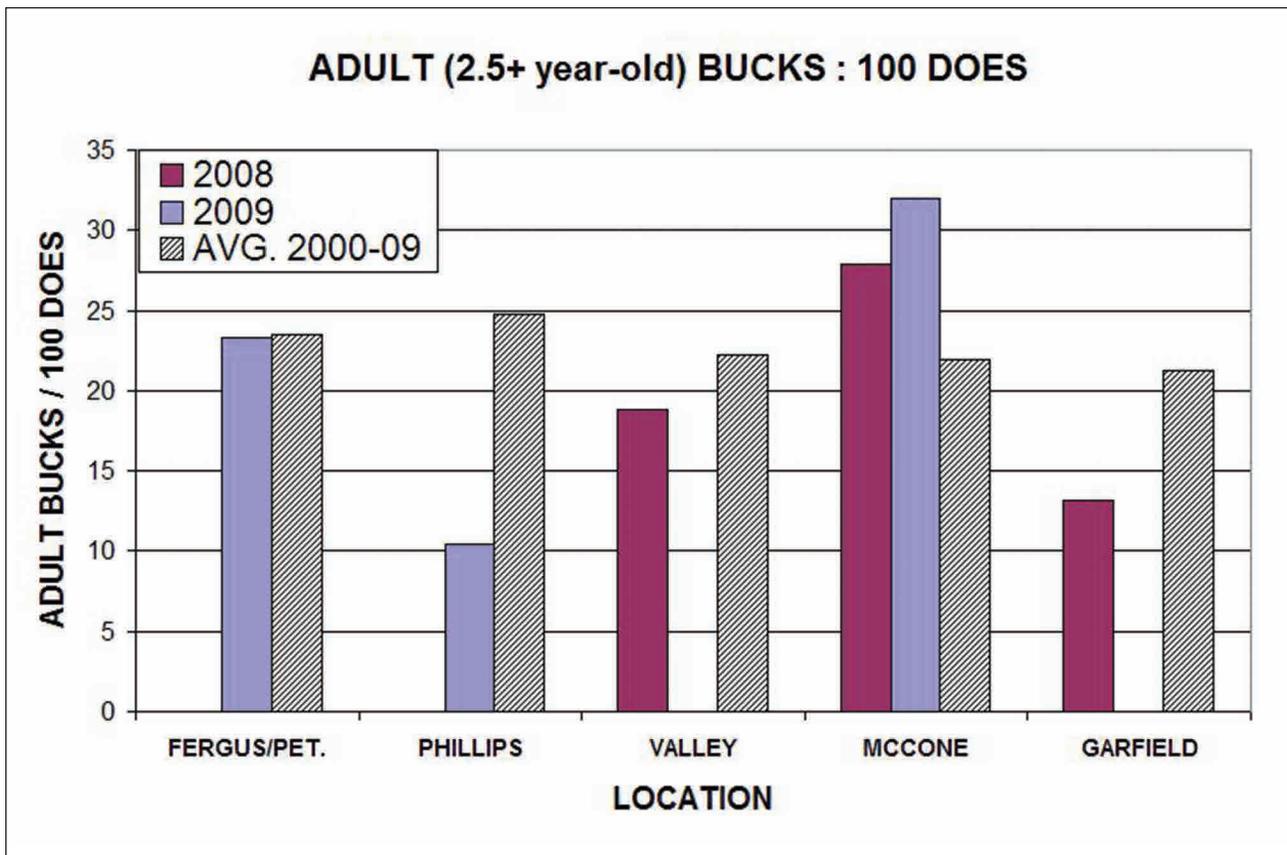


Figure 30. Chart of the ratios of adult mule deer bucks to does within the six counties covering the Charles M. Russell and UL Bend Refuges, Montana (2000–09).

Overall, the public has supported the Service's approach for mule deer because of the variety of hunting opportunities. For example, in one hunting district on the refuge (652), mule deer hunting is by permit only and in 2008, nearly 900 people applied for the 100 permits. In other areas, the refuge has established regulations that shorten the hunting season to the first 3 weeks of the standard 5-week season in most of the rest of Montana. The logic for the shortened season is to allow more mature bucks to survive the hunting season by limiting hunting pressure during the rut, when bucks are more vulnerable to harvest, generally during the last 2 weeks of the hunting season. In another hunting district (700), refuge regulations permit mule deer hunting for the full 5-week season authorized by MFWP.

There are no mule deer harvest estimates specifically for the refuge, but MFWP does produce estimates for each hunting district in the State. More than 6,000 mule deer were harvested in those hunting districts that encompass the refuge in 1995 and mule deer population levels were near all-time highs. That level dropped to less than 3,000 during the following several years and populations were near all-time lows. Slowly, populations have rebounded, but they still fluctuate, and harvest from 2006 through 2008 was around 5,000 mule deer annually (figure 31).

White-tailed Deer

White-tailed deer are much less abundant than mule deer and are found primarily along the Missouri and Musselshell Rivers and major tributaries. They are also seen often on parts of UL Bend National Wildlife Refuge and occasionally in other upland sites. No monitoring specifically geared toward white-tailed deer has been done and hunting seasons on the refuge have been the same either-sex, 5-week season as adjacent areas. In addition to a deer A-tag valid on the refuge for either deer species and either sex in most areas, MFWP also offers a B-tag for an antlerless white-tailed deer that can be used throughout eastern Montana and those tags are valid on the refuge. There are a few hunters who concentrate on hunting for big bucks in the river bottoms of the refuge, but the hunting pressure for white-tailed deer is far less than for elk and mule deer.

There are no white-tailed deer harvest estimates specifically for the refuge, but MFWP does produce estimates for each hunting district in the State. About 1,000 white-tailed deer were harvested in those hunting districts that encompass the refuge in 2000 and then dropped to an average of 500 for all eight hunting districts for the next 4 years. The estimate for 2008 was a harvest of about 1,100 white-tailed deer.

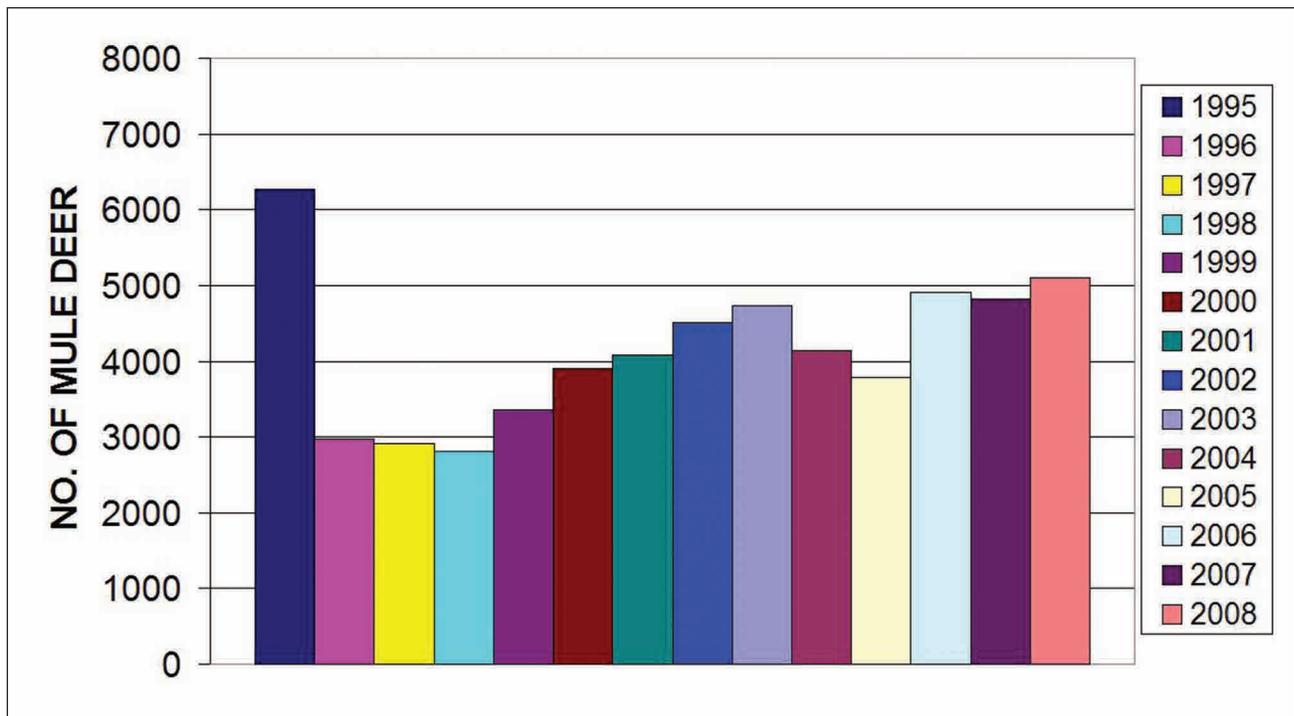


Figure 31. Chart of the number of mule deer harvested in hunting districts on and next to the Charles M. Russell and UL Bend Refuges, Montana (1995–2008).

Pronghorn

The 1936 Executive Order 7509 establishing the Fort Peck Game Range specifically identified the need to protect and manage for pronghorn (refer to chapter 2). Pronghorn are a highly mobile species and recent research using Global Positioning System (GPS) collars has documented migrations of more than 300 miles from animals collared near the Montana–Canada border north into Alberta and Saskatchewan. The collar from a pronghorn doe marked north of Malta during January 2008 was retrieved 1 year later some 70 miles south, within 1 mile of the refuge boundary. With deep snow and bitterly cold, subzero temperatures during December 2008 and January 2009, many hundreds of pronghorn were observed migrating south from Canada and northern Montana and likely crossed the refuge and the Missouri River and wintered farther south. During the spring, pronghorn have been observed crossing the Missouri River headed north, or attempting to head north, but stranded on the south side of Fort Peck Reservoir. They have been observed pacing the south shoreline of Fort Peck Reservoir during spring and sometimes attempting to swim across to the north, having migrated south across the ice during the previous winter.

Despite the mandatory focus on pronghorn in the Executive order, very little survey work has been done on pronghorn and no research studies have ever been conducted. Much of the refuge is not considered pronghorn habitat as the topography is too

rough or is covered with trees and juniper. However, pronghorn are regularly observed using many areas on the refuge, but the role the refuge lands play in a larger landscape and pronghorn ecology are unknown. Studies designed to better understand pronghorn ecology using GPS collars have been proposed, but have not yet materialized.

Rocky Mountain Bighorn Sheep

Quoting from the refuge's 1980 annual narrative report:

“The future of the remnant Two Calf transplant herd was sealed this fall when the last remaining ram was poached. FWS special agents have not been able to develop enough evidence to make an arrest.

The ram was poached at the beginning of the rut and it is doubtful any breeding occurred. The number of surviving lambs is unknown but probably less than five. There are no yearling rams and poor survival in the past has resulted in some very old ewes. A BLM transplant occurred some 25 miles upriver and possible dispersal might replace some animals.

On March 8, 1980, 27 bighorn sheep from the Sun River herd were released near Mickey–Brandon Buttes. The majority of the ewes and two small rams stayed on the buttes. The older rams wandered to the north throughout the summer and at least 4 returned to the

buttes area for the rut. Another small group of ewes was reported by hunters to be on Iron Stake Ridge, 15 miles northeast of the main herd group. A December aerial count showed 4 rams, 11 ewes and 3 lambs.”

Bighorn sheep are occasionally observed in the Two Calf Creek and Heller Bottom area on the very southwestern part of the refuge. It is thought these animals are part of a larger sheep population that extends upstream from the refuge. In the Mickey/Brandon Buttes and Ironstake Ridge/Larb Hills area, an average of 94 bighorn sheep (range of 74–128) were counted annually from a combination of ground and aerial surveys from 1986 through 1997. Counts during December ground surveys from 1998 through 2004 increased steadily from a low of 96 to a high of 174 in 2004. MFWP personnel counted bighorns in hunting district 622, west of Timber Creek, while conducting helicopter elk surveys in 2006 and 2007 and observed close to 200 sheep each year. The refuge staff conducted an aerial bighorn sheep survey in July 2009 (see figure 32). This was the first time such a comprehensive summer survey of all potentially occupied sheep habitat was attempted. Results were reported as follows:

“An aerial bighorn sheep survey was completed on July 16–17, 2009 in HD 622. Of special note was seeing 24 sheep, including at least 6 lambs, east of Timber Creek. This is the first time we’ve tried a summer aerial survey and although we counted 190 sheep, I’m sure we missed seeing rams.”

For many years the refuge proposed moving bighorn sheep into suitable habitat east of Timber Creek. During the last several years, there have been anecdotal reports of sheep in this area. It appears they have begun colonizing this area on their own. MFWP released its Draft Bighorn Sheep Conservation Strategy in August 2009 (MFWP 2009a) for public comment. Their population objective for Hunting District 622 bighorn sheep is 175–200 observed sheep, but does not include the approximately 20 square miles of habitat now occupied by sheep east of Timber Creek. With the recent expansion of hunting district boundary 622, this could be revised in the future. Two either-sex bighorn sheep tags were issued in 1987 for Hunting District 622. From two to seven either-sex permits have been issued annually since then along with a few permits for ewes. Ninety-eight rams and 10 ewes have been harvested from 1987 through 2008

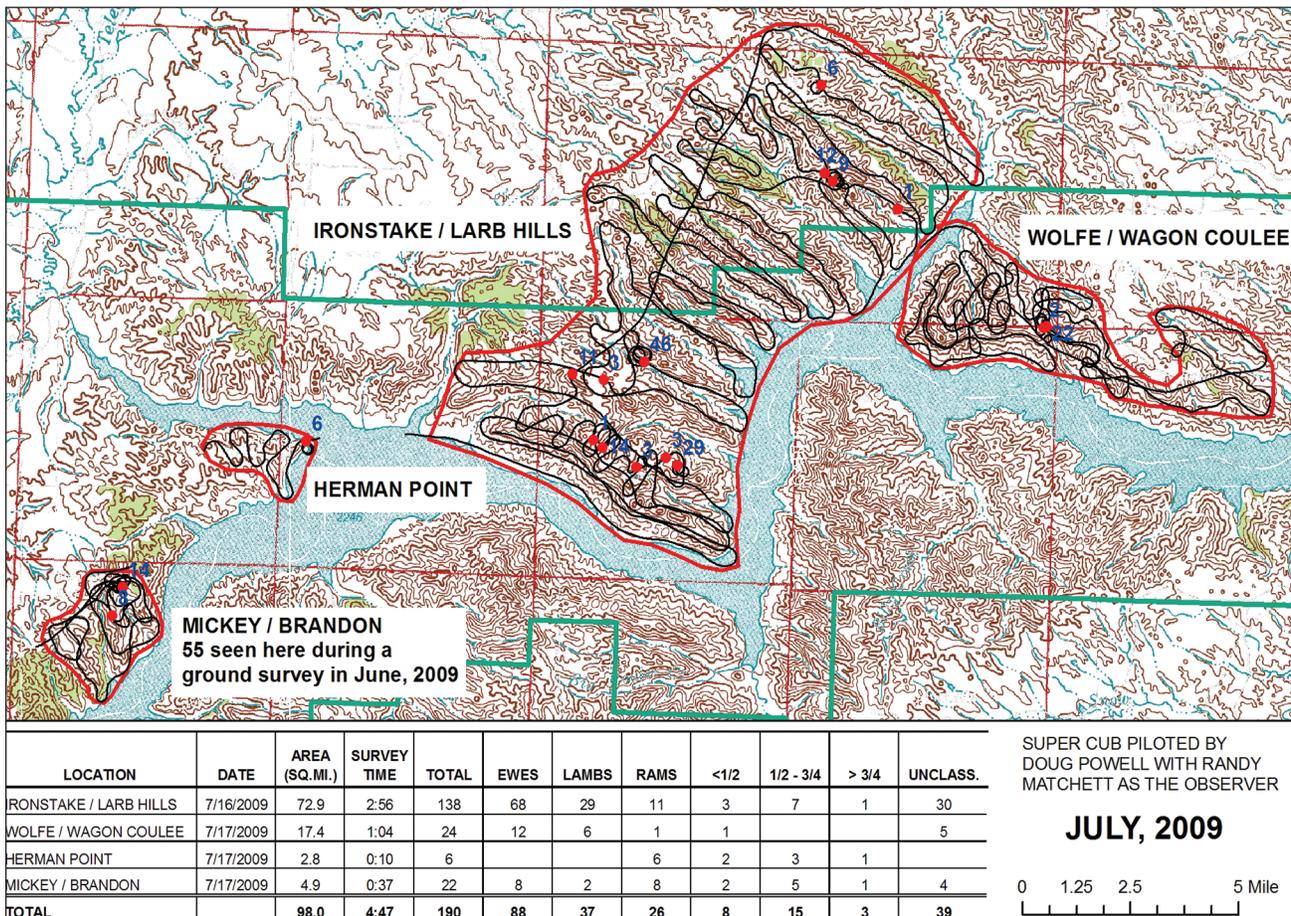


Figure 32. Map of the aerial bighorn sheep survey at the Charles M. Russell Refuge, Montana (2009).

and the long-term average ram age was 6.7 years old (range of 4.9–7.8). Almost two-thirds of the total harvest has come from the Mickey/Brandon Buttes area.

There is about 200 square miles of bighorn sheep habitat in northern Garfield County, of which more than 90 percent is on public land (figure 33). Refuge

staff are in the early phases of working with land-owners, MFWP, and other partners to see if bighorn restoration into this area is possible. For comparison, there is about 110 square miles of habitat where about 200 bighorn sheep currently live in the Mickey/Brandon Buttes and Ironstake Ridge areas.

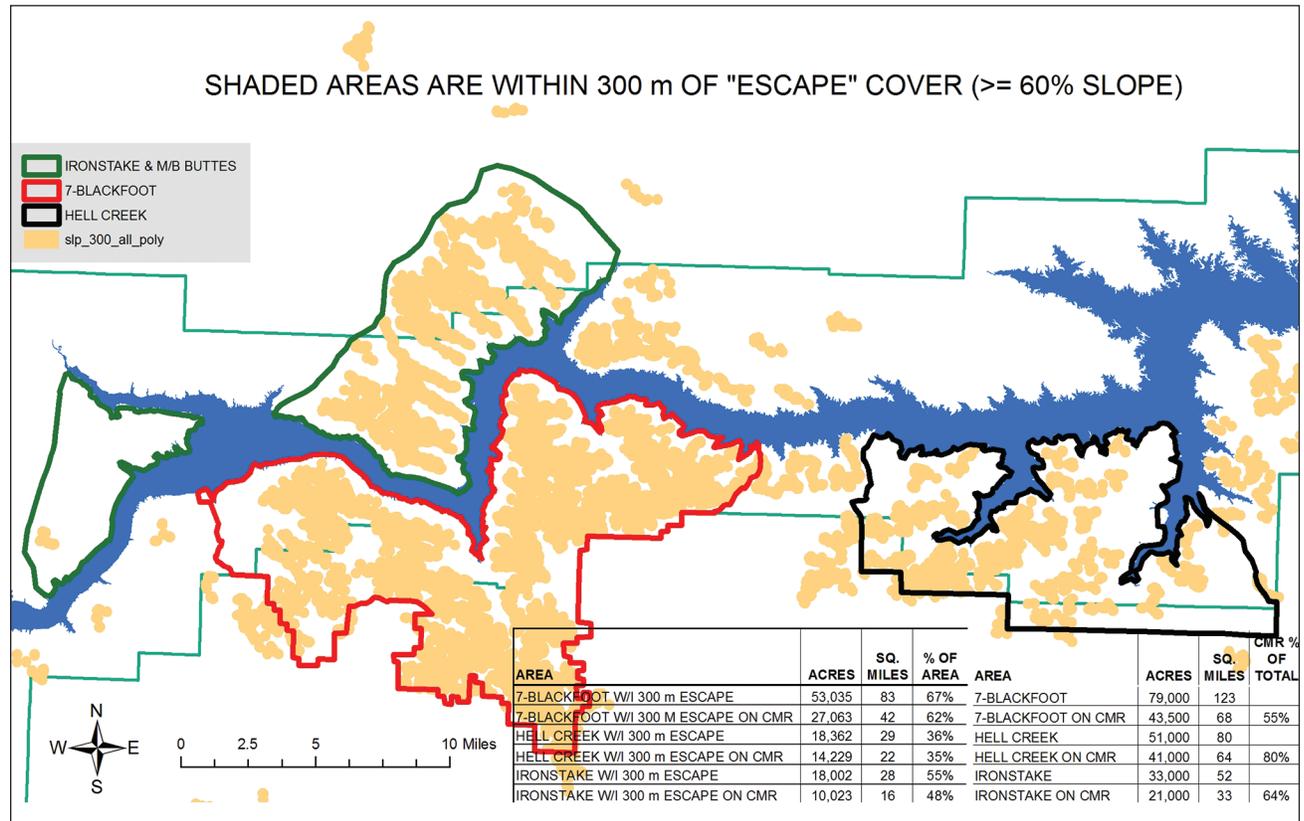


Figure 33. Map of areas within 328 yards (300 meters) of escape cover for bighorn sheep at and around the Charles M. Russell and UL Bend Refuges, Montana.

Mountain Lion

Hunting for mountain lion is not currently allowed on the refuge. Mountain lion sightings, encounters with hunters and poaching on the refuge have been numerous enough in recent years to suggest a well-established population. The abundance of elk and deer, especially on the western half of the refuge, will provide an adequate prey base to support mountain lions. No studies on mountain lion abundance or ecology have been conducted in the Missouri River Breaks, so little information is known.

More than a dozen mountain lions have been fitted with GPS collars in recent years in the nearby Bears Paw Mountains and Little Rocky Mountains. Data from marked animals there and other observations showed very high mortality rates, primarily from human harvest in these mountain ranges. This study was expanded to the refuge during winter 2010–11, and five of eight independent lions detected on the western part of the refuge, north of the Mis-

souri River, were fitted with GPS collars by refuge staff. In addition, 3 litters with at least 6 kittens were also seen. Refuge staff is continuing to capture and track lions. The objectives of this study are to:

- characterize movements of mountain lion within the refuge and possible dispersal between the Missouri River Breaks, Bears Paw Mountains, and Little Rocky Mountains;
- describe habitat use and selection;
- estimate cause specific mortality rates;
- determine the proportion of mountain lion home ranges within the refuge (to what degree are mountains lions available for potential harvest outside the refuge);
- use data in support of the statewide population estimation project that will include estimates of area-specific densities within the Missouri River Breaks, Bears Paw Mountains, and Little Rocky Mountains.



Western Painted Turtle

OTHER WILDLIFE

This section discusses the smaller animals found on the refuge including amphibians, reptiles, fish, and small mammals.

Amphibians and Reptiles

Nineteen amphibian and reptile species are present on the refuge. Incidental observations from 1974 to present, as well as systematic surveys conducted in 1998–99 (Hendricks 1999), have documented nine species of herpetofauna listed as a Montana species of concern with either a ranking of S2 (milksnake, western hognose snake, and Great Plains toad) or a S3 (greater short-horned lizard, plains spadefoot toad, common sagebrush lizard, painted turtle, spiny softshell, and snapping turtle). The northern leopard frog was proposed for Federal listing, but on October 4, 2011, the Service concluded that listing under the Endangered Species Act was not warranted. The tiger salamander, boreal chorus frog, Woodhouse's toad, gopher snake, eastern yellow-bellied racer, common, terrestrial and plains garter snakes and western rattlesnake also occur on the refuge.

Amphibians and reptiles require a mosaic of habitats suitable for breeding or nesting, foraging, protection, and overwintering. Habitat linkages are required to meet all the life stages, allowing animals to migrate seasonally between different areas

to feed, overwinter, and reproduce. The permeable nature of amphibian skin makes these animals extremely vulnerable to contaminants in the environment (Pilliod and Wind 2008).

Tiger salamanders often live in rodent burrows during much of the year and migrate to shallow ponds to breed in the spring. Some may keep larval characteristics including external gills and larval body form and reach sexual maturity in a process called paedomorphosis or neoteny. These are strictly aquatic and may exist with individuals that metamorphose. Most amphibians use upland forests, shrublands, and grasslands for foraging, overwintering, or dispersal. Many reptiles are adapted to be less dependent on waterbodies (Werner et al. 2004). Boreal chorus frogs breed in glacial potholes and reservoirs and feed in moist areas around ponds, or move into terrestrial settings to feed on ants and spiders. Adults forage 0.5 mile or more from breeding sites. They overwinter in underground rodent burrows or crevices.

Great Plains toads are found up drainages and on the prairie where they are seen around glacial potholes, stock reservoirs, irrigation ditches, and smaller coulees. They require clean water so heavily used stock ponds may not be conducive to breeding. They spend time underground sometimes in prairie dog burrows. They will forage 1 mile from breeding sites. Woodhouse's toads are common along rivers, large lakes and reservoirs. They overwinter below the frost line in rodent burrows, crevices or among tree roots. Breeding occurs in river backwaters, stock reservoirs, larger ponds, or lakes.

Plains spadefoot toads are found in more arid environments close to water. They spend much of their time underground, but will, depending on temperature and moisture, throughout the day, emerge from and retreat to burrows dug with the spur on the back of their feet. They burrow below the frost line during winter and occasionally use rodent burrows.

Greater short-horned lizard occupy sagebrush and shortgrass prairie, especially south-facing slopes, rocky rims of coulees, and shale outcrops. Common sagebrush lizard is associated with sagebrush habitat, but also live in ponderosa pine and juniper along the Missouri River and in shortgrass prairies. The lizards seek refuge under rocks, in crevices at the base of trees, or in rodent burrows.

Painted turtles live in ponds and wetlands, and spiny softshell turtles and snapping turtles live in the Missouri and Musselshell Rivers. They lay their eggs on land, often spending winter months buried and inactive in soft mud. Spiny softshells dehydrate much faster than hardshell turtles, and they are rarely found far from water. Nesting occurs in sand or gravel, usually 100 yards or less from water. Snapping turtles are omnivores that live in large rivers,

lakes, ponds, and marshes. They dehydrate more rapidly than most freshwater turtles, so are vulnerable to high temperatures and low humidity. They overwinter under cutbanks, submerged logjams, or in the bottom mud of larger rivers or marshes (Werner et al. 2004).

Western hognose snake and prairie rattlesnake use burrows, dens, and tunnels dug by prairie dogs and pocket gophers for cover and as places to search for food. Rock outcrops in grassland areas provide important cover and basking sites. Western hognosed snakes like well-drained, sandy soils, so are often seen along exposed riverbanks, sandstone outcroppings, and old riverbeds. Eastern yellow-bellied racers use open habitats such as prairie, sagebrush, and badlands. They overwinter in mammal burrows, rock crevices, and sandbanks, alongside garter snakes, rattlesnakes, or gopher snakes. Milksnakes inhabit grasslands and spend most of the day in burrows around sandstone outcroppings, riparian zones, cedar-juniper hillsides, and margins of agricultural lands (Werner et al. 2004).

Fish

Numerous fish species are found in both the large and small streams on the refuge. Bramblett et al. (1999) performed a literature review for fish on the refuge. He found MFWP unpublished reports (Needham 1978, Needham and Gilge 1980) summarized fish sampling on the refuge. In 1977, MFWP sampled larval fish and benthic macroinvertebrates in Timber, Nelson, Big Dry, Sand, and McGuire Creeks. Larval cyprinids and catostomids and benthic macroinvertebrates (*Diptera* spp., *Coleoptera* spp., *Neuroptera* spp., *Ephemeroptera* spp., *Trichoptera* spp., *Odonata* spp., *Hemiptera* spp., *Annelida* spp., and *Amphipoda* spp.).

In Big Dry, Little Dry, Timber, Nelson, and McGuire Creeks, in 1979 and 1981 MFWP sampled 17 taxa in Big Dry Creek including goldeye, common carp, fathead minnow, flathead chub, *Hybognathus* spp., lake chub, longnose dace, sand shiner, river carpsucker, shorthead redhorse, white sucker, black bullhead, channel catfish, walleye, yellow perch, and freshwater drum (Needham and Gilge 1980). The Montana Rivers Information System lists 17 species in Big Dry Creek. These include some of the list above with the following additions bigmouth buffalo, plains minnow, smallmouth buffalo, and western silvery minnow but not other *Hybognathus* spp., freshwater drum, or shorthead redhorse.

The 15 taxa in Little Dry Creek included common carp, fathead minnow, flathead chub, *Hybognathus* spp., lake chub, longnose dace, pearl dace, sand shiner, river carpsucker, shorthead redhorse, white sucker, black bullhead, channel catfish, walleye, and yellow perch. Nine taxa in Timber Creek

included common carp, fathead minnow, *Hybognathus* spp., lake chub, longnose dace, pearl dace, sand shiner, buffalo, and white sucker. The 12 taxa in Nelson Creek include common carp, fathead minnow, flathead chub, *Hybognathus* spp., lake chub, longnose dace, sand shiner, buffalo, white sucker, plains killifish, brook stickleback, and yellow perch. Two museum specimens from Nelson Creek were a lake chub and a fathead minnow. Five species in McGuire Creek were common carp, fathead minnow, lake chub, sand shiner, and white sucker.

The Montana Rivers Information System database lists the following: (1) fathead minnow as the only species in Flat Creek; (2) four species in Squaw Creek—fathead minnow, lake chub, longnose dace, and western silvery and plains minnow; (3) four species in Timber Creek (north side)—fathead minnow, longnose dace, northern redbelly dace, and white sucker; (4) six species in Timber Creek (Big Dry Arm)—fathead minnow, lake chub, northern pike, northern redbelly dace, western silvery and plains minnow, white sucker; and (5) four species in Woody Creek—fathead minnow, lake chub, longnose dace, and western silvery and plains minnow.

Wagner (1996) sampled Rock Creek and found three species in the upper section (white sucker, longnose dace, and northern redbelly dace), six species in the middle section (white sucker, longnose sucker, carp, longnose dace, fathead minnow, and flathead chub), and no fish in the lower section because it was completely dry.

MFWP, which is responsible for monitoring and managing fish species in the Missouri and Musselshell Rivers, sampled fish in the Lower Musselshell River in August 2000. Sauger is probably not still common in the Lower Musselshell. McMahon and Gardner 2001 comments on Musselshell River habitat, “No data are currently available on the status of sauger ... Chronic dewatering limits its suitability as sauger habitat.” They estimate that sauger populations may have declined by 50 percent in the Lower Musselshell. The Montana Rivers Information System lists the following 24 species in the Musselshell River: black bullhead, blue sucker, channel catfish, common carp, emerald shiner, flathead chub, freshwater drum, goldeye, lake chub, longnose dace, northern pike, northern redbelly dace, plains minnow, river carpsucker, sand shiner, sauger, shorthead redhorse, smallmouth bass, smallmouth buffalo, stonecat, walleye, western silvery minnow, white sucker, and yellow perch.

MFWP (Gardner 2003) evaluated the fisheries conditions in the middle Missouri River, which includes parts of the refuge. Methods used included electrofishing, trammel net drifting (deeper areas), seining (shallow areas), trawling, and creel surveys. Shorthead redhorse, goldeye, longnose sucker, emer-

ald shiner, and sauger were most abundant species found during electrofishing. Flathead chub, *Hybognathus* spp., shorthead redhorse, and emerald shiner were most abundant in the seine sampling. Channel catfish, sicklefin chub, and sturgeon chub made up 75 percent of the fish sampled by trawling and goldeye and channel catfish were the most common fish caught according to creel census surveys. Sauger catch rates were 13.8 fish per hour in the Fred Robinson Bridge section (Robinson section) giving a density 126 sauger per mile.

In 2005–06, electrofishing samples found shorthead redhorse, goldeye, emerald shiner, *Hybognathus* spp., and flathead chub to be the most abundant species. Emerald shiner and *Hybognathus* spp. were the most abundant species captured by seining. The exceptionally abundant representation of emerald shiner was one of the most noticeable changes compared to past years with catch rates nearly three times greater than the trend. The most abundant species captured by trawling were the shorthead redhorse, longnose dace, channel catfish, sturgeon chub, and sicklefin chub. Catch rates for sauger in the Robinson section were 12.3 fish per hour.

In addition to the above-listed common species, the following species were also found in the Missouri River (Gardner 2003): bigmouth buffalo, burbot, carp, rainbow trout, flathead chub, freshwater drum, longnose dace, river carpsucker, shovelnose sturgeon, smallmouth buffalo, smallmouth bass, stonecat, walleye, and white sucker. All six State species of special concern were sampled: pallid sturgeon, blue sucker, paddlefish, sauger, sicklefin chub, and sturgeon chub.

Small Mammals

Minimal information has been collected on the distribution and occurrence of small mammal species on the refuge. Although there have been cooperative efforts with the Montana Natural Heritage Program, Montana Tech University, the University of Montana, and the University of Denver that have targeted specific questions about small mammals, few have identified the current composition of small mammal communities that exist on the refuge. Half of the studies identified the presence of specific diseases (plague and Hantavirus) in terrestrial small mammals (Douglass and Hughes 2003, Holmes et al. 2006) while others have attempted to identify the composition of small mammal communities in and surrounding the refuge (Hendricks et al. 2007, Stewart 2007).

The Montana Natural Heritage Program has an ongoing study aimed at filling in the distribution gaps for small mammals in Montana and included several sites within or surrounding (within 10 miles) the refuge boundary. Terrestrial small mammal spe-

cies were captured using a combination of Sherman live traps, snap-traps, and pitfall arrays. Although research in 2006 extended ranges of several terrestrial small mammals, no new species were captured outside known occupied counties (Hendricks et al. 2007). Time and personnel limited the trapping effort and many terrestrial species of low abundance or relatively rare were not captured. Further research is needed to quantify the occurrence and abundance of these rarer species.

Research targeting bat species identified range expansions and filled distribution gaps for several species found in central Montana. Bat species were documented using recorded vocalizations during survey periods in 2003–04 by University of Denver and again in 2006 by the Montana Natural Heritage Program. Results from these studies showed new locations within counties for several species (Hendricks et al. 2007, Stewart 2007), signifying the lack of information available for many species' distributions.

Moose

Moose have occasionally been observed on the refuge, often young dispersing bulls from central Montana mountain ranges or southern Canada. Although there are substantial willow communities in the Missouri River floodplain, the area is generally not considered suitable moose habitat. Nonetheless, in recent years moose appear to be expanding their range in parts of eastern Montana and in many places in the North Dakota prairies, and could potentially extend their range onto the refuge, but currently they are not a common species on the refuge.

Black Bear

A few black bear sightings have been reported on the refuge over the years, but none have become established residents and the Missouri River Breaks are not considered suitable black bear habitat.

3.3 SPECIAL MANAGEMENT AREAS

The Charles M. Russell and UL Bend Refuges have other special land designations being reviewed as part of the CCP and EIS. The Service has several types of jurisdiction across the refuge.

- *Service Primary:* Lands that were withdrawn or acquired for the sole purpose of managing as part of the refuge.
- *Service Secondary:* Lands that are withdrawn or acquired that have a secondary purpose subject to the primary purpose.
- *Withdrawn Lands:* Lands that were withdrawn from public domain and reserved for a specific

purpose such as a national wildlife refuge or USACE project. Public domain lands include lands that were never homesteaded or Bankhead–Jones lands that came back to the public domain when the original homesteader defaulted.

- *Acquired Lands*: Lands that were purchased in fee title by USACE for the Fort Peck Project or purchased by the Service for the management of the refuge.

The Service works closely with USACE, BLM, and the National Park Service in managing lands within the refuge that have other Federal-jurisdiction land designations.

WILDERNESS

In 1976, Congress designated about 20,890 acres as the UL Bend Wilderness. This acreage was later modified to its current size of about 20,819 acres. Within UL Bend Wilderness, visitors can expect to experience undeveloped land that has kept its primeval character providing an opportunity for solitude and unconfined recreation. For further information on the specific boundaries of each tract reviewed for its wilderness character, refer to appendix F.

As guided by the Service's Wilderness Stewardship Policy, which provides an overview and foundation for implementing the Wilderness Act, and as part of the development of the draft CCP and EIS, a wilderness review has been conducted updating the existing lands within the refuge and their current wilderness potential. Proposed wilderness units are those areas that have previously been reviewed by the Service and approved by the Secretary of the Interior as a parcel of land that meets the wilderness character found within the Wilderness Act of 1964. The refuge currently maintains 15 areas of about 155,288 acres as proposed wilderness units. All 15 units are spread across the 1.1 million-acre refuge. Because Congress has not officially designated these 15 areas as wilderness, they are managed as proposed wilderness units in which Service policy (FWS 2008c) requires them to keep their wilderness character in the event they are designated as wilderness. In 2002, roads were closed in several proposed wilderness units in compliance with Service policy.

Several of the existing proposed wilderness units are grazed prescriptively or have no Federal grazing allotment. Some of the proposed wilderness units are currently annually grazed: units 8 and 14 and part of units 1, 5, 7, and 11 (see figure 11 in this chapter and figure 41 in chapter 4). Refer to "Upland Objectives" under section 4.2 in chapter 4 for more information on livestock grazing in the uplands.

Appendix F has more information on the specific boundaries of each tract reviewed for its wilderness character.

LEWIS and CLARK NATIONAL HISTORIC TRAIL

In 1978, Congress amended the National Trails System Act to include national historic trails and designated the Lewis and Clark Trail as one of four national historic trails. It commemorates the events that form the trail's central theme through historic interpretation, preservation, and public use. The trail is approximately 3,700 miles and follows the Missouri and Columbia Rivers including the section that flows through the entire refuge. The official headquarters for the trail system is located in Omaha, Nebraska and is administered by the National Park Service. The Lewis and Clark expedition camped at 19 sites on the refuge, which are shown in figure 10.

HELL CREEK and BUG CREEK NATIONAL NATURAL LANDMARKS

The primary goals of the National Natural Landmarks Program, which was established by the Secretary of the Interior in 1962, are to recognize landmark resources and support their conservation. On the refuge, there are two of these areas: the Hell Creek Fossil Area and the Bug Creek Fossil Area. Both areas were designated because of their paleontological resources. The program is administered by the National Park Service and involves an annual inspection. A plaque has been installed at each site designating the area. Future refuge management involving prescribed fire, grazing, and scientific research should consider this designation when making management decisions (see figure 10). There are several sites on adjacent BLM land including Ash Creek Divide, Hell Creek, Bug Creek, and Sand Arroyo.

RESEARCH NATURAL AREAS

"Research natural areas" are part of a national network of reserved areas under various ownerships where natural processes are allowed to predominate and that are preserved for the primary purpose of research and education. Currently, there are 210 research natural areas on national wildlife refuges. They exist to fulfill three objectives, delineated by the Service's Refuge Manual as follows: (1) to participate in the national effort to preserve adequate examples of all major ecosystem types or other outstanding physical or biological phenomena; (2) to provide research and educational opportunities for scientists and others in the observation, study, and monitoring of the environment; and (3) to contribute to the national effort to preserve a full range of genetic and behavioral diversity for native plants and animals including endangered or threatened species. Research natural areas are areas where nat-

ural processes are allowed to predominate without human intervention. The Service's Refuge Manual states that a research natural area "must be reasonably protected from any influence that could alter or disrupt the characteristic phenomena for which the area was established." Future management decisions must be evaluated to ensure the characteristics for which these areas are recognized and protected for their ecological values. There are eleven research natural areas listed for the refuge on the Service's Web site: Dillon Island, Fourth Ridge, Grand Island, Limber Pine, Manning Corral Prairie Dog Town, Missouri River Bottomlands, Prairie Dog Island, Spring Creek Bay Coulee, Two Calf Douglas-fir Community, Two Calf Island, and York Island. Several of these areas are actually part of the same natural area, resulting in seven research natural areas that the refuge recognizes (see figure 10).

UPPER MISSOURI BREAKS WILD and SCENIC RIVER

In 1968, Congress passed the Wild and Scenic River Act, and in 1976 the Upper Missouri Breaks Wild and Scenic River was established, which includes the western most 10 miles of the Missouri River on the refuge. This designation recognizes the wildness and scenic values that exist along that part of the river. Management decisions should ensure that those values are protected for the American public. Such activities as livestock grazing on the river and vehicle traffic on refuge roads 209, 307, 308, 874, 845, and 853 should be evaluated to ensure these activities do not detract from the wild and scenic values.

MISSOURI BREAKS BACK COUNTRY BYWAY

The National Scenic Byways Program is part of the U.S. Department of Transportation, Federal Highway Administration. The program is a grassroots collaborative effort established to help recognize, preserve, and enhance selected roads throughout the United States. In addition to the national designation, many agencies promote their own sets of scenic roads and byways. BLM has identified several "backcountry byways" including the Missouri Breaks Back Country Byway, designated on July 21, 1989, which passes through BLM lands and through several refuge roads along the western boundary including the Knox Ridge Road to U.S. Highway 191. This byway is not officially recognized under any Service designation.

LANDS where USACE has PRIMARY JURISDICTION

These are lands within the refuge that have been withdrawn or acquired and are subject to the pur-

poses and operation of the Fort Peck Project. Most lands where USACE has primary jurisdiction have either been outgranted to the Service, or by agreement, allow the Service to manage those lands as part of the refuge for the purposes of wildlife and wildlife habitat. Some USACE primary lands within the refuge have been kept by USACE. These include the developed recreation sites and administrative sites such as the dam and power plant.

USACE has 16 designated recreation sites on the refuge. The sites are managed by a multitude of agencies and governments including counties, BLM, MFWP, and the Service. The level of recreation development is defined in the Fort Peck master plan (USACE 2008). Agencies responsible for management of individual recreation sites changes depending on funding levels. The Service participated in the development of the master plan.

UPPER MISSOURI RIVER BREAKS NATIONAL MONUMENT

On January 17, 2001, President Clinton created by proclamation The Upper Missouri River Breaks National Monument. The monument abuts the refuge to the west, and the stretch of the wild and scenic river on the refuge is managed as if were part of the monument. Specifically, this pertains to river travel only. At the terminus of the wild and scenic river is Kipp Recreation Area near the Fred Robinson Bridge (figure 10), which is a designated USACE recreation site. USACE permits BLM to run the Kipp site. The recreation site is located where USACE has primary jurisdiction and the Service has secondary jurisdiction. At times, this has created management challenges, particularly when development of the recreation facilities involves habitat loss or degradation on the refuge. In the past, the Service and BLM have coordinated development activities to minimize habitat loss or manipulation. Ideally, this should be continued and formalized with the three agencies involved to ensure conflicts over future use of the area does not affect each agency's purposes.

3.4 VISITOR SERVICES

The nearly 250,000 visitors to the refuge enjoy a variety of recreational activities related to the six wildlife-dependent recreational uses that are identified in Improvement Act as the priority uses (hunting, fishing, wildlife observation, photography, interpretation, and environmental education). Due to the refuge's immense size and remote location, there are several other activities such as camping and boating that are allowed on the refuge, and these enable the Service to facilitate providing for the priority public uses on the refuge. Service policy guides the

management of wildlife-dependent recreational uses (FWS 2006c).

The refuge's estimates of current visitation figures come from a variety of sources including traffic counters; physical counts of visitors who come through the headquarters, field stations, and the Fort Peck Visitor Center; paddlefishing data; and hunter permits. While the Service uses traffic counters across an estimated 40 roads across the refuge, there are neither enough counters nor personnel to count every visitor on the numerous roads found across the refuge and estimates are used.

This section discusses the priority public uses, access, and other activities that the Service is involved with in managing the refuge. Recreational areas that USACE manages are mentioned briefly, but because the Service does not manage these areas, these are not analyzed further.

HUNTING

Hunting has been an important traditional public use of the refuge throughout its history. For many visitors, the refuge is synonymous with big game hunting. Long known for its ability to offer outstanding opportunities to hunt for Rocky Mountain elk, mule deer and white-tailed deer, as well as Rocky Mountain bighorn sheep, the refuge offers multiple oppor-

tunities for outdoor recreation. Hunters currently are able to take part in a variety of hunting opportunities from areas with significant road access to areas with relatively no roads as provided for through wilderness and proposed wilderness units. Each year, about 103,900 hunters come to the refuge. Of these, there are about 90,000 big game visits, 2,900 waterfowl and migratory bird visits, and 10,000 upland game visits reported annually (refer to section 3.7 below).

The Theodore Roosevelt Conservation Partnership conducted a poll of hunters and sporting groups (figure 34). The results showed that the Missouri River Breaks, including the refuge, ranks among the most highly valued recreation areas in Montana (Dickson 2008).

Hunting for upland birds and waterfowl is currently permitted and some visitors take part in this activity, although not at the level of big game hunting. In recent years, the refuge has instituted several special hunting opportunities including hunts open only to young people with a refuge-sponsored orientation day at the refuge and an accessible hunting blind to provide wheelchair-bound hunters a quality opportunity to hunt elk and deer.

The refuge takes in parts of eight hunting districts within three administrative regions managed

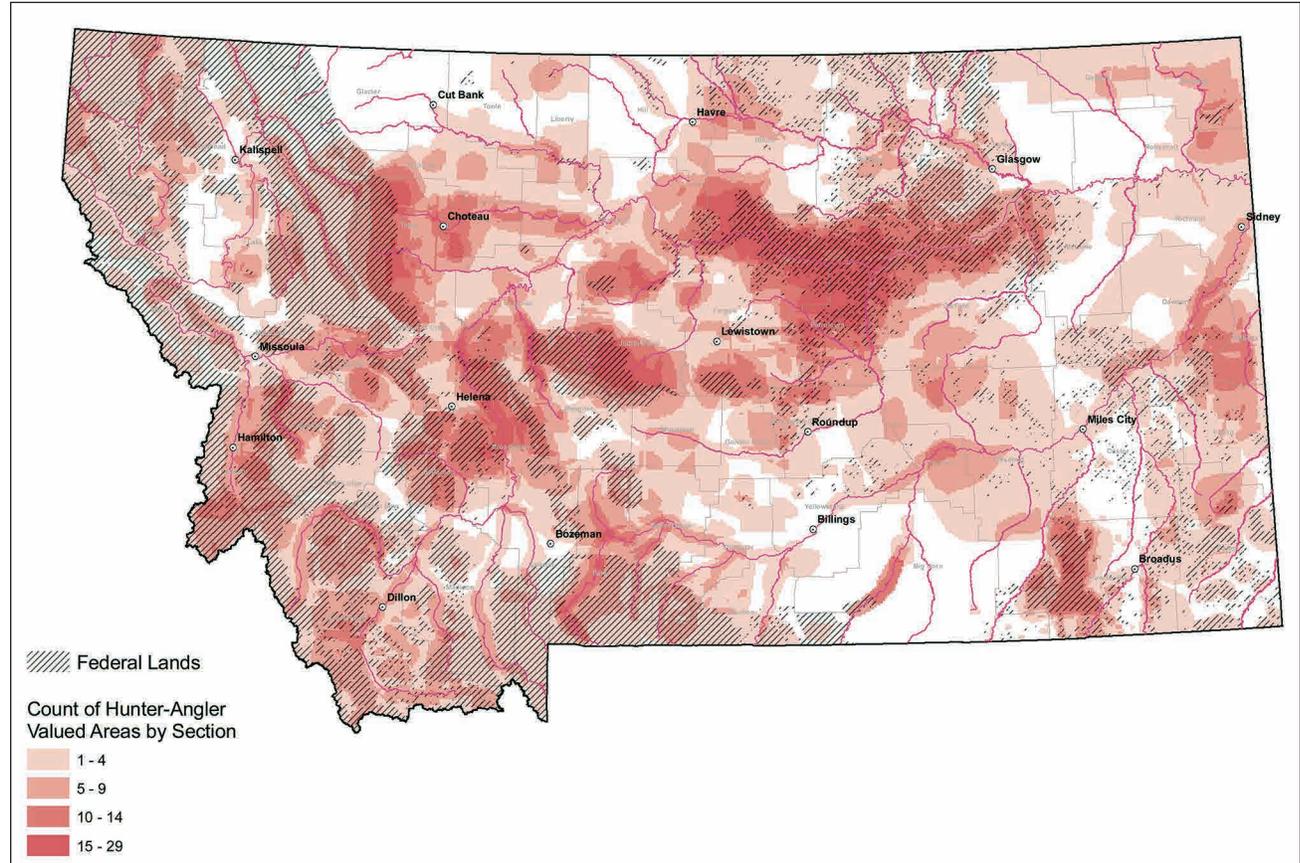


Figure 34. Map of areas in Montana that are valued by hunters and anglers. Source: Dickson 2008.

by MFWP. Season-setting and permit allocations are primarily done through a process administered through MFWP. The refuge is an active partner in this process and refuge wildlife objectives are considered in the refuge's management recommendations in these efforts. At times, the refuge has promulgated more restrictive regulations to address wildlife objectives within the refuge. For example, there is a current, 3-week, mule deer, rifle season in place for parts of the refuge where mature buck ratios are below the set objective, which differs from the State-regulated, 5-week, mule deer, rifle season.

Commercial outfitting for hunting is also allowed on the refuge. Currently, there are about 11 permits issued annually (refer to commercial recreation below).

FISHING

About 60,000 fishing visits are attributed to the refuge throughout the year as anglers participate in several fishing opportunities including bank fishing, fishing from boats, and also ice fishing on the surface of Fort Peck Reservoir and the Missouri River. This does not include the number of fishing visits attributed to USACE recreation areas or the lake, which is about 160,000 fishing visits (USACE 2009c).

The State of Montana (MFWP) has primary responsibility for all fisheries management within the refuge, which is consistent with the Service's policy on fishing (FWS 2006e). This includes regulating harvest, egg collecting efforts, and stocking activities (MFWP 2008a).

One of the more popular fishing opportunities is the spring paddlefish run, which brings some of the greatest angler concentrations to the banks of the Missouri River seen throughout the year. Anglers also pursue walleye, sauger, northern pike, channel catfish, and shovel nose sturgeon. Additionally, lake trout and salmon are found in Fort Peck Reservoir and provide for great open-water-fishing opportunities.

Anglers are able to access the river and reservoir on the refuge through the numbered road system, which provides for several roads leading to the water's edge, some with primitive or improved boat ramps. Recreation sites administered by USACE are located throughout the Fort Peck Reservoir and provide anglers with camping and boat launching facilities.

Sport fishing on Fort Peck Reservoir and upstream sections of the Missouri River has always been a popular activity with locals and nonresident anglers alike. The main game species present include walleye, northern pike, chinook salmon, lake trout, smallmouth bass, and paddlefish. With the exception of paddlefish, lake trout, and smallmouth bass, all of these are stocked to varying degrees in the

reservoir, because natural reproduction is not sufficient to meet the needs of anglers. The State of Montana runs a warm-water fish hatchery in Fort Peck and this hatchery supplies most of the fish that are stocked in any given year. Supplemental fish releases also occur from fish reared at the hatchery in Miles City, Montana.

Walleye tournaments are popular on the reservoir, with a varying number of them occurring each year. The most popular and well-known of these is the Governor's Cup Tournament, which is held in July and can have as many as 200 teams participating. In addition, the Jordan chapter of Walleyes Unlimited annually sponsors a Kid's Fishing Day at Hell Creek Recreation Area, and the refuge always collaborates on this event. These tournaments are regulated by USACE, with enforcement activities being provided primarily by MFWP. In recent years, the number of participants in these local tournaments has declined.

Another popular time of year for fishing use on the refuge is in May and June when large numbers of paddlefish move upriver from the reservoir to spawn upstream of the refuge in the upper Missouri River Breaks National Monument. Fishing pressure is most prevalent from Rock Creek Boat Ramp to the Fred Robinson Bridge and can attract large crowds when fish numbers and weather conditions are favorable. The State of Montana regulates the harvest and typically sets a quota number that only allows for catch and release fishing after that number of permitted fish has been reached.

Paddlefish are among the largest freshwater fish. Remarkably adapted to its environment, the paddlefish is a classic example of millions of years of ecological fine-tuning and could be the oldest big game animal surviving in North America (MFWP 2009c). In Montana, the Slippery Ann area is one of a few important paddlefishing areas along the Missouri River. Historically, paddlefishing was open to all, and hundreds of anglers would pack into accessible areas from Kipp Recreation Area to the Rock Creek boat ramp along the Missouri River to try their luck in the spring. Law enforcement officers remained busy keeping order and preventing resource damage from camping and bank fishing. In recent times, MFWP has placed limits on days open for paddlefishing, the number of permits issued and number of paddlefish harvested.

Throughout the refuge depending on the lake elevation, there are about 16 boat ramps available to the public for launching boats, although most of these are managed and maintained by USACE. In general, overall fishing use of the reservoir and river is highly variable and depends on reservoir levels and boat access along with how good fishing success is in any given year.

WILDLIFE OBSERVATION and PHOTOGRAPHY

The refuge provides outstanding wildlife-viewing opportunities due to the abundance of elk, mule deer, bighorn sheep, eagles, burrowing owls, sage and sharp-tailed grouse and other grassland birds. Consistent with the opportunities to view wildlife, many visitors also take the opportunity to photograph these critters and their associated habitats. These photographers take advantage of early mornings and late evenings to make breathtaking photographs. The refuge receives approximately 20,300 photography visits a year. The auto tour route and elk-viewing area receives approximately 4,000 visitors during the elk rut. Other visitors take advantage of photographing prairie dogs and burrowing owls, sage-grouse and sharp-tailed grouse on leks, and bald eagles around Fort Peck Dam in the winter. Numerous professional photographers have photographed the scenery and diversity of wildlife for numerous book projects and magazine articles. Videographers with National Geographic and other television programs come to the refuge to capture provocative images of the Missouri River Breaks. Over the years, numerous volunteers and neighbors have obtained some extraordinary photographs of refuge wildlife and scenery. These people have graciously shared their photographs with the refuge and they have become invaluable in the development of brochures and publications.

Commercial photography occurs sporadically with a few requests annually from still photographers and videographers. Most of these requests are from professionals that are writing books on the area or preparing an informational video associated with other work in the area such as American Prairie Reserve and the World Wildlife Foundation. Temporary blinds are allowed but they must be removed at the end of the filming periods. All permit holders are required to provide the Service copies of their work for use by the Service for public use programs, brochures, and other needs. A nominal fee is charged. Additionally, the Service collaborates with other local photographers to obtain refuge media for brochures or other needs.

INTERPRETATION

Interpretation is closely tied to the other priority public uses. The guiding principles are to promote visitor understanding and appreciation for America's natural and cultural and conservation history. The communication process should forge emotional and intellectual connections between the audience and the resource (FWS 2006g). Interpretation provides opportunities for visitors to make their own connections to the resource. Examples of interpre-

tive resources found on the refuge include interpretive programs, exhibits, signage, facilities, and special events.

Each of the refuge's four field stations—Lewistown (headquarters), Sand Creek, Jordan, and Fort Peck—provide a visitor contact area; however, the attractiveness and accessibility vary between the stations. In 2007, region 6 conducted a visitor service review, and the reviewers recommended sprucing up these areas with wildlife mounts and displays. There are also kiosks with interpretive panels at each office and at several other places on the refuge. Several kiosks need to be moved to more suitable locations and almost all of the panels need to be updated. Most of the refuge brochures and other printed materials comply with Service's graphic standards.

The Fort Peck Dam and Interpretive Center is a cooperative effort between USACE, the Service, and Fort Peck Paleontology Incorporated. One-third of the facility is dedicated to interpreting the fish, wildlife, and habitat of the refuge. There is a memorandum of understanding in place that requires a Service staff presence at the center but this position has been vacant since 2007. Two seasonal employees are hired during the summer to help USACE with running the facility.

There is a 20-mile auto tour route near the Sand Creek Field Station with a graveled road and updated interpretive panels. Based on traffic counters set up at different access points, an estimated 10,000 vehicles use the tour route each year. Several hiking trails are located at Sand Creek Field Station, which provide access to wilderness and there are paved accessible walking trails near the Fort Peck Interpretive Center on the east side of the refuge.

The Slippery Ann Elk Viewing Area on the west side of the refuge is very popular with the public, particularly during the fall. From September to early October, visitors can watch as many as 300 elk in the bottomlands near the Missouri River. During peak times, on weekend evenings as many as 175 vehicles have been counted entering the viewing area. In 2009 on one peak day (September 26), 161 vehicles entered the viewing area with 585 visitors counted. From September 5–October 18, there were an average of 35 vehicles a day and about 107 visitors a day. Out of 56 counties in Montana, visitors from 40 counties (75 percent) visited the viewing area. Additionally, there were visitors from 32 States (65 percent), two Canadian provinces and several international visitors. Some of the main issues have been how to handle the increasing interest in the viewing area. Public safety and effects on refuge resources are of concern. Dust from vehicles, inadequate and appropriate parking along the route, and visitors not adhering to refuge regulations all need to be addressed.

The refuge offers bus tours several times during the fall and has produced a brochure with information on the viewing area and elk biology.

A 30-minute video about the refuge and refuge management is being produced by the Service's National Conservation Training Center. In the future, the video will be shown at the Fort Peck Interpretive Center, on bus tours to the elk-viewing area and will be on a continuous loop at the Lewis-town headquarters.

ENVIRONMENTAL EDUCATION

Environmental education is a process designed to teach visitors and citizens the history and importance of conservation and biological and scientific knowledge of the Nation's natural resources. Within the Refuge System, it incorporates onsite, offsite, and distance learning, activities, programs, and products that address the audience's course of study (FWS 2006d).

Often environmental education is associated with teaching children (kindergarten through high school) through the local schools using the State standards for the curriculum that is taught. Most of the schools in the six counties surrounding the refuge are located far from the refuge, which makes field trips difficult due to time constraints and school transportation budgets. There has been no formal environmental education program since 2007 when



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The refuge offers limited programs in environmental education.

the outdoor recreation planner stationed at Fort Peck Field Station left the Service but refuge staff give classroom presentations when requested. There is no refuge-specific curriculum. Staffs at Fort Peck and Jordan Field Stations take part in annual environmental camps in cooperation with other agencies. Seasonal employees at the Fort Peck Interpretive Center give presentations throughout the summer and there are educational trunks available for loan through the Fort Peck Interpretive Center.

OUTREACH

Currently, key outreach tools for the refuge are public presentations, news releases, weed tours, county commissioner meetings, the Ranchers Stewardship Alliance, and Missouri River Conservation Districts. The refuge Web site is currently being expanded and updated to increase its usefulness and appeal. As of August 2009, the Web site attracted an average of almost 3,000 visitors a month.

ACCESS

The refuge staff and the public access the refuge by a variety of modes or means including vehicle, boat, aircraft, foot (including snowshoes or cross country skis), bicycle, or horseback. ATVs are allowed on the refuge only on numbered routes that are open to all other vehicles. All ATVs using the refuge are required to be street-legal and display a metal license plate. Snowmobiles are not allowed any part of the refuge other than the ice of Fort Peck Lake. Snowmobiles may be offloaded at any point that a numbered route reaches that lake ice, but are restricted from any other travel within the refuge.

Access is an important consideration particularly for outdoor recreationists, the primary user of the refuge. Other needs for access include staff access in the performance of duty, permittee access, and access for fire suppression.

Current information about access is in the Service's guide map and information brochure (last updated in 2009). In 2002, several roads in proposed wilderness areas were closed in accordance with Service policy for managing wilderness.

Roads

Currently, there are approximately 670 miles of refuge roads. These include several paved highways that traverse the refuge, gravelled roads, and dirt or two-track roads. All refuge routes have a three-digit number from 101 to 899. Typically, the lower the number, the more frequently traveled and maintained the road will be.

U.S. Highway 191 traverses the refuge on the west end near the Sand Creek Wildlife Station. It is an asphalt two-lane road, crosses the refuge for about 9 miles, and crosses the Missouri at the Fred

Robinson Bridge. State Highway 24 passes through or immediately adjacent to about 11 miles of the refuge near the Big Dry Arm and the Fort Peck Field Station. Both highways are maintained by Montana Department of Transportation.

There is at least one graveled, all-weather access road leading to the refuge from each of the six adjacent counties with 60 miles of all-weather access within the refuge boundary. Most of the refuge's roads are small two-track dirt trails that require a high-clearance four-wheel-drive vehicle. All open routes on the refuge are uniquely numbered. The nature of the soil types found within the refuge make road conditions impassible in wet conditions unless significant improvements have been made such as gravelling or pavement. An all-weather road does not equate to all-season access.

The refuge grades approximately 137 miles on an annual basis. Most of the work is done on the west half of the refuge. Some years, depending on weather conditions, certain parts of roads will be maintained up to three times during the frost-free season. In addition, about 2 miles of road are worked on each year with other refuge equipment to repair washouts and culverts. In Garfield County, about 56 miles of road are maintained by the county under a special use permit. In McCone County, about 25 miles of road are maintained under a special use permit. Valley County also maintains about 8 miles of refuge road leading to the Pines and Bone Trail Recreation Areas.

Money for road improvements primarily comes from the Service's refuge roads program, which was created under the 1998 Transportation Equity Act for the 21st Century (TEA-21) and subsequently revised by passage of the Safe, Accountable, Flexible, Efficient Transportation Equity Act. It is administered under the Federal Land Highways program. Any money that is obtained can only be used for refuge roads, and money must be used for maintenance and improvement.

On the refuge, roads have been created by county commission resolution or by petition. In addition, attempts have been made to establish roads by grant (easement), but at times this has met with local landowner opposition.

County Commission Resolution. The Crooked Creek Road (refuge road #103) was designated a public road by a Petroleum County Commission resolution in the 1990s. After the refuge graveled about 5 miles of the road with TEA-21 money, the county established it as a public road and, in effect, agreed to maintain the road. The road leads to the Crooked Creek Recreation Area where Petroleum County has a USACE permit to manage the site.

Petitioned Roads. There are an unknown number of petitioned roads on the refuge within the six coun-

ties. Some counties' road books and files will have complete sets of petitioned road records for individual roads. Some will have part of the legal requirements for a legally petitioned road. Usually the only time the necessary research is done to determine if a road is truly a petitioned road is when a private landowner or land management agency proposes to close a road. On the refuge, road 343/606 that leads to the Musselshell Bottom in Garfield County was closed at the refuge boundary by a new landowner. Because this was a major access point to a large part of the refuge, the Service and the county challenged the closure. Information presented at a public commission meeting showed that the refuge had periodically maintained the road, and historically the road led to an old post office. The county commissioner's decision was based on historical information provided by the Service and neighboring landowners. The road remains open today and is considered a public road. In the early 1990s, a fire destroyed the Garfield County courthouse that housed all the county road records. In Garfield County, it will be difficult to establish public roads without having the historical records. In several areas, access to the refuge has been blocked because roads cross private land that has been closed. Through land acquisition and buying rights-of-way, vehicle access to the refuge for the public will need to be improved. In addition, Garfield County may be willing to establish roads by easement if landowners and agencies can identify a public and private benefit.

Each of the six counties has a variety of complete or incomplete road records. Some records parallel and overlap nicely the current refuge road system. In some instances, county records show petitioned roads that may never have been built or have never been shown on refuge maps. As stated in chapter 1, determining the legal validity of petitioned roads is outside the scope of the CCP. This document will not affect the counties' or a private landowner's legal ability to contest the existence or nonexistence of a road on the refuge that may or may not be open to the public.

Where possible the counties and the Service may agree on which roads on the refuge are open to vehicle travel. In some situations, it will be beneficial to identify roads as being refuge roads to allow the expenditure of Service's refuge roads program money to improve all-weather access. In some situations, it may be best to recognize a road as a legal county road to facilitate maintenance. Over the past 18 years, approximately 45.5 miles of refuge roads have been graveled on the refuge with the use of refuge road dollars. If a road is designated a county road, such as the Crooked Creek Road, money from the refuge roads program cannot be used to improve or maintain the road in the future. This must be con-

sidered before declaring a “county road” versus leaving a road a “refuge public road.”

Other Public Access Issues

Most of the open refuge roads are publicly accessible. Roads that lead to the refuge are designated for public use and allow legal access to the existing and open refuge roads. However, some refuge roads currently remain open, yet are not open to the public. This situation primarily occurs in the Garfield County area where several roads that access open refuge roads cross private land bordering the refuge. These roads that cross private lands are not open to the public and subject to the private landowner’s permission. In Garfield County, this situation occurs on 21 individually numbered routes and has created an exclusive use situation.

Boats. Numerous types and sizes of boats are used to access the Fort Peck Lake and the Missouri River. Montana boating laws and regulations apply to refuge waters. The Service has little data on the total number of boaters using the Fort Peck Reservoir or Missouri River but informal observations by staff suggest that more boats could be accessing the refuge from the river or lake during hunting season than in the past.

Restrictions are in place from June 15 to September 15 for the wild and scenic river part of the refuge along the western boundary (refer to soundscapes in section 3.1 above). In reporting on visitor and boat use through the Upper Missouri Wild and Scenic River, about 22 percent of boaters use the stretch from Judith Landing to the James Kipp Recreation Area located on western edge of the refuge (BLM 2008c). The latest information for 2008 on boat use for the Upper Missouri River shows there were about 4,495 registered users (personal correspondence with Vicki Marquis, Missouri River Districts Council, November 2009), so it is estimated that nearly 990 boats take out at Kipp during the summer season. Since 1976, the highest number of registered users occurred in 2002 with 6,034 registered users with 1,272 using a commercial operator.

Water levels on the Missouri River fluctuate considerably and dictate what types of boats may be suitable for use. Boat access to the water varies from improved USACE concrete boat ramps located at developed recreation areas that allow larger craft to launch to areas where vehicle access leads to the water edge but only small watercraft (such as canoes) can be used. Access to those boat launch areas vary as well from paved highway and graveled and improved all-weather roads to unimproved two-track roads that are impassible when wet.

Access by Foot, Horse, or Bicycle. There are no restrictions for access by hiking or walking on the refuge

other than the elk-viewing area and Sand Creek Administrative Area on the west end of the refuge. Additionally, there are no designated or improved hiking trails on the refuge (an established hiking trail is located at Hell Creek State Park within the refuge). Similarly, there are no restrictions to horseback riding on the refuge other than the previously mentioned areas closed to foot traffic. As with foot travel, there are no designated trails or paths for horse travel, and some parts of the refuge are unsuitable or unsafe for horse use. Certified weed-free hay is required when keeping horses on the refuge. Bicycles are allowed on numbered roads only including seasonally closed roads.

Universal Access. There are several hundred miles of open refuge roads that are available for hunters of all abilities to hunt from with the proper Montana State license. Additionally, an accessible blind is available to hunters needing wheelchair access along the Missouri River.

Use of Game Carts. Game carts were originally designed for retrieving big game in areas where road access was limited. They often consist of a small cart with two wheels that a hunter pushes or pulls. On much of the refuge, it is not feasible to use one because of the rugged, steep terrain, and hunters have to carry an animal out to where they can use a game cart. Game carts are not allowed in UL Bend Wilderness. However, the use of a game cart is approved for the proposed wilderness units. A minimum requirement analysis is being completed as part of the wilderness review (refer to appendix F).

RECREATION SITES

USACE recreation areas include Crooked Creek, Forchette Bay, Devils Creek, Hell Creek, McGuire Creek, Nelson Creek, Rock Creek, Fort Peck, and The Pines. Because the Service does not have primary jurisdiction over these areas, they are not analyzed further.

The Service managed several primitive camping areas that have vault toilets including Slippery Ann, Rock Creek, Turkey Joe, Withrow Bottoms, Jones Island, and Rocky Point (figure 10). A few other areas that were outgranted to the Service in the Enhancement Act of 2000 have no facilities (Bear Creek and Bobcat).

Except where designated as closed, camping (other than backpacking) must take place within 100 yards of the Missouri River and Fort Peck Reservoir or within 100 yards of numbered and open roads. Camping is limited to 2 weeks within any 30-day period. The use of dead and down wood is allowed for making a campfire. Camping is not permitted on the islands.

COMMERCIAL RECREATION

There are several commercial recreation activities that occur on the refuge including hunting and outfitting, fishing, and photography. Any commercial activity requires a special use permit. Currently, the Service has provided little to no oversight for the commercial harvest of fish or mussels in the past because most of it falls within the primary jurisdiction of USACE. This topic is discussed in detail under “Fishing Objectives” in section 4.6 in chapter 4. Commercial outfitting also occurs on the refuge but is limited to 11 special use permits annually.

REFUGE HEADQUARTERS and FIELD STATIONS

The headquarters for the refuge is located along Airport Road in Lewistown, Montana. It consists primarily of a headquarters building, a maintenance shop, and a few other buildings. Additionally, there are three field stations located at Sand Creek, Jordan, and Fort Peck and a small research facility at the UL Bend Refuge. Each field station consists of a few buildings that provide office space, a fire cache, some maintenance capability and storage, and residences or bunkhouses.



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A small wind turbine at refuge headquarters is used to offset energy costs.

3.5 HUMAN HISTORY and CULTURAL RESOURCES

From prehistoric times to the present day, the refuge has a rich human history that has shaped the landscape.

PREHISTORIC HISTORY

As a river corridor, the refuge was an important land feature for aboriginal people due to the variable resources provided by a major waterway in relatively dry country and unique hunting opportunities provided by the Missouri River Breaks. Most of the prehistoric people of the plains depended on animal products for subsistence. Areas along the Missouri River Breaks probably tended to concentrate large ungulates along the breaks, funneling animals into narrow passages to cross the river during winter migrations. These natural game funnels would have made likely ambush points for prehistoric hunters. An area of the refuge near UL Bend is known as an important migrational area for large ungulates and it is obvious that aboriginal cultures exploited this knowledge based on the presence of prehistoric sites documented in the area. Documentation of the use of the refuge by native people is known mostly through surface remains. Some archaeologists believe that the actively eroding nature of the soils along the refuge have erased the remains of many of the earlier sites, but recent archaeological work has shown that some earlier prehistoric sites could be deeply buried (Loffin 2008). Formal archaeological investigations have been sporadic and were associated primarily with Federal projects. Planning documents and some large-scale fieldwork has been produced by BLM on their lands surrounding the refuge (Davy 1992, Ruebelmann 1982). Known prehistoric site types suggests that the early inhabitants of the river were highly mobile and did not create permanent villages as is seen further east in the Missouri River floodplain. This is consistent with the use of the area by groups of people exploiting the area for hunting bison. To date, little archaeological excavation has taken place on the refuge, but archaeological testing was conducted on a few sites in 2008 and more testing is scheduled for 2009 (Boughton and Peteson 2007).

Paleo-Indian Period (9500 B.C.–6500 B.C.)

Although no Paleo-Indian sites are known on the refuge, in the 1960s, one Folsom point was reported at the UL Bend Refuge by a nonprofessional (Reubelmann 1982). More recently, Davy reports that a Folsom and a Hell Gap point have been recovered on the surface and in a buried context by professionals

(1992). Investigation into the buried artifact showed that there was no site associated with it.

Middle Prehistoric Period (6500 B.C.–200 A.D.)

Depending on location, it appears that these people were largely focused on exploiting bison, but the tool kit expanded from Paleo-Indian times suggesting dependence on a broader spectrum of plant and animal resources in more varied habitats. Climatologically, it was becoming dryer and Plains Archaic populations tended to inhabit areas with protected water sources. Sites typically occur in basin and foothill regions, river valleys and in open prairie. During the Altithermal, some of the Great Plains became dry enough to cause the formation of dune fields, which pushed the bison and native people to other areas. There is a wide variation of projectile point (spear or atlatl) types associated with the Middle Prehistoric, no doubt due to the varied species, environments and hunting techniques used to obtain game in this fluctuating climatic regime. The spear thrower was introduced allowing greater range than spear throwing and necessitating smaller projectile points. Communal hunting continued, but researchers have suggested that smaller hunting groups were used at various times of the year. There is also more evidence of processing of vegetal resources suggesting reliance on a broader spectrum of resources. There are very few excavations of Middle Prehistoric sites near the refuge, although surface finds prove that these people were present.

Late Prehistoric Period (A.D. 200–1750)

During this phase, prehistoric people moved out onto the prairies and new technologies were introduced including the bow, arrow, and pottery. Complexes included in this tradition include Besant, Avalonea, Benson's, Butte/Beehive, and Old Women's. The Besant complex represents the earliest adoption of pottery and bow and arrow use in this area of the northern Great Plains. In the Dakotas, it has been documented that sites of this phase have burial mounds along the Missouri River although none have been reported in Montana. In areas of the lower Missouri, village-dwelling, semi-agricultural, aboriginal people lived in earthen lodges, making forays at certain times of year to other areas to secure resources. Although none of these village sites is known from the refuge, a nonprofessional reported that an earthen lodge existed on the river before it was flooded to create Fort Peck Reservoir (Reubelmann 1982).

Although the horse was in use in the southern plains earlier, in the northern plains they were not in widespread use until A.D. 1725–50. Bison continued to be the primary resource exploited by Protohistoric groups, but the addition of the horse to hunting techniques drastically affected social organization, set-

tlement patterns, and effectiveness of bison hunting. Protohistoric people were able to react more quickly to the movements of the bison herds, were able to hunt further away from base camps and began to leave women and children in camps while hunting.

Although many of the prehistoric sites on the refuge do not have datable artifacts, it has been suggested that most of the known prehistoric sites are attributed to this period. This may be because most of the sites are known from surface finds, and it is logical that the latest materials are on the surface. It is also likely that aboriginal populations were much higher during this period as more groups were pushed into the plains with the advancement of Anglos and the effect trade goods were having on tribal politics.

HISTORICAL PERIOD

During this period, trade goods and interaction between Anglos and tribal people began to directly affect aboriginal lifeways. This process started well before Anglos reached the area around the refuge. Trade goods and the desire for them changed Native American lifeways by shifting hunting activities for household consumption to a means to obtain trade goods. As more of the aboriginal people were being pushed into the area, conflict between tribes in search of bison became more frequent. Taking control of territories for hunting grounds and high mobility became increasingly important. Furthermore, during the 19th century, the area around the refuge was the stage for many conflicts between Anglos and tribal people due the increasing use of this section of the river to move goods to and from western Montana to support the fur trade, bison robes trade, and gold mining.

One well-documented, aboriginal historic site from this period is located south of UL Bend on the opposite side of the river (Park 1998). The site consisted of a bison kill located in a series of coulees. Artifacts observed in the surface included a projectile point (arrowhead), stone butchering tools, a piece of iron, and a potsherd. The site consists of three activity areas where butchering was conducted each having evidence of buried deposits including evidence of hearths. This site is planned for archaeological testing to demonstrate its eligibility for the National Register.

Native American Tribes

Archaeologists and linguists debate the origin of aboriginal groups in eastern Montana before 1500. In eastern Montana, by the 1600s, it is generally accepted that the River Crow were situated on the Missouri River and the Mountain Crow along the Yellowstone River. The Blackfoot were situated northwest of the River Crow into Canada and the

Assiniboine to the northeast of the River Crow into Canada. Before the introduction of trade goods, the Sioux lived in Minnesota. At that time, they were at war with the Chippewa, who had been armed through trade with Anglos, and began moving westward and south. Firearms gave the Chippewa an advantage in warfare, which destabilized the traditional relationships between the groups.

The Sioux left their aboriginal homelands in Minnesota and began to disperse west and south following major river drainages. This process was relatively rapid beginning in Michigan, Iowa, and South Dakota. No doubt, the mobile lifestyle required by bison hunting made the process faster. Early Anglo explorers wrote that they had seen some horses among the Sioux in Minnesota during the first Anglo contact in the 1600s. Many of the eastern Sioux have certain culture traits that are more woodland oriented while the western tribes have aspects of their culture that are similar to other plains groups. In the east, early accounts of the Sioux document at least some level of agriculture or intensive plant exploitation along with hunting as the basis of the economy. As the Sioux moved west onto the plains, their economy was directly linked to bison as their major resource. With this orientation toward hunting bison, shifts in their material culture and mobility patterns were required to stay in close association with the bison herds. For instance, the use of tipis for shelter was necessary for mobility and the use of horses, increased the effectiveness of hunting bison. Access to guns and other trade items also made bison hunting more effective. To acquire trade goods, the Sioux became involved in the bison robe trade.

The Assiniboine split from the Sioux and began to move north and westward onto the Canadian plains to hunt bison. By the late 17th and early 18th centuries, they were trading with the Hudson's Bay Company in Saskatchewan, Canada allowing them access to guns and trade goods. In the fur trade, the Assiniboine acted as intermediaries between the company and other plains tribes. Eventually the Assiniboine expanded their control from Lake Superior to northeast Montana.

In the late 18th century, increased movement of Anglos in the northern plains caused the first outbreaks of smallpox among the native people (Fandrich and Peterson 2005). By 1781, reports in Saskatchewan Canada relate that 30–60 percent of the native population was lost. Diseases introduced by Anglos greatly affected tribal politics and warfare, because the loss of population numbers forced certain tribes to create partnerships that allowed them to defend themselves against native enemies. Anglo contacts grew more frequent with ongoing movement of riverboats associated with the fur trade and discovery of gold in western Montana. This increased oppor-

tunities for diseases to spread through the native populations. With the introduction of the steam-powered riverboats using the Missouri River to ship supplies, diseases were able to move faster across the region. The Gros Ventre, Sioux, and Plains Cree did not experience radical population losses from the outbreak. The companies with which they had been trading vaccinated the Sioux and Cree to prevent population losses. The Mandan and Hidatsa, who lived in dense village populations, were devastated by the outbreak and never played a major role in the region's native political arena. Interruptions in hunting caused by the Sioux, who had moved further up the Missouri to take advantage of the territory that opened up with the movement of the Mandan, Hidatsa, and Arikara, kept these groups from sustaining themselves by hunting bison. This forced the Mandan, Hidatsa, and Arikara to become dependent on the Federal Government for support. The Assiniboine also lost two-thirds of their population and became vulnerable to attacks from the Crow, Blackfoot, Gros Ventre, Hidatsa, and Sioux. They were never again able to regain their former political power.

In the late 1860s, the Sioux were becoming a major political force in the area. In 1868, 1,000 Sioux of the Cuthead Band of the Yanktonai and two Bands of the Sissetons arrived at Fort Buford. They agreed to make peace with the Federal Government and made an alliance with the Lower Assiniboine. These Sioux were able to sustain themselves in the first year with annuities shared by the Assiniboine. Yellowstone Kelly noted that Medicine Bear of the Sioux moved up the Missouri River displacing the other groups, which opened the eastern mountains up to hunting for the Sioux. Sioux conflicts with the Assiniboine resulted in the recommendation from Indian Agent Sully that the Assiniboine go north to the Milk River Agency and join the Gros Ventre. Some Assiniboine agreed, while others did not, which split the group into the Upper Assiniboine allied with Long Hair and Whirl Wind and the Lower Assiniboine of the Canoe Paddler Band allied with the Yankton, Yanktonai, and Santee Sioux. They resided near the mouth of the Popular River. The San Arcs and Tetons controlled the area west of Big Muddy Creek to the Musselshell River.

During the 1880s, the climate and conditions for native people in northeastern Montana were at their worst. The bison were now gone from the area and a series of harsh winters left most tribal populations without adequate food. Government supplies were not sufficient to feed the tribal populations and without bison hunting for supplemental nutrition, starvation ensued. At the Wolf Point subagency, 300 Assiniboine starved as well as tribal members at other locations.

Lewis and Clark Expedition

In 1802, Thomas Jefferson organized the Corps of Discovery after the Louisiana Purchase from the French ended any European claim to the land. At the time, this part of the western United States was largely undocumented. Jefferson realized the need to survey the area in preparation for settlement and was also in search of a Northwest Passage to the Orient. At that time, there was no navigable route that connected Eastern and Western North America, requiring ships to sail around South America and Africa. Ultimately, this goal of the Corps was not realized because the route was difficult to navigate and required several portages making movement of large watercraft unpractical. When the Corps of Discovery returned to Saint Louis they brought with them field maps documenting the locations of waterways and resources they had encountered. The Corps found large numbers of wild furs and wildlife that inhabited the region, which would later spur the fur trade. Although the Lewis and Clark Expeditions of the region are generally thought of as the first Anglo visitors to the refuge, they were predated by trappers who traveled the area in the 18th century. Some of these trappers were of French Canadian origin working with the Hudson's Bay Company.

Fur Trade

With the rise of beaverpelt prices, in the 19th century, more whites came to the Upper Missouri to trap. Once the beaver were trapped out of the area near the refuge, the fur trade shifted to the bison robe trade. Several small forts were established along the refuge part of the river for two reasons: (1) forts allowed the tribes easy access to traders for their furs; and (2) the river boats coming from Saint Louis often could not get further up river from the refuge because the river become shallower upstream. The shallower parts of the river were not navigable by riverboats when the water was low and the shallower sections froze up earlier in the year. Much of the river cargo was destined for Fort Benton near modern day Great Falls. Fort Benton served as a hub of transport for supplies and people because a road network leading to mining and other resource areas in the region connected the town.

By the 1820s, the American Fur Company began to sponsor forts along the river to secure a share of the trade in animal products from native and white trappers. In 1829, the American Fur Company established Fort Union near the mouth of the Yellowstone River creating the first substantial settlement of Anglos in the region (Brumley 2006). Fort Williams and Fort Jackson were established upstream of Fort Union to expand company control of trading. Several other forts were established to compete with the American Fur Company, but most failed due to

the fierce competition with American Fur Company or frequent attacks by native people. One reason so many forts, trading posts and riverboat landings were constructed within the refuge was due to the difficulty with getting up river from this point. The stretch of river from Cow Island to Fort Benton was known as "Rocky River" marking the point where elevation increased approximately 2 feet per mile as one went upstream (Davy 1992). From the refuge, riverboats could be unloaded and freight put on wagons to be hauled to Helena, Great Falls, or the Judith Mountains. Typically, the forts did not stay in business very long because conditions of the river and animal populations themselves affected their success. Fort Carroll is an excellent example. In the early 1880s, it was located within 150 miles of the remaining bison herds. It did brisk business with the riverboats in 1874 and 1875 because the river was low, and freight was unloaded at the town to be hauled by wagon to Great Falls (FWS 1996). Afterwards, when the river was elevated, riverboats were able to get up river to Fort Benton without help and the town's prosperity dwindled. By 1881, about 2,130 bison robes were traded at Carroll, down from earlier years of 4,000 robes. Soon after, the bison robe trade ended.

Thirty-one trading posts were built on the Missouri River between the North Dakota boundary to Fort Benton between 1828 and 1885 (Davy 1992). Those located in the refuge boundary are Fort Peck (1867), Fort Pouchette (1870), Fort Musselshell (1869), Kerchival City (1866), Fort Sheridan (1870), Fort Andrews (1862), Carroll (1874), Fort Hawley (1866), Wilders Landing (1875), Rocky Point (1875), Little Belt Mountain City (1875). Forts with a military function were Fort Peck, Rocky Point, Fort Carroll, and Fort Reeve (1867). In addition to forts, there were riverboat landings along the Missouri River, because riverboats could not get up the river to Fort Benton during icy and low water conditions. Cargo had to be unloaded and moved by wagon to the forts up river. Fieldwork in the 1970s showed that remains of these landings as well as sunken riverboats can still be found (Wood 1977).

Throughout the 19th century, the fur trade in eastern Montana was dependent on riverboats to move the goods to the region. Originally, the trade consisted of beaverpelts, but in the 1840s the animals had been overexploited and fur prices dropped, changing the focus of trade to bison robes. Growth of this industry was rapid as 2,600 bison robes were sent east annually in the early 1800s, whereas approximately 90,000 or more were shipped annually from St. Louis by the 1850s. By 1850, the tribes were dependent on trade goods, which they obtained through the bison robe trade.

With the discovery of gold in western Montana in the 1860s and the development of the fur trade,

steamboat travel was a vital supply line to towns such as Fort Benton and Helena that had few other options for travel because of the lack of well-established roads or railways to supply these towns. Food, supplies, and trade goods required for miners and trappers were hauled up from St. Louis. Goods including furs, bison robes, and gold were sent downstream to the markets. Steamboat traffic was common on the river from 1859 until 1888 and averaged about 20 boats a year.

Railroads

During the 1880s, railroads were established, linking eastern Montana to large cities and markets for the natural resources that were available for exploitation at the time. With the establishment of the railways, movement of goods was faster, more predictable, and cheaper than riverboat travel along the Missouri. The grasslands left vacant by the removal of bison and the placement of native people on reservations made the area particularly suitable to livestock grazing. With the addition of the railroad to the State's transportation system, the reliable movement of cattle to large markets in the east was ensured. The industry flourished, and high stocking rates were common due to unmanaged grazing on free land. This early success was tainted in the winter of 1886–87 when severe snow and cold froze many cattle that walked with the wind into coulees and fences and became trapped. Some estimates of losses of cattle in the region are as high as 50–90 percent. Of the State's 220 cattle operations in business before that winter, 120 financially survived.

By 1900, a homestead boom began that would last until 1918. Initial settlement of the region was in river bottoms that were readily cultivated. It was spurred by the cheap transportation by railways, profitable shipment of grain to market and advertisement campaigns by the railroad companies for free land. The

Federal Government had given the railways land along tracks to pay them for the construction costs. When an area was settled, the railroads were not only able to sell the land but also created more traffic for freight as the settlers needed to move their products to market. The homestead boom was so intense that Montana had more homestead entries than any other State. The boom continued successfully as high moisture during the period of 1909–16 made dry farming of cereal grains successful. The combination of shipping grain by rail made moving the grain to large eastern markets financially profitable and reliable. Once conditions became dryer, the farming boom ended as farmers began to understand the lack of predictable moisture in the eastern part of the State limited dryland farming. This, in combination with the Great Depression, caused a mass exodus from Montana in which half of Montana farmers lost their farms between 1921 and 1925. This process has continued in to modern times as illustrated by Garfield County, which in 1919 had 30 settlements with post offices. By 1968, five remained (Davy 1992). Creating predictable water for farming in eastern Montana was not resolved until large-scale Government irrigation brought predictable water to the agricultural fields.

Roosevelt Era

In response to the Great Depression and the drought of the 1930s, President Franklin D. Roosevelt created a series of Government programs to provide jobs and income for impoverished families. Most of these programs were construction projects including dams, roads, and public works. The largest of these projects in Montana was Fort Peck Dam, which is situated on the eastern end of the refuge. The project was authorized by Roosevelt in 1933 and constructed under management of USACE. This work was completed from 1933 to 1940. The dam originally



Brett Billings / USFWS

Old homesteads dot the landscape.

had two purposes: providing jobs to Montanans who were jobless and creating flood control for the Missouri River. In 1938, the dam was altered to generate electricity in preparation for the United States involvement in the Second World War. It is the largest earth-filled dam in the world. Inside the clay core of the structure are 17,000 tons of steel sheet pilings that span the river. The project was so large that several towns were established to house workers. Some of the names of the towns include New Deal, Square Deal, and Roosevelt Heights showing their direct relationship with the project. During the construction period in the mid-1930s, the city of Fort Peck unofficially had a population of 30,000. Fort Peck is distinguished as being the first planned community, other than military post and religious communities, in the United States (Davy 1992). It was designed by USACE in 1933. At its peak, the project employed 10,546 people.

Homesteads and Ranching

Ranching in Montana began as small operations providing beef to miners primarily in the western part of the State to support the mining operations. In 1866, the first cattle drive from Texas took place and started the first open-range ranching in the grasslands that were vacant after the destruction of the bison herds. (Malone et al. 1976).

By the late 1870s, the large cattle raising operations west of the Continental Divide were searching for more range lands. By the mid-1870s, ranchers had brought medium-sized herds into central Montana. The rapid expansion of the cattle industry on the northern Great Plains ended suddenly in the late 1880s south of the Missouri River and in 1906–07 north of the river. Ranchers failed to take action to ensure the range was not overstocked and during the brutal winter of 1886–87 and again in 1906–07, approximately 50–75 percent of stock in central and eastern Montana was lost. The winter of 1886–87 ended open-range ranching south of the Missouri River and started the ranch cattle operation. Open-rangeland ranching continued north of the river until the winter of 1906–07 when again another severe winter killed thousands of stock.

The Homestead Act had little effect in central Montana until 1909 when the Enlarged Homestead Act was passed. This act allowed a person to receive 320 acres instead of the original 160 and one-eighth of the land had to be cultivated continuously. The countryside became dotted with homestead shacks, and trails became roads as more and more traveled their course. “The homestead rush began slowly, but in less than 20 years an immense grassland in Central and Eastern Montana, over 500 miles long and 300 miles wide, was overrun, divided up into 320-acre tracts, plowed up and was producing some of

the lushest crops ever seen.” These homesteaders were mostly farmers, whereas those that preceded them were cattle and sheep men (Willmore 1990).

The beginning of the end of the boom years was 1919. It was the driest year ever recorded in central Montana, and there were no crops. More dry years followed until the Great Depression of the 1930s. Wheat harvests averaged only 2.4 bushels on land that had previously averaged 50 bushels and prices tumbled. Hordes of grasshoppers and cutworms, intense heat, and winds all added to the homesteader’s misery. Families were starving and the exodus from the area accelerated. More than half of the farmers lost their land through bankruptcy and abandonment or sold to the Government under the Bankhead–Jones Farm Tenancy Act of 1937. The ranches that survived these times had diversified their operations to include a combination of stock and crops. Many of the area’s farmers and ranchers of today are the children, grandchildren, and even great grandchildren of the men and women who made it through the difficult, sometimes impossible, days (Willmore 1990).

Historic Artists

Artists beginning in the early 19th century have portrayed the refuge. In 1833, Prince Maxmillian from Germany visited the refuge documenting its natural wonders. Maxmillian brought with professionally trained Swiss artist Karl Bodmer who painted the first scenes from the area by a classically trained artist. As a scientist, Maxmillian’s observation along with Bodmer’s illustrations provide a valuable source of scientific information about the natural features and native people inhabiting the area at that time. Maxmillian’s expedition was from Fort Union to Fort McKenzie, which is just downstream of Fort Benton.

Charles M. Russell, the namesake of the refuge, was an artist and cowboy who was born in 1864 and came to live in the Judith Basin in 1880. His primary artistic subjects were the cowboys of eastern Montana. Russell worked as a cowboy for 11 years beginning in 1882. These experiences left him with scenes of cowboy life from the late 19th century from which to draw on as an artist. Russell disagreed with the practice of dryland farming in the eastern Montana prairie, because he realized that the crops would fail in dry periods causing soil destruction. Known for his early conservation ethic, Russell was given the honor of having the refuge named after him.

KNOWN CULTURAL RESOURCES

The refuge has 363 known archaeological sites. Approximately 275 of the known archaeological sites are either National Register–eligible or have not been evaluated and therefore have to be treated as eligible. Very few of the archaeological sites on the



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In 2010, a bow hunter discovered the fossilized bones of a sea creature. This is a rare find for the refuge, because very few prehistoric marine reptiles have been found in this area.

refuge have been visited by a professional archaeologist. Many of the aboriginal sites that have been reported by refuge staff are stone circles or what are commonly called tipi rings or are historic farmsteads. Most of the known archaeological sites have been reported to the Montana State Historic Preservation Office; however, the information recorded was not done by current professional standards, making management of the resource difficult. Overall, less than 1 percent of refuge lands have been formally surveyed for archaeological sites.

REFUGE RESOURCES IMPORTANT to TRIBES

In 2005, USACE completed a study of the traditional cultural properties near the refuge. During this study, the Assiniboine, Blackfoot, Chippewa–Cree, Crow, and Sioux Tribes were interviewed about traditional use of the area. Many of the 16 traditional cultural properties are found on refuge land and include burial locations, plant-gathering areas, and ceremonial locations. Some areas were inundated by Fort Peck Lake.

Modern tribes still collect and use plants or other resources for ceremonial and traditional purposes. Consultation with the Fort Peck and Fort Belknap tribal council in 2009 revealed that collecting sweat rocks, willows, and other materials are very important cultural traditions. Tribes that are interested in collecting small quantities of plants or other natural

resources need to contact the refuge manager and obtain a special use permit before collecting materials for ceremonial purposes. Although bison are not managed as a species on the refuge, many tribes still consider them as central to their culture. Other wildlife species currently found on the refuge that are important include elk, deer, and other species; however, the State of Montana regulates the harvest of huntable populations of wildlife through State licensing. Many tribes also use eagle feathers and parts today for ceremonial purposes. The Service provides eagles to tribal members through the National Eagle Repository located in Colorado. Tribes reported having a deep spiritual connection to the refuge, and many of the scenic areas are considered focal spiritual areas, although information about any specific site on the refuge is not known.

3.6 PALEONTOLOGICAL RESOURCES

The refuge offers various exposures of geologic and paleontological interest, and the refuge has 465 known paleontological sites. Several of these sites have been designated as “national natural landmarks” for paleontological resources (refer to “Special Management Areas” under section 3.3 above).

The western part of the refuge is shortgrass prairie with sparse pine forest in the uplands and cot-

tonwoods in the dissected drainages and floodplain areas. On the eastern side of the refuge, the vegetation is shortgrass prairie with juniper in deeply eroded drainages. Areas of the eastern part of the refuge have scant vegetation and are commonly known as badlands. In general, the central part of the refuge contains earlier fossils of Pleistocene mammals, while the downcutting of the river on the eastern part of the refuge has exposed the Hell Creek Formation (Cretaceous Era), which is tens of millions years earlier. The Hell Creek Formation is known for its dinosaur fossils. In certain areas, exposures of marine fossils are observable.

Of the paleontological deposits on the refuge, the dinosaur fossils have become famous and have been displayed in museums around the world. Although the refuge has been visited by paleontologists since the late 19th century, the first scientifically documented *Tyrannosaurus rex* fossil was excavated near Jordan, Montana, in 1902 (Graetz and Graetz 2003). Among the most recognizable dinosaur fossil finds to come from the refuge are *T. rex*, *Triceratops*, *Albertosaurus*, *Mosasaurus*, and duck-billed dinosaurs. The quality of the fossils is such that recently one of the most complete (*T. rex*) fossils excavated was found at the refuge and a group of several associated *T. rex* fossils were identified on the refuge. Many of these fossils can be seen at the Museum of the Rockies in Bozeman. The interpretive center at Fort Peck Field Station has many complete dinosaurs on exhibit.

In 2009, the Paleontological Resources Protection Act became law and requires the protection of these resources using scientific principles and expertise. Agencies are to develop plans for inventory, monitoring, and scientific and educational use of these resources in accordance with agency policies. Casual collecting or recreational digging is not allowed on the refuge. Special use permits are issued to institutions such as the Museum of the Rockies. Many of the paleontological sites known to refuge staff have not been formally reported to the Montana State Historical Preservation Office because the refuge has a problem with paleontological looters and wants to keep this knowledge as safe as possible to prevent attracting more looters. The refuge's law enforcement personnel regularly write citations for looting and try to monitor as many of these resources as possible.

3.7 SOCIOECONOMICS

Information on socioeconomic conditions was obtained with the help of USGS through the Policy and Science Assistance Branch of the Biological Resources Division, in Fort Collins, Colorado (Koontz et al. 2010).

For CCP planning, an economic analysis provides a means of estimating how planned management activities affect the local economy. The report for the refuge provides a description of the local community and economy near the refuge. Next, the methods used to conduct a regional economic impact analysis are described. An analysis of the CCP management strategies that could affect interested groups, residents, the public, and the local economy is then presented. The refuge management activities of economic concern in this analysis follow:

- refuge purchases of goods and services within the local community
- refuge personnel salary spending
- grazing operations
- spending in the local community by refuge visitors
- revenues generated from refuge revenue sharing

REGIONAL ECONOMIC SETTING

For the purposes of an economic impact analysis, a region (and its economy) is typically defined as all counties within a 30- to 60-mile radius of the impact area. Only spending that takes place within this regional area is included as stimulating changes in economic activity. The size of the region influences both the amount of spending captured and the multiplier effects. The six-county area is large (15.3 million acres) and remote with much of the regional economic activity confined within the six-county area. The 1.1 million-acre refuge boundary accounts for 1 percent of the land and water within the six-county area: 11.6 percent of Garfield County; 8.7 percent of Phillips County; 6.6 percent of Valley County; 5.3 percent of Petroleum County; 5.1 percent of McCone County; and 2 percent of Fergus County. Based on the relative self-containment in terms of retail trade, the surrounding six counties make up the local economic region for this analysis.

During the last century, ranching, farming, mining, natural gas development, and the railroad have all been important factors in the social and economic history of the area. More recently, outdoor recreation and tourism have been increasingly important contributors to the local economies. The next sections describe the socioeconomic characteristics and trends in the six-county area.

POPULATION and DEMOGRAPHICS

This section describes the characteristics of the population for Montana and the six counties surrounding the refuge. This includes population projections, employment, income, and refuge activities that affect the local economy.

Population and Density

Table 11 summarizes the population estimates and trends for Montana and the six counties surrounding

the refuge. In 2008, there were 25,278 residents in the local six-county area, comprising approximately 2.6 percent of the State's population while covering 16 percent of the State's land area. In 2008, Fergus County had the largest population in the six-county area with 11,195 residents, while Petroleum County had the least populated county with 436 residents. While Montana's population grew by more than 7 percent from 2000 to 2008, all six counties experienced a declining population during that time ranging from a 5.9-percent decline in Fergus County to a 15.2-percent decline in McCone County.

As shown in table 11, all six counties have substantially lower densities (0.3–2.6 persons per square mile) compared to that of Montana (6.6 persons per square mile). Nearly half of the residents in Fergus County live in the city of Lewistown, creating a local density of 3,055 persons per square mile. Similarly, more than 40 percent of Valley County's residents live in the city of Glasgow, resulting in a local population density of 2,075 persons per square mile. The higher local densities in these major communities indicate that rural areas outside of these communities are more sparsely populated than the county densities shown in table 11.

Communities near the Refuge. Lewistown, the county seat of Fergus County, is the largest city in the six-county area, with 5,954 residents in 2008 (U.S. Census Bureau 2008). Located in the geographic center of Montana, Lewistown has historically been an important regional trade center for the surrounding farms and ranches (Destination Lewistown 2009). Recently, there has been a great deal of growth and diversification in the local economy including recreation, tourism, and a wide variety of businesses in the small manufacturing and service sector (Destination Lewistown 2009).

Established as a railroad town in the 1880s, Glasgow, the county seat of Valley County, is the second largest city (2,921 residents in 2008) near the refuge. The construction of Fort Peck Dam (approximately 18 miles southeast of Glasgow) and the establishment and subsequent closure of Glasgow Air Force Base have been important historical events for the Glasgow economy.

Other communities near the refuge include the agricultural community of Malta (1,801 residents in 2008 and the Phillips County seat), which is also a notable stop on the Montana Dinosaur Trail. The terrain between the towns of Jordan (336 residents and the Garfield County seat) and Circle (542 residents and the McCone County seat) offers numerous recreational opportunities and is well known among paleontologists for its fossil beds (Travel Montana 2009). The agricultural town of Winnett (163 residents in 2008 and the Petroleum County seat) was formerly an oil-boom town with more than 2,000 residents in the 1920s (Travel Montana 2009).

Population Projections. As shown in table 11, Montana's population is projected to increase by 34 percent from 2000 to 2030. Based on recent trends, most of the increase in statewide population can be expected to come from the in-migration of new residents who are aged 30–49 and have children or who are older than 50 and retired, and those who are attracted to the wilderness and mountains (Kemmmick 2002, Young and Martin 2003). However, most of the increase in population is expected to occur in western Montana. In contrast, the six-county area surrounding the refuge is expected to continue to lose population in the next 20 years. Much of the loss in eastern Montana is expected to come from the emigration of people aged 20–29 leaving the region for better opportunities (Young and Martin 2003). By 2030,

Table 11. Population estimates for the Nation and the counties surrounding the Charles M. Russell and UL Bend Refuges, Montana.

<i>Area</i>	<i>2008 population</i> ¹	<i>Percent change from 2000</i> ¹	<i>Persons per square mile</i> ¹	<i>Expected population percent growth (2000–30)</i> ²
United States	304,059,724	8	80.1	—
Montana	967,440	7.2	6.6	34.2
Fergus County	11,195	-5.9	2.6	-1.6
Garfield County	1,184	-7.4	0.2	-14.8
McCone County	1,676	-15.2	0.6	-23.6
Petroleum County	436	-11.6	0.3	-20.9
Phillips County	3,904	-15.1	0.7	-21.5
Valley County	6,892	-10.2	1.4	-23
Six-county Area	25,287	-9.4	1.1	-13.3

¹Source: U.S. Census Bureau 2008; *Population Estimates, GCT-T1 and DP-1*.

²Source: NPA Data Services, Inc. 2007; U.S. Census Bureau 2008.

the counties of McCone, Petroleum, Phillips, and Valley are expected to lose more than 20 percent of their populations compared to 2000 (table 11). Garfield County is expected to lose 15 percent by 2030. Fergus County is expected to lose 4 percent by 2010 but is expected to regain some of its population, for an overall loss of approximately 2 percent by 2030. Overall, the six-county area surrounding the refuge is expected to lose approximately 13 percent between 2000 and 2030, with most of the loss occurring by 2020 (NPA Data Services 2007).

Age and Racial Composition. The six-county area surrounding the refuge has an aging population beyond that of the State of Montana as a whole. Whereas the median age of Montana in 2007 was 37.5 years, the six adjacent counties had a median age ranging 40.8–42.4 years (U.S. Census 2009). In addition, the six-county area had substantially higher proportions of residents between the ages of 65 and 84 (14.9–17.7 percent) compared with the entire State (11.7 percent) and substantially lower proportions of residents between the ages of 25 and 40 (26.8–28 percent) compared with the State (33.7 percent). The aging trend in the six-county area is likely driven by the trend of the young generation (particularly between the ages of 20 and 29) emigrating out of eastern Montana (Young and Martin 2003) in addition to the aging baby-boomer generation. The impact of retirement-age people on a community can be complex, but can include bringing in other sources of income and the desire for different types of recreation or amenities. For example, as the older recreation user groups increase, more hunters may request increased vehicle access to retrieve game and may rely on off-highway vehicles or motorboats as means to access otherwise remote hunting areas.

In 2000, the proportion of white persons not of Hispanic or Latino origin in Phillips County (89.4 percent) and Valley County (88.1 percent) was close to than the State average (90.6 percent) while the averages in Fergus County (97.1 percent), Garfield County (99.1 percent), McCone County (97 percent), and Petroleum County (99.2 percent) were greater than the State (U.S. Census Bureau 2007). The percentage of residents identifying themselves as American Indian or Native Alaskan was 6.2 percent for the State while the Phillips and Valley Counties were higher than the State average, 7.6 percent and 9.4 percent respectively, due to the presence of Indian reservations (U.S. Census Bureau 2007). The percentage of residents identifying themselves as American Indian or Native Alaskan was significantly lower than the State average for the remaining counties, ranging from 0.2 percent for Petroleum County to 1.2 percent for Fergus County.

EMPLOYMENT and INCOME

The following narrative contains information about employment trends, types of employment, current employment, and related income for Montana and the six-county area of the refuge.

Employment Trends

Employment trends in the six-county area from 1975 to 2006 are shown in figure 35 (U.S. Department of Commerce 2008). During the 30-year period, the State as a whole experienced a substantial increase in total employment. Fergus County was the only county that followed the State trend with a steady increase in employment since the early 1980s. Petroleum, McCone, and Valley Counties experienced loss in total employment until around 1990 and have been experiencing a steady recovery since. Phillips County experienced an increase in employment between 1975 and 1990, but its current total employment has been declining since the 1990 peak level. Garfield County's employment has remained relatively stable compared to the other counties in the region.

Based on the long-term trend data for employment by industry (U.S. Department of Commerce 2008), several trends explain the total employment fluctuations seen in figure 35. Decline in total employment observed in most counties before 1990 is largely attributed to the decline in farm employment as well as some rapid declines in the manufacturing industry (Valley County). Phillips County's boom and bust in employment was largely attributed to the rise and fall of the mining industry, creating a sudden decline in employment in mining as well as associated services after the gold mine closures in the 1990s. Fergus County also experienced a short boom and bust in the mining industry around 1990, but the loss of employment from the mining industry did not negatively affect total employment in the county due to the presence of other stronger industries (such as retail trade, services, and construction) that experienced growth during the same period. The employment trend data suggest that counties with higher dependency on farming, (Garfield, McCone, and Petroleum Counties) may be more likely than others to be impacted by refuge management that influence surrounding counties' farming practices.

Overall, employment in all counties in the area except Phillips County has been steadily increasing since the mid-1990s. This increase is not easily explained by the area's population trend (table 11) or the trend in employed labor force (number of persons 16 years and older who are employed) (Montana Department of Labor and Industry 2009), because both population and labor force has mostly declined

in the six-county area during the same period. It is likely that the recent increase in employment in the six-county area is explained by an increase in people with multiple jobs. The increase in people with more than one job is likely attributed to small farmers and ranchers who require supplemental income, as many are unable to make enough profit from their crops or livestock (Gruenert 1999).

Table 12 shows the percentage of total employment in Montana and the six-county area for 2005 and the percent change from 1995 to 2005. Employment is broken into two categories: (1) by wage and salary employment (people who work for someone else); and (2) proprietors (self-employed including sole proprietorships, partnerships, and tax-exempt cooperatives). In 2005, all six counties surrounding the refuge had substantially higher proportions of proprietors (39–65.5 percent) compared to the State as a whole (27.1 percent; see table 12). Approximately half of all proprietors in the six-county area are farm proprietors (those who are self-employed and run a farm, producing or expected to produce at least \$1,000 worth of crops and livestock in a typical year), whereas that of the entire State is substantially lower.

As shown in figure 35, five out of six counties surrounding the refuge have been experiencing increases in total employment since the mid-1990s. During that time, Montana also had an increase in total employment, with most of the increase coming from wage and salary employment (see table 12). However, in the six-county area, wage and salary employment has declined in many of the counties and much of the loss has been compensated by the increases in proprietor employment, particularly in

the nonfarm sector. These data indicate that, unlike the State as a whole, the six-county area is becoming more dependent on self-employment as wage and salary employment decline. In addition, while farm proprietorships have not shown substantial growth and have decreased in some cases, they are still significant components of the economic structure in the six-county area.

Current Employment and Income

Table 13 summarizes industry output, employment, and labor income (employee compensation plus proprietor income) for the six-county area. Industry output, as used here, is the value of an industry's total production expressed as a single dollar figure. The data presented in this section were compiled by the Minnesota IMPLAN (impact analysis for planning) Group from several sources including Census Bureau economic censuses, Bureau of Economic Analysis output, and employment projections developed by the Bureau of Labor Statistics (Minnesota IMPLAN Group 2007).

Consistent with the information presented in the previous section, the six-county area has substantially higher farm and ranch employment (proprietors and salary and wage employment combined) than the State as a whole, indicating that farming is an important sector in the area in terms of employment numbers. Aside from farming and governmental employment, retail trade and the service sectors also have high employment across all six counties.

During the past 30 years, Montana and the six-county area experienced a steady increase in total personal income (U.S. Department of Commerce 2008). This increase was attributed to a steady in-

Table 12. Employment by type for Montana and the counties surrounding the Charles M. Russell and UL Bend Refuges.

Location	Total employment		% Wage and salary		% Proprietors		% Nonfarm		% Farm	
	2005	% Change 1995–2005	2005	% Change 1995–2005	2005	% Change 1995–2005	2005	% Change 1995–2005	2005	% Change 1995–2005
Montana	615,864	22	73	19	27	29	23	34	4	8
Fergus County	7,654	11	61	6	39	19	27	27	12	6
Garfield County	872	9	48	-1	52	20	25	44	27	4
McCone County	1,283	7	51	-1	49	15	19	30	30	8
Petroleum County	345	24	35	-3	66	45	36	151	30	-4
Phillips County	2,645	-9	58	-16	42	4	23	4	19	5
Valley County	4,706	0.1	65	-2	35	4	20	2	15	6

Source: U.S. Department of Commerce 2008; CA30.

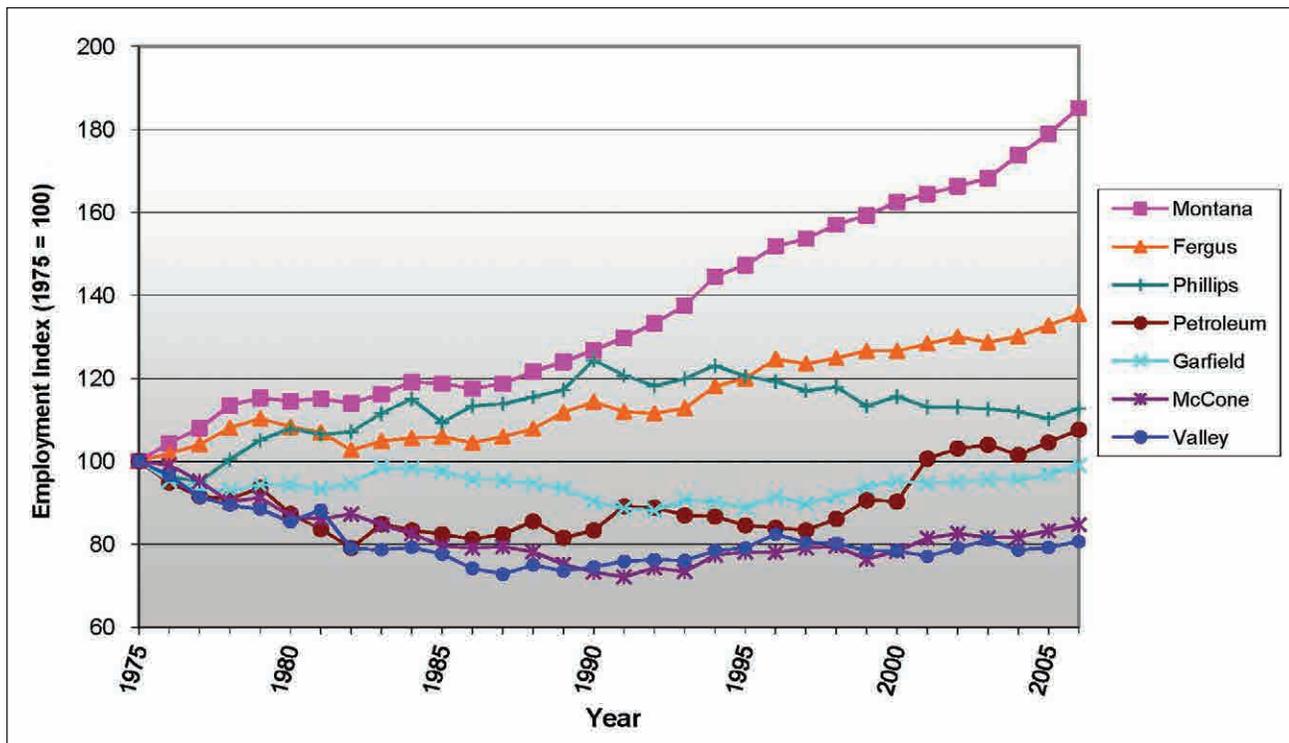


Figure 35. Graph of the total employment index for Montana and the counties surrounding the Charles M. Russell and UL Bend Refuges (1975–2006). Source: U.S. Department of Commerce 2008; CA25.

Note: Total employment includes all jobs filled within each area. Full-time and part-time jobs are counted at equal weight, and those holding two or more jobs are counted multiple times. The trend data for each of the counties and Montana are presented as an index, and are standardized with 1975 as the base year.

Table 13. Employment by industry for the counties surrounding the Charles M. Russell and UL Bend Refuges, Montana.

Industry	Industry output (\$millions)	Employment (number of full- and part-time jobs)	Labor income (\$millions)
Agriculture, forestry, fishing, and hunting	368.9	4,093	22.6
Mining	40.5	74	8.3
Construction	147.4	1,206	44.7
Manufacturing	184.2	618	22.8
Transportation and public utility	214.4	578	41.9
Wholesale trade	62.2	586	22.3
Retail trade	78.6	1,402	33.5
Finance, insurance, and real estate	237.3	1,129	32.1
Professional, scientific, and technical services	33.3	447	17.1
Health and social services	112.3	1,688	54.4
Arts, entertainment, and recreation	12.2	413	3.6
Accommodation and food services	45.6	1,026	12.6
Other services	119	1,887	29.2
Government (Federal, State, local, and military)	158.3	2,799	121.2
Total	1,814.2	17,945	466.4

Source: Minnesota IMPLAN Group, Inc. 2007.

Note: County level data are available for employment but are not shown because the new North American Industrial Classification System introduced in 2001 prevents disclosure of employment numbers for many industries in small communities.

crease in both labor and nonlabor-source incomes, but nonlabor-source incomes (transfer payments and dividends, interests, and rent) increased at a greater rate than that of labor source income despite decreasing populations in the area (U.S. Department of Commerce 2008). Such a trend suggests that there are greater proportions of individuals receiving transfer payments in the form of Social Security, Medicare, and Medicaid in these counties, further supporting the aging trend of the area.

Median household income, earnings per job, and unemployment data for the region, State, and Nation are displayed in table 14. Median household income and earnings per job are below the national average. The unemployment rate is the percentage of the labor force that is not working, but is actively seeking work. In general, the six counties' unemployment rate is similar to or less than the State average (U.S. Department of Labor 2008). Unemployment rates in all six counties along with Montana have followed a declining trend since 2000. In 2008, unemployment rates were lower for Montana and the six-county area than the national average. McCone and Garfield Counties have the lowest unemployment rates in the region despite having lower average earnings per job than all but one of the other counties in the region. The lower median income, earnings, and unemployment in the six-county area compared to the State average aligns with the aging population (less people actively seeking work) and the growing number of people with more than one job to supplement their income.

KEY REFUGE ACTIVITIES that AFFECT the LOCAL ECONOMY

The ability of the refuge to influence local economic activity and desired economic conditions is related to the Service's land use decisions and associated land

uses. Livestock grazing, tourism, and recreation are the prominent resource-based industries with ties to the refuge, and are described in more detail in the next section.

Livestock Grazing

Farming and ranching are important cultural forces in eastern Montana including the areas surrounding the refuge. As was shown in table 13, farming is the largest employer in each of the six counties surrounding the refuge. From 2001 to 2007, agricultural employment in the six-county area has remained fairly stable, averaging 3,408 jobs, with a high of 3,487 in 2002 and a low of 3,373 in 2007 (U.S. Department of Commerce 2008). In 2007, Fergus County had the highest percentage of agricultural jobs of the six counties surrounding the refuge with 1,075 jobs, or 32 percent of total farm employment. As shown in figure 36, Valley County had the second highest farm employment with 826 jobs, or 25 percent of the total for the area. Phillips County consisted of 613 jobs (18 percent), McCone County had 444 jobs (13 percent), and Garfield County had 298 jobs (9 percent). Petroleum County had the fewest farm jobs with only 117, or 3 percent of total agricultural employment of the six-county total.

More United States farmers now hold off-farm jobs in addition to their farm operation, and off-farm income now makes up a larger proportion of the total household income of United States' farmers (Fernandez-Cornejo 2007, Gruenert 1999). This trend is clear in Montana and in the six-county area. Although the proportion of farm operators primarily employed in farming is higher in the region compared to the State, this proportion has decreased in recent years (see table 15). Garfield County has the highest proportion of farmers whose primary occupation is farming, while Valley County had the lowest.

Table 14. Income, earnings, and unemployment for the Nation, Montana, and counties surrounding the Charles M. Russell and UL Bend Refuges.

<i>Area</i>	<i>Median household income (\$)¹</i>	<i>Average earnings per job (\$)²</i>	<i>Unemployment rate²</i>
United States	50,740	48,900	5.8
Montana	43,000	34,433	4.5
Fergus County	37,259	28,417	4.2
Garfield County	32,694	21,053	3.3
McCone County	38,535	21,135	2.6
Petroleum County	28,254	17,851	5.3
Phillips County	33,798	22,685	4.5
Valley County	37,019	27,091	3.8
Six-county average	34,593	23,039	4

¹Source: U.S. Census Bureau 2007.

²Source: U.S. Census Bureau 2008.

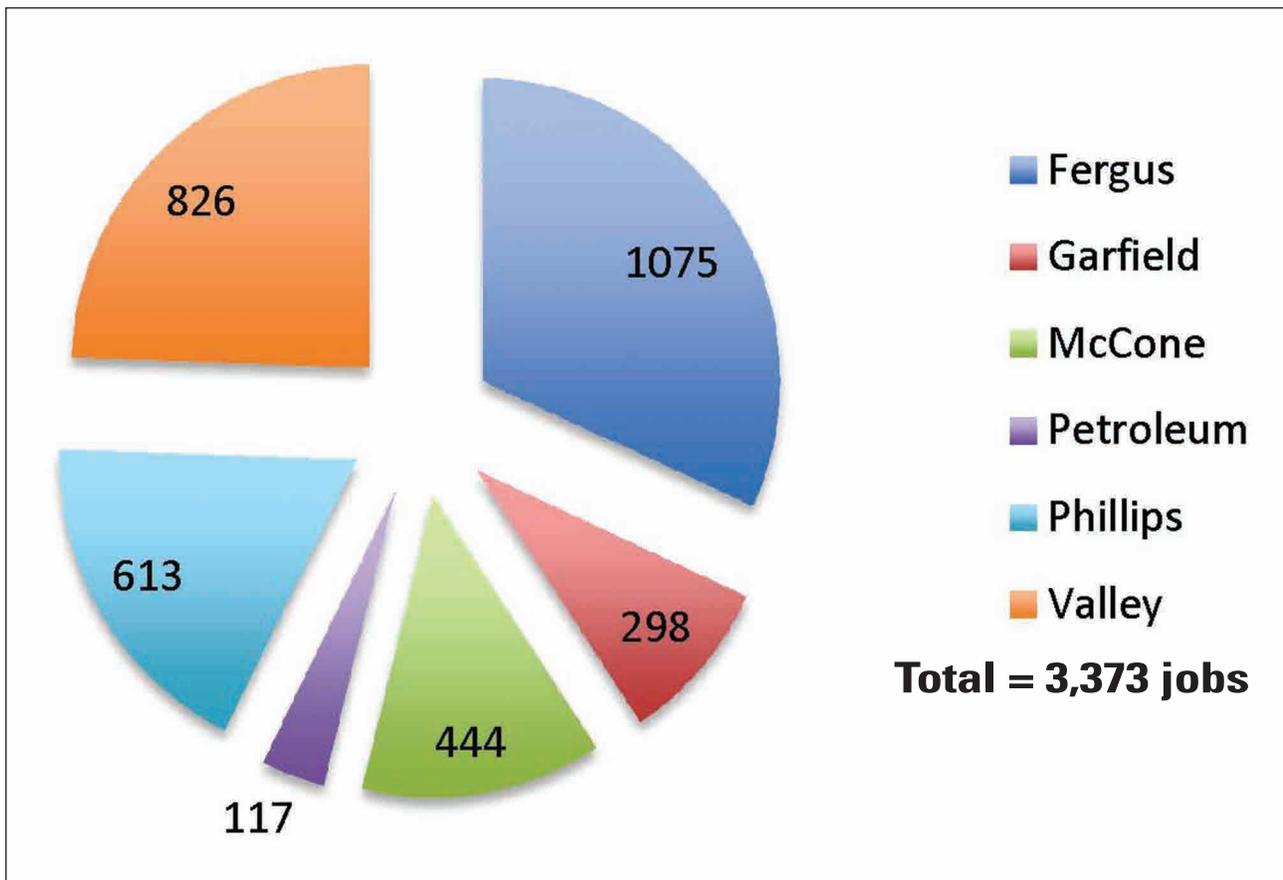


Figure 36. Chart of agriculture employment in the six counties surrounding the Charles M. Russell and UL Bend Refuges, Montana. Source: U.S. Department of Commerce 2008.

Table 15. Farm operators whose primary employment is farming in Montana and the counties surrounding the Charles M. Russell and UL Bend Refuges.

Year	Montana	Fergus County	Garfield County	McCone County	Petroleum County	Phillips County	Valley County
2007	51%	60%	77%	69%	72%	65%	58%
2002	64%	69%	84%	70%	73%	72%	73%

Source: USDA 2009, table 46.

From 2001 to 2007, agricultural earnings in the six counties surrounding the refuge were stable, with an average of \$17.1 million dollars per year (U.S. Department of Commerce 2008). The highest value (just over \$18 million) occurred in 2002, and the lowest (just under \$16 million) occurred in 2003. In 2007, agricultural earnings totaled just under \$18 million, with the largest earnings in Fergus County of \$4.5 million, or 25 percent of total earnings in the six-county area. Phillips County had the second largest earnings in 2007 with \$4.2 million, or 24 percent of the total. Valley County had \$3.5 million (20 percent), McCone County had \$2.6 million (14 percent), and Garfield County \$2.3 million (13 percent). Petroleum County had the lowest agricultural earnings

with only \$812 thousand, or 4 percent of the total agricultural earnings in the six-county area in 2007.

Agricultural Revenues from Livestock. Gross revenues from livestock have averaged about 46 percent of total gross revenue from agricultural operations over the past 40 years (see figure 37). The lowest percentage (37 percent) of livestock revenue occurred in 1996, while the highest (62 percent) occurred back in 1971. Gross revenues from crops averaged 35 percent over this time span, with a low of 24 percent in 1971, and a high of 60 percent in 1974. Other agricultural income averaged 19 percent, with a low of 3 percent in 1974 and a high of 32 percent in 1986. Other sources of revenue for agricultural operations

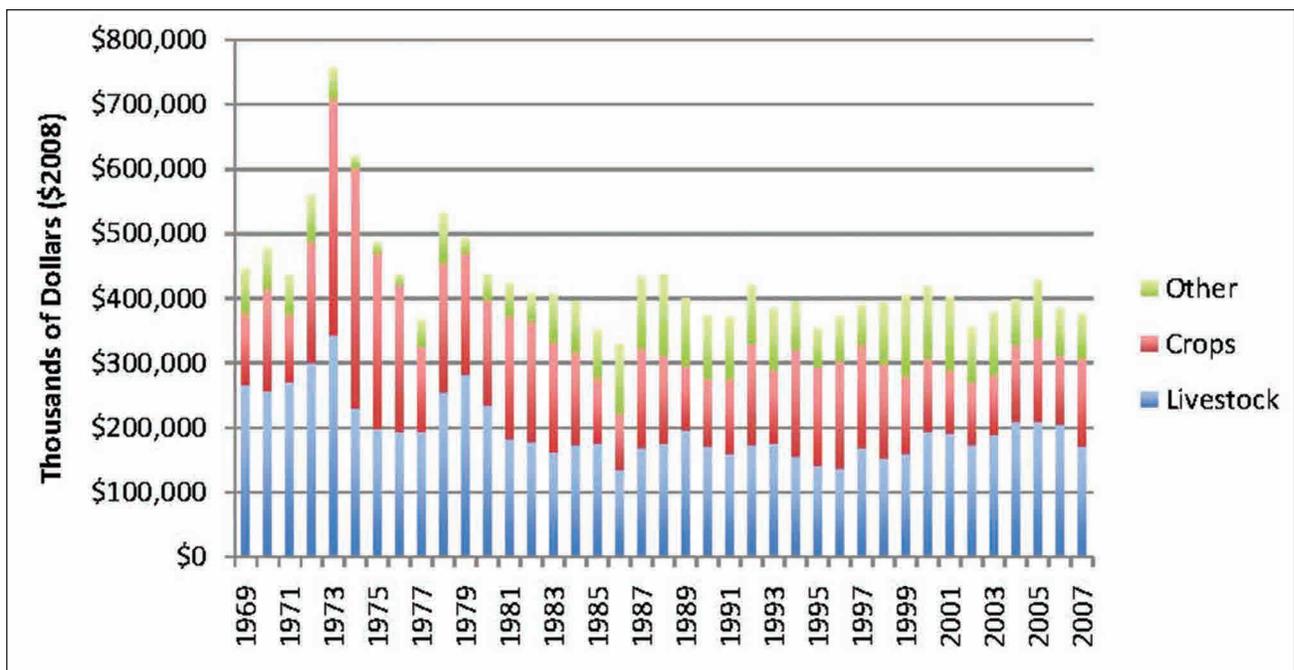


Figure 37. Chart of trends in gross revenues from agriculture in the area surrounding the Charles M. Russell and UL Bend Refuges, Montana (1969–2007). *Source: U.S. Department of Commerce 2008; other sources of revenue for agricultural operations include Government payments, value of home consumption, machine hire and custom work, rental income, and income from forest products.*

include Government payments, value of home consumption, machine hire and custom work, rental income, and income from forest products.

In 2007, gross revenue for agricultural operations in the six counties surrounding the refuge totaled \$364.7 million (U.S. Department of Commerce 2008). This total consists of \$164 million (45 percent) from livestock, \$133 million (36.5 percent) from crops, and \$67.7 million (18.5 percent) from other sources. Fergus County had the largest gross revenues from agriculture (\$107.5 million), followed by Valley County (\$81.2 million), Phillips County (\$64.6 million), McCone County (\$56.1 million), and Garfield County (\$53.1 million). Petroleum County had the lowest total gross revenue from agricultural operations with \$14.5 million, or 3.8 percent of the six-county total.

As shown in figure 38, livestock ranged from a low of 23 percent of total gross revenue from agricultural operations in McCone County to a high of 67 percent in Petroleum County. Valley (35 percent) and Fergus (48 percent) were the only two other counties that had less than 50 percent of total gross revenue from agricultural operations from livestock. In Phillips County, livestock accounted for 53 percent of total gross revenue from agricultural operations, while in Garfield County it account for 61 percent.

Cattle Inventories. Between 1950 and 2009, cattle inventory for the six counties surrounding the refuge has averaged 378,988 head. During this time, the

cattle inventory has ranged from a low of 244,100 in 1950 to a high of 513,400 in 1975 (figure 39). As shown in figure 39, the name change to Charles M. Russell National Wildlife Refuge was initiated in 1976 when there were 474,700 head of cattle in the six-county area. When the 1986 EIS for the refuge was completed in 1986, cattle numbers in this area were 338,000 head. When the 1986 EIS was implemented in 1991, cattle numbers were 329,400 head. In 2008, there were 382,400 head of cattle in the six-county area, while the refuge supplied 18,872 AUMs. This number has steadily declined from 22,470 AUMs supplied in 2001 to 17,883 AUMs in 2007, with a slight increase to 18,872 AUMs in 2008 (+5.5 percent over 2007 levels, yet –16 percent from 2001 levels). However, over this same period, the number of cattle in the six-county area has increased from 361,400 in 2001 to 382,400 in 2008 (+2.8 percent over 2001 levels).

AUM Inventory by County. In 2008, Fergus County had the highest inventory of cattle and calves, while Garfield County had the highest inventory of sheep and lambs (table 16).

As shown in table 17, of the Federal agencies supplying AUMs in the six-county region, BLM supplied the largest proportion (21 percent) in 2008, followed by DNRC with 7 percent and the Service with just less than 1 percent. Non-Federal grazing permits or owned or leased land supplied the remaining 72 percent of AUMs in the region.

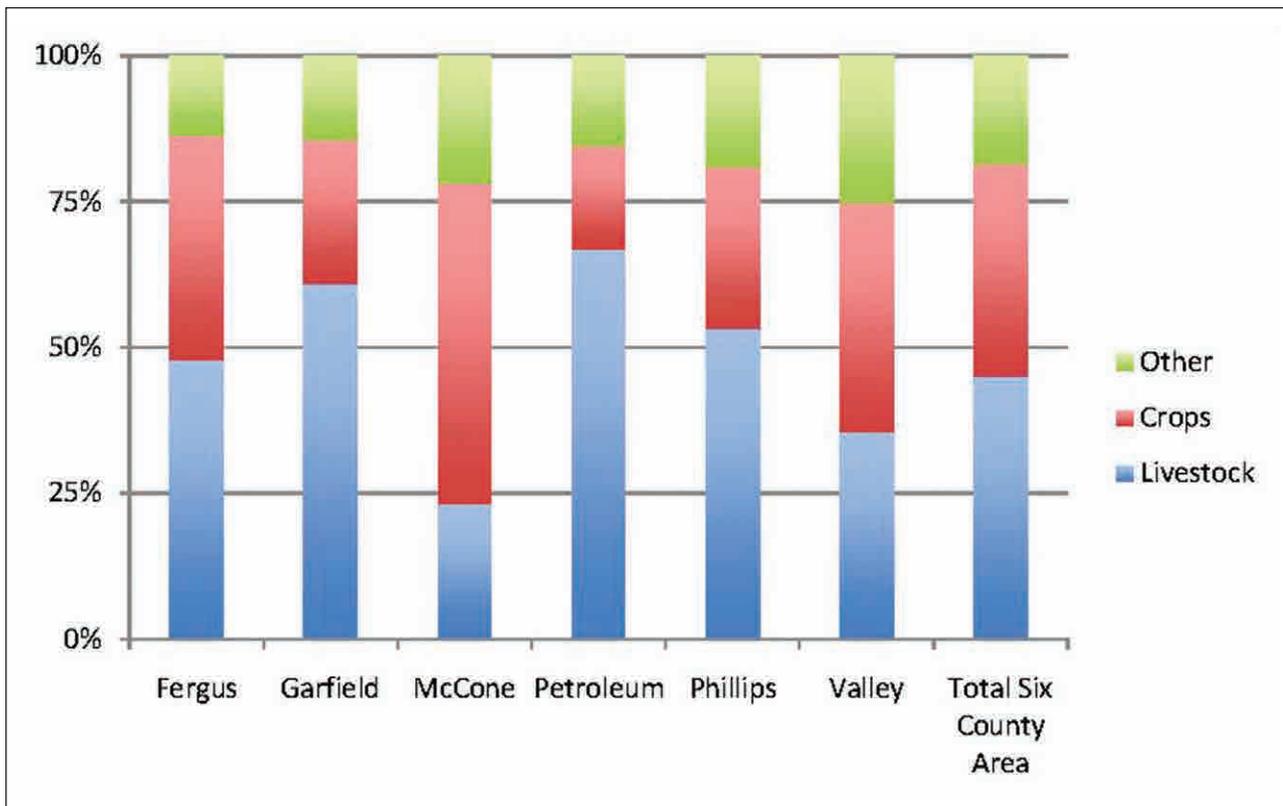


Figure 38. Chart of the breakdown of gross revenues from agriculture for the six counties surrounding the Charles M. Russell and UL Bend Refuges, Montana (2007). Source: U.S. Department of Commerce 2008. Other sources of revenue for agricultural operations include Government payments, value of home consumption, machine hire and custom work, rental income, and income from forest products.

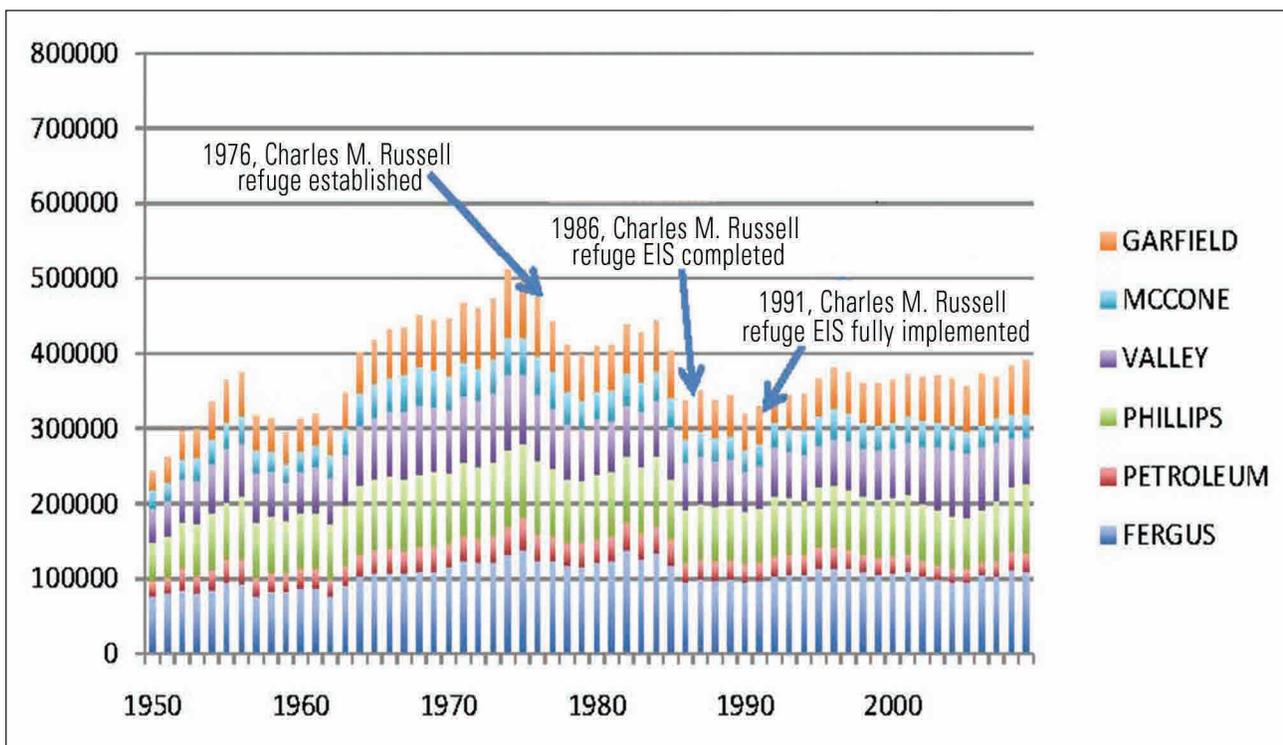


Figure 39. Chart of the cattle inventory for the six counties surrounding the Charles M. Russell and UL Bend Refuges, Montana (1950–2009). Source: USDA 2008.

Table 16. Animal inventory and animal-unit months (AUMs) of feed needed for the counties surrounding the Charles M. Russell and UL Bend Refuges, Montana.

County	Cattle and calves inventory*	Sheep and lamb inventory	Total AUMs of feed needed**
Fergus	116,094	6,062	711,113
Garfield	68,390	23,444	466,606
McCone	38,780	6,763	248,911
Petroleum	26,155	4,032	166,607
Phillips	80,791	10,511	509,972
Valley	71,167	2,184	432,244
Total	401,377	52,996	2,535,452

Source: USDA 2009, tables 12 and 17.

*Cows and calves are each counted as one unit. The agricultural census figure is the physical number of animals at the end of December, not the annual average, so is likely an underestimate.

**Calculated as [(cattle and calves inventory / 2) × 12 months] + [(sheep and lamb inventory / 5) × 12 months]

Table 17. Total animal-unit months (AUMs) for the counties surrounding the Charles M. Russell and UL Bend Refuges, Montana (2008).

County	Total annual AUMs of feed needed ¹	U.S. Fish and Wildlife Service ²		Bureau of Land Management ³		Montana Department of Natural Resource Conservation ⁴		Other	
		AUMs	% of total AUMs	AUMs	% of total AUMs	AUMs	% of total AUMs	AUMs	% of total AUMs
Fergus	711,113	857	0.1	58,943	8.3	31,160	4.4	620,153	87.2
Garfield	466,606	7,088	1.5	91,961	19.7	32,784	7	334,773	71.7
McCone	248,911	2,601	1	40,135	16.1	18,951	7.6	187,224	75.2
Petroleum	166,607	501	0.3	65,302	39.2	13,017	7.8	87,787	52.7
Phillips	509,972	6,020	1.2	120,801	23.7	37,475	7.3	345,676	67.8
Valley	432,244	4,514	1	143,975	33.3	44,208	10.2	239,547	55.4
Total	2,535,452	21,581	0.9	521,117	20.6	177,595	7	1,815,159	71.6

¹ Calculated as [(cattle and calves inventory / 2) × 12 months] + [(sheep and lamb inventory / 5) × 12 months]
Dependency = agency AUMs / total AUMs of feed needed.

² U.S. Fish and Wildlife Service numbers are a 10-year annual average.

³ BLM source: Rhodes, personal communication, April 2009.

⁴ DNRC source: C. Rooney, personal communication, April 2009.

⁵ Other = private and other non-State or non-Federal lands. This is actually an underestimate; the agriculture census is the physical number at the end of December, not the annual average.

As shown in table 17 and figure 40, nongovernment lands supplied the most AUMs (ranging from 55 percent for Valley County to 87 percent in Fergus County) while the Service supplied the least amount (ranging from 0.1 percent for Fergus County to 1.5 percent for Garfield County). Although Valley County had the largest number of AUMs supplied by a Government agency (143,975 BLM AUMs), Petroleum County had the largest percentage of AUMs supplied by a Government agency (39.2 percent of BLM AUMs). Valley County had the largest reliance (both in absolute and percentage terms) on DNRC lands, with 44,208 AUMs (10.2 percent of total county AUMs).

Tourism and Recreation

This section describes how tourism and recreation in Montana and around the refuge affect the local economy.

Tourism and Outdoor Recreation in Montana and Counties Surrounding the Refuge. Montana residents and visitors to the State take part in a variety of outdoor recreation activities. According to the 2006 “National Survey of Fishing, Hunting, and Wildlife-Associated Recreation,” approximately 950,000 residents and nonresidents took part in wildlife-associated activities in Montana (FWS 2008e). Of all participants, 31 percent fished for 2.9 million fishing days, 21 per-

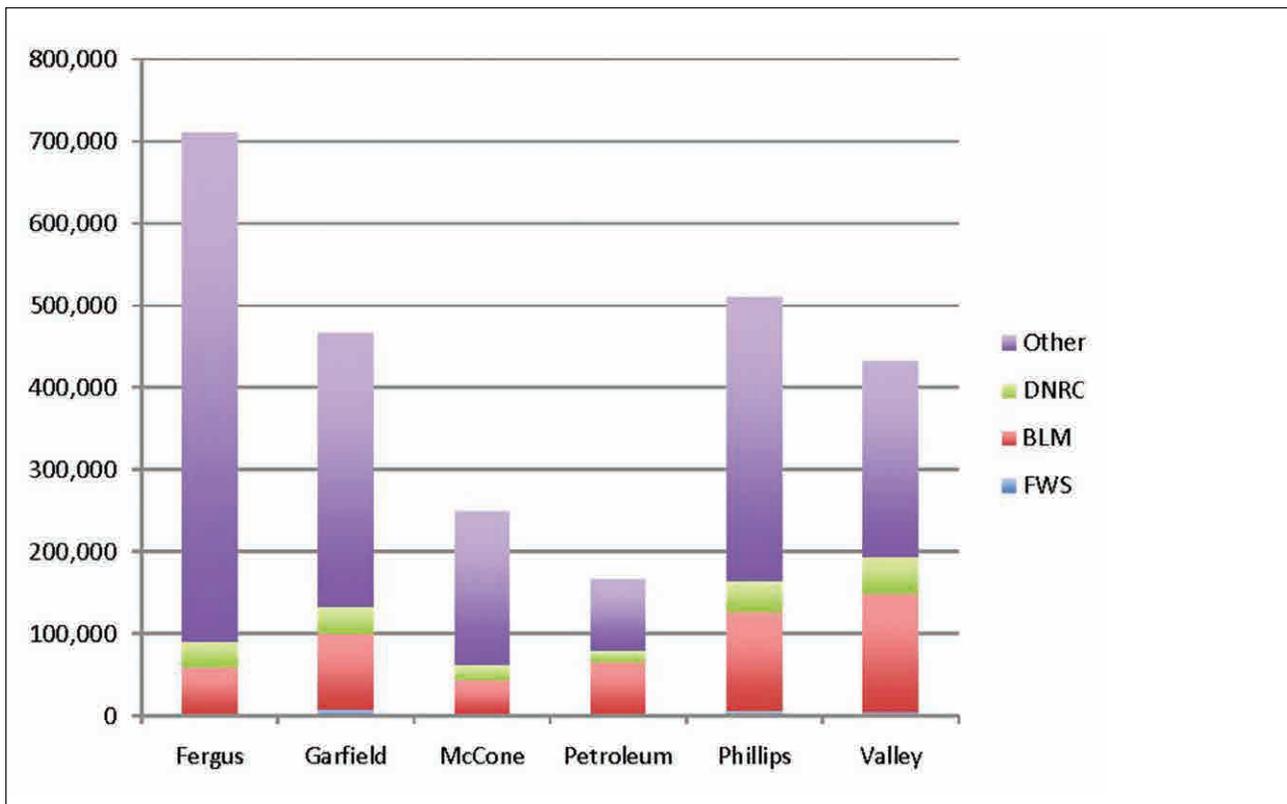


Figure 40. Chart of animal-unit months by agency for the six counties surrounding the Charles M. Russell and UL Bend Refuges, Montana (2007). Source: USDA 2009.

cent hunted for 2.1 million hunting days, and 79 percent participated in wildlife-watching for 3.1 million activity days. Montana residents had the highest per capita hunting participation in the country at 20 percent, and fishing participation was high at 23 percent. Most of the anglers (59 percent) and hunters (74 percent) in Montana were State residents, while most of the away-from-home, wildlife-watching participants in Montana were nonresidents (67 percent). These wildlife-associated activities in Montana generated \$1.1 billion in 2006, with \$231 million generated from fishing activities, \$311 million from hunting activities, and \$376 million from wildlife-watching activities.

Tourism and Recreation in Travel Regions Surrounding the Refuge. Montana is divided into six travel regions for similar historical, cultural, climatic, and geological features. The six-county area surrounding the refuge falls into two travel regions. Fergus and Petroleum Counties are included in the Russell Country travel region, which encompasses the north-central part of the State including Great Falls. Garfield, McCone, Valley, and Phillips Counties are included in the Missouri River Country, which encompasses most of the refuge and the northeastern part of the State.

While travel, tourism, and recreation contribute significantly to Montana's economy, most of these

activities occur in the western parts of the State, bringing substantially less benefits to the Russell Country and Missouri River Country travel regions compared to the other regions. Among all of the non-resident overnight stays in Montana in 2005, only 8 percent of nights were spent in the Russell Country and 3 percent in the Missouri River Country (Rademacher and Nickerson 2006). Similarly, nonresident expenditures in Russell Country accounted for 8 percent of the State total (Oschell and Nickerson 2006b), while Missouri River Country accounted for 1 percent (Oschell and Nickerson 2006a). Lodging tax revenue growth was also lower in Russell and Missouri River Country travel regions. Both regions experienced approximately 8 percent growth from 1995 to 2005 (adjusted for inflation in 2005 dollars) while the other four travel regions experienced 19–39 percent growth during the same period (Montana Department of Commerce 2008).

Nevertheless, Russell Country received 976,140 visitors in 2005 who spent \$216.8 million in the travel region for various travel-related expenses (Oschell and Nickerson 2006b). Travelers to Russell Country took part in activities similar to those visiting Missouri River Country, such as driving for pleasure (55 percent), wildlife watching (40 percent), visiting Lewis and Clark sites (31 percent), recreational shopping (29 percent), day hiking (29 percent), visit-

ing historical sites (26 percent), picnicking (26 percent), and visiting museums (26 percent). The refuge was visited by 8 percent of the Russell County visitors, and was the sixth most visited site.

Likewise, 283,013 nonresident visitors traveled to the Missouri River Country, spending \$32.9 million in the area for expenses such as gas, food, shopping, and lodging (Oschell and Nickerson 2006a). Visitors to Missouri River Country took part in activities such as driving for pleasure (46 percent), wildlife watching (39 percent), visiting museums (31 percent), day hiking (29 percent), picnicking (28 percent), visiting Lewis and Clark sites (27 percent), visiting historical sites (20 percent), developed camping (20 percent), and fishing (16 percent). Fort Peck Lake, which lies within the refuge, was the second most visited site among all Missouri River Country nonresident visitors (21 percent), and the refuge was the fourth most visited site (14 percent).

LAND USE and OWNERSHIP CHANGES SURROUNDING the REFUGE

Outdoor recreational amenities are an important factor in attracting and keeping residents and small businesses in the West (Rasker and Hansen 2000, Rasker 2006). Migrants to the West have been found to select work and residences based on scenic amenities, access to recreational opportunities, and a desire to escape urban problems (Egan and Luloff 2000, Rudzitis 1999, Rudzitis and Johansen 1989, Salant et al. 1997, Vias 1999). Rapidly rising land prices in western Montana are also spurring demand, especially among recreational buyers, for large tracts of land in eastern and central parts of the State (Norman C. Wheeler and Associates 2008). The aging landowner population has further contributed to the turnover of land from production to rural residential development (Johnson 2004).

Seasonal and Recreational Housing

The number and proportion of housing units designated for seasonal or recreational use can provide insight into the types of landowners in an area, which is important for several reasons. Absentee landowners may have different opinions of how the refuge should be managed. Seasonal or part-time residents typically do not generate as much local economic activity because they make fewer purchases within the region and generate less income tax revenue. However, they will continue to pay property taxes and, because they do not require services year-round, they will typically require fewer local government services over the course of a year compared to full-time residents.

Much of the land surrounding the refuge is owned by BLM. The remaining is mostly in private owner-

ship. As shown in table 18, the six-county area surrounding the refuge experienced an increase in seasonal housing units between 2000 and 2008, which may reflect the recent trend in private property purchases for hunting and other recreational uses in areas surrounding the refuge (Barron Crawford, project leader, Charles M. Russell National Wildlife Refuge; personal communication, fall 2009). However, the proportion of seasonal-use housing units rose only very slightly. Valley and Garfield Counties have the highest number of seasonal units, which can be partially attributed to the presence of leased cabin sites within refuge recreation areas in those counties. Garfield County has the highest proportion, by far, of seasonal housing, which is in line with its designation as a retirement destination, assuming that a significant number of those retirees are only part-time residents of the county.

Table 18. Seasonal housing in the counties surrounding the Charles M. Russell and UL Bend Refuges, Montana.

<i>County</i>	<i>Seasonal housing units</i>		<i>% of total housing units 2000</i>
	2000	% Change from 1990	
Fergus	187	3	3.4
Garfield	293	12	30.5
McCone	107	-14	9.8
Petroleum	28	-30	9.6
Phillips	264	4	10.6
Valley	376	43	7.8
Total	1,255	3	12

Historically property sales in eastern Montana were made primarily by agricultural operators from western Montana seeking to move or expand their operations to a more affordable area. This trend is shifting more toward individuals and investors interested in the recreational amenities such as hunting and fishing. As a result, the number of seasonal units is expected to continue increasing in eastern Montana including the areas surrounding the refuge.

Most of the access roads to the refuge lands cross private lands. These mostly dirt roads are not designated as public roads or do not have rights-of-way or easements owned by local, State, or Federal governments. As a result, some roads on private lands that the public have traditionally used to access the refuge are being closed by private landowners, and the closures are reducing the number of access roads available to the public (Barron Crawford, project leader, Charles M. Russell National Wildlife Refuge; personal communication, fall 2008). These closures are seen more on lands that have recently been sold to

new owners, many of whom have bought land for private hunting access or paleontological resource use.

Changing Land Use near the Refuge

Next to the northern border of the refuge near the eastern end of the UL Bend National Wildlife Refuge in Phillips County lies the American Prairie Reserve managed by the American Prairie Reserve. As of 2011, the foundation had more than 123,000 acres in deeded and leased land acquired since 2004 for a prairie-based wildlife reserve (American Prairie Foundation 2011). Within the reserve is a 2,600-acre enclosed bison range that supports a herd of nearly 200 bison (as of spring 2010) initially translocated from Wind Cave National Park in South Dakota. The foundation plans to continue acquiring land for the preserve, as well as expand the bison herd and bison range, restore other native prairie wildlife, preserve human history, and manage the preserve for public use such as hiking, birdwatching, camping, and hunting.

A socioeconomic impacts analysis conducted for American Prairie Reserve in 2002 concluded that, under most examined scenarios, the regional economic impacts of eliminating cattle grazing on the proposed prairie reserve would be more than offset by conservation management expenditures (Duffield and Neher 2002). However, as a result of the establishment of the American Prairie Reserve, Phillips County has experienced negative economic impact from the loss of grazing as well as associated retail sales (Dunbar and Robinson, Phillips County commissioners; personal communication, fall 2008). Other residents fear that the purchases of large acreage of land by nonprofit conservation groups as well as non-resident buyers are replacing family-oriented farms with absentee owners who contribute little to local schools and businesses (Thackeray 2006).

The Nature Conservancy manages the 60,000-acre Matador Ranch located north of the refuge along Highway 191 near Zortman, Montana. The ranch is leased out to area ranchers at discounted rates, and ranchers agree to take certain conservation actions on their own grazing lands in exchange (Red Lodge Clearinghouse 2008). As part of the partnership, ranchers protect prairie dog colonies and sage-grouse leks, control invasive plants and agree not to plow their grazing lands during their leases. As a result, many of the ranchers have received the Montana State University's Undaunted Stewardship Certification. The partnership also resulted in the formation of the Ranchers Stewardship Alliance, a community-based conservation group that promotes "ecological, social and economic conditions that will sustain the biodiversity and integrity of America's northern mixed-grass prairie for present and future generations" (Ranchers Stewardship Alliance 2008).

A recent report by the World Wildlife Fund (Freese et al. 2009), highlights the expanding role of nature-based economic activities in supporting and diversifying the economic structure in northern Great Plains communities. The report suggests that "landowners, businesses, and local communities may be able to increase and diversify economic activities through three major categories of nature-based economic development: (1) natural amenities, which include those natural features of the landscape that make a place attractive for visiting (for example, ecotourism and hunting) or living; (2) ecosystem products, which include commercial products harvested from native or seminative ecosystems, such as native plant seeds and native vegetation, whether harvest directly as hay or indirectly by livestock grazing; and (3) other ecosystem services, which include many services from healthy ecosystems for which no or only quasi-markets exist, such as provisions for clean water, prevention of soil erosion, and carbon sequestration, and nonuse services such as the value people derive from knowing wildlife exists and from conserving wildlife for future generations" (Freese et al. 2009).

ATTITUDES, VALUES, and BELIEFS

As much of the data presented in this report show, eastern Montana is a changing landscape. Over the past several years, there have been changes in demographics, changes in prevailing economic sectors, and changes in land use and ownership patterns. Many of these changes are interrelated. When evaluating both historical and anticipated future change, it is important to understand public attitudes, values and beliefs toward the resources the refuge aims to protect and the effects of refuge management on the community. This information provides insight into closely held opinions about quality of life issues not as easily captured with demographic information provided in this report.

Public values toward wildlife are changing across the United States, in particular in the western United States. A study examining people's views about wildlife in 19 western States (Teel et al. 2005) identified four types of values people hold toward wildlife, called wildlife value orientations. These wildlife value orientations are related to people's support toward management actions and participation in wildlife-associated recreation. The "utilitarian" value orientation is associated with the belief that wildlife should be used and managed for human benefit, whether it is for recreational, personal, or economical purposes. On the other hand, the "mutualist" value orientation is associated with the belief that humans and wildlife are meant to coexist or live in harmony. Those who possess both utilitarian and

mutualist values are called “pluralist.” The final category, “distanced,” is given to those who do not have either a utilitarian or a mutualism orientation, and generally have a lack of interest in wildlife-related issues and less participation in wildlife-related activities compared to the other value orientation types.

Results from the study suggest that the western United States as a whole is gradually moving away from the more traditional utilitarian value orientation and moving more toward the less traditional mutualist value orientation (table 19). In Montana, however, nearly half of the State (47 percent) was found to hold the traditional utilitarian value orientation, while only 19 percent were categorized as mutualists. Considering that the area surrounding the refuge is considerably more rural compared to some of the western portions of Montana, it is likely that even higher proportions of residents around the refuge hold utilitarian value orientations toward wildlife, while those living in urban areas of the State hold more mutualist value orientations. This suggests that visitors to the refuge from nearby counties may be more interested in hunting and other consumptive activities on the refuge, while those coming from urban areas may be more interested in nonconsumptive activities such as wildlife watching. This may also affect the type of hunting experience visitors are seeking.

In addition to people’s general perceptions about wildlife and natural resources, their attitudes toward the refuge and its management specifically form the basis of their level of support for management actions. The Service’s public scoping process revealed several important qualities of the refuge that residents of the six-county area value. Some people expressed appreciation for the intrinsic values of the refuge (such as its scenic beauty, remoteness, abundance of wildlife, and unique ecosystem), while others expressed appreciation for the recreational value that the land provides (such as hunting, fishing, and wildlife watching) (FWS 2008b). In addition to these intrinsic and recreational values, local residents emphasized two other values associated with the refuge: historical value and economic value. Many residents in the area have had family ties to the land for several generations, and strive to keep unique traditions and way of life for its historical value. Local communities derive economic value from the refuge through grazing leases, as well as the money that recreational visitors spend in the region. However, some local residents believe that past management approaches in the refuge have negatively affected the local economy, while others believe that increasing visitor numbers to the refuge will require more infrastructure maintenance in local communities.

Table 19. Wildlife value orientations and proportions in the western States and Montana.

<i>Wildlife value orientation type</i>	<i>Description</i>	<i>Percent in 19 western States</i>	<i>Percent in Montana</i>
Utilitarian	Believe that wildlife should be used and managed for human benefit.	34	47
Mutualist	Believe that humans and wildlife are meant to coexist or live in harmony.	33	19
Pluralist	Hold both a mutualism and utilitarian value orientation toward wildlife.	20	27
Distance	Distanced from the issue of wildlife. Do not hold either a mutualism or a utilitarian orientation toward wildlife.	13	7

Source: Teel et al. 2005.

4—Management Direction



USFWS

Proposed wilderness units on the refuge provide secure habitat for wildlife like these bighorn sheep.

Starting with an overview, this chapter describes the management direction for the Charles M. Russell and UL Bend National Wildlife Refuges. As presented in sections 4.2–4.9, the objectives and strategies are designed to achieve the refuge purposes, vision, and goals; the mission of the Refuge System; and the mission of the Fish and Wildlife Service (refer to chapters 1 and 2).

The last sections of this chapter describe important aspects of implementation, monitoring, and review of the CCP:

- 4.10 Stepdown Management Plans
- 4.11 Plan Monitoring and Evaluation
- 4.12 Plan Amendment and Revision
- 4.13 Funding and Personnel

4.1 MANAGEMENT OVERVIEW

The Service will begin to carry out the CCP immediately on publication of the record of decision (appendix A) in the Federal Register, in 2012. Selected management activities and projects will be carried out as money becomes available. The plan does not constitute a commitment for funding, and future budgets could influence implementation priorities.

ECOLOGICAL PROCESSES EMPHASIS

In cooperation with partners, the Service will use natural, dynamic ecological processes and management activities in a balanced, responsible manner to

restore and maintain the biological diversity, biological integrity, and environmental health of the refuge. Once natural processes are restored, a more passive approach (less human assistance) will be favored.

Figure 41 depicts the CCP management direction for resources and public use, which is summarized below:

- *Habitat:* To maintain plant diversity and health in upland and riparian areas on the refuge, fire will be used in combination with wild ungulate herbivory (wildlife feeding on plants) or prescriptive livestock grazing, or both.
- *Water:* By increasing streamflows, pools, and beaver ponds on the refuge, the natural water processes will be restored. Select stock ponds will be maintained.
- *Wildlife:* The health and diversity of all species' populations will be restored and maintained on the refuge as balanced, self-sustaining populations through coordinated habitat and wildlife objectives and public use objectives such as hunting.
- *Threatened and endangered species:* Through disease management, population augmentation, or habitat manipulation, the refuge will protect or enhance threatened and endangered species and other species of concern.
- *Research:* Research and monitoring will be designed to understand the interaction between fire, grazing, plant response, wildlife populations, and other ecological factors affecting the refuge.

- *Fire*: Prescribed fire will restore the natural fire regime on the refuge. Wildfires will be evaluated to determine management response.
- *Public use*: There will be an emphasis on quality wildlife-dependent public uses, experiences, and facilities at the refuge for hunting, fishing, wildlife observation, photography, environmental education, and interpretation.
- *Access*: Secure access will be provided to the refuge. Access will be primarily managed to benefit natural processes, but some improvements will be made for quality visitor experiences.
- *Economic use*: These uses will be limited when they are injurious to ecological processes.
- *Wilderness*: The UL Bend Wilderness, 15 proposed wilderness units, and 8 wilderness study areas will be protected.
- *Cultural and paleontological resources*: Significant cultural and paleontological resources will be protected and managed.
- *Refuge operations*: Personnel will be added—outdoor recreation planners, law enforcement officer, refuge manager, maintenance employees, and fire specialist. Facilities will be expanded including office space, a bunkhouse, and a science interpretive center.
- *Partnerships*: The CCP will be carried out through partnerships with agencies, counties, conservation districts, private landowners, communities, and others.

LEGAL COMPLIANCE and RESOURCE PROTECTION

The Service will comply with all applicable laws, regulations, and policies for management activities that could affect refuge resources such as soil, water, air, threatened and endangered species, cultural resources, and paleontological resources. Disturbance activities include subsurface mineral reservations and management of utility lines, easements, contaminants, and invasive species. A list of key legislation and policies that the Service adheres to is in appendix E.

The Service will continue to protect all areas with special land designations: wilderness, proposed wilderness, wilderness study areas, the Lewis and Clark National Historic Trail, the Hell Creek and Bug Creek Fossil Areas, the research natural areas, and the Upper Missouri River Breaks Wild and Scenic River.

INTRODUCTION to the GOALS, OBJECTIVES, and STRATEGIES

Based on the vision and goals for the refuge, the Service developed objectives and strategies:

- Objectives are concise statements of what needs to be achieved; how much, when, and where it will be achieved; and who will be responsible. An explanation, or rationale, for each objective describes how and why the objective's actions are important to achieving the associated goal.
- Strategies are specific activities or techniques that are used to achieve objectives.

Objectives provide the basis for monitoring refuge accomplishments and evaluating success in meeting the goals. To the extent possible, each objective has been developed to be specific, measurable, achievable, results-oriented, and time-fixed (FWS 2000c). Timeframes for the objectives are based on the assumption that implementation will occur over 15 years.

Focal, Target, and Sentinel Species

It is important to understand the designations for species that the refuge staff has identified for management and monitoring in the plan, as detailed in the objectives and strategies.

- A *focal bird species* is representative of a broader group of species that share similar conservation needs. It may have restrictive habitat needs or be more sensitive to or limited by certain ecological processes or management activities such as fire or grazing. For example, an area that supports Sprague's pipit also supports western meadowlark, but an area that supports western meadowlark does not necessarily support Sprague's pipit (Lambeck 1997). The Service identified 13 focal bird species for habitats on the refuge: uplands (6 species), river bottoms (3 species), and riparian areas and wetlands (4 species).
- A *target wildlife species* is one the Service chose to manage for specific biological or social reasons. A target species could be a focal, endangered, big game, or other species. Establishing a hutable bighorn sheep population east of Timber Creek is an example of a species being targeted for a specific area.
- A *sentinel plant species* is one that vanishes first when ecological processes are out of balance. The Service identified 23 sentinel plant species to monitor as indicators of refuge habitat conditions. An important limiting component for many wildlife species is the availability of quality foods (White 1978); for example, the sentinel Maximilian sunflower provides valuable wildlife forage, fruit, and pollen-producing food plants and is desired by both wildlife and livestock.

As the landscape conservation cooperatives described in chapter 1 (section 1.5) are starting to integrate strategic habitat conservation across landscapes larger

Figure 41 follows (two foldout pages)

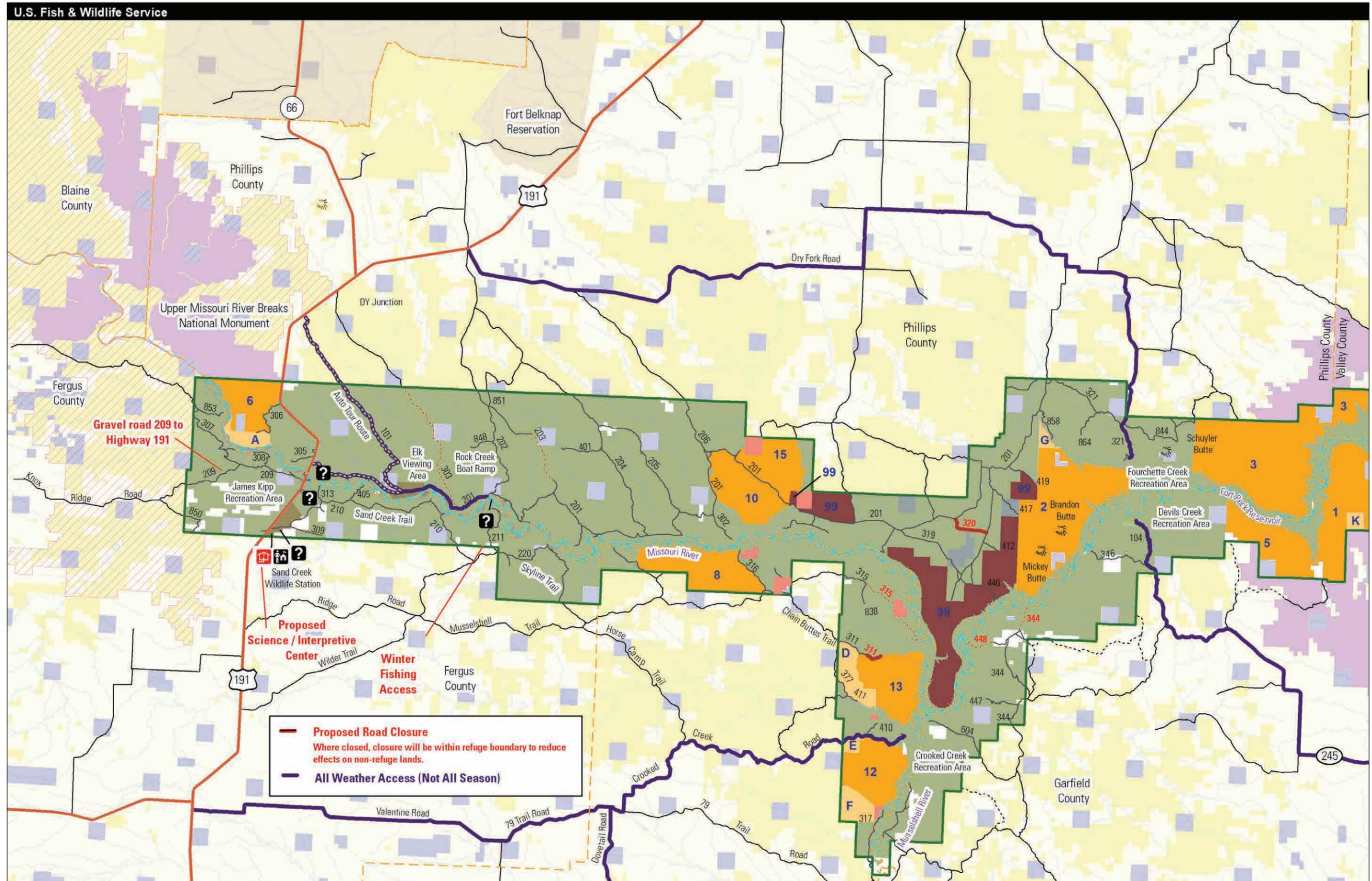


Figure 41. Map of management direction for the Charles M. Russell and UL Bend Refuges, Montana.

Figure 41 (west)

than an individual refuge, the Service is beginning to adopt other terminology, such as “surrogate species,” under these efforts. Surrogate species is a term for species-based conservation planning; it can include various categories such as focal, target, umbrella, representative, keystone, indicator, and flagship species.

Organization of the Objectives

The following sections, organized by goal title, contain the specific objectives designed to achieve the goals and meet the ecological processes emphasis of the plan. Rationale and strategies are also described for the objectives.

- 4.2 Goal for Habitat and Wildlife Management
- 4.3 Goal for Threatened and Endangered Species and Species of Concern
- 4.4 Goal for Research and Science
- 4.5 Goal for Fire Management
- 4.6 Goal for Public Use and Education
- 4.7 Goal for Wilderness
- 4.8 Goal for Cultural and Paleontological Resources
- 4.9 Goal for Refuge Operations and Partnerships

Objectives for the first four goals above—habitat and wildlife, threatened and endangered species and species of concern, research and science, and fire—are intricately linked in managing habitat, wildlife, and water resources.

4.2 GOAL for HABITAT and WILDLIFE MANAGEMENT

Conserve, restore, and improve the biological integrity, environmental health, and ecological diversity of the refuge’s plant and animal communities of the Missouri River Breaks and surrounding prairies to support healthy populations of native plants and wildlife in a changing climate. Working with others, reduce and control the spread of nondesirable, non-native, invasive plant and aquatic species for the benefit of native communities on and off the refuge.



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The use of prescribed fire, wildfire, and grazing by wild ungulates and livestock is addressed.

What is Prescriptive Livestock Grazing on the Refuge?

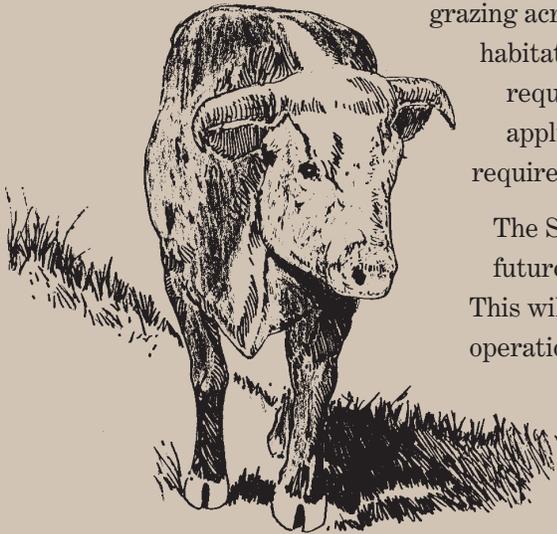
Prescriptive livestock grazing is the planned application of livestock grazing at a specified season, duration, and intensity to achieve specific vegetation objectives. The objectives are designed to meet the broader habitat and wildlife goals. Rather than managing refuge resources to support livestock grazing or other economic uses, livestock grazing is used as a habitat management tool to achieve the goals and objectives for wildlife habitat (FWS 2001).

The Service has been gradually making the transition to prescribed livestock grazing for more than 20 years as a result of the 1986 record of decision on an earlier EIS (FWS 1986) and Service policies that resulted from passage of the Improvement Act—compatibility (FWS 2000a) and biological integrity (FWS 2001). Current prescribed grazing is applied on about 34 percent of the refuge. In practice, these current grazing prescriptions range from variable livestock timing and distribution to long-term rest or permanent exclusion.

Future prescriptive grazing regimens may include short-duration, high-intensity grazing treatments to control invasive plants (FWS 2011b); habitat management for specific wildlife or focal bird species; or multiple-unit rotational systems to provide long-term rest between grazing treatments. These and other prescriptions such as pyric herbivory will be considered for achieving habitat objectives and developing a mosaic of desired habitat conditions that support a variety of wildlife species.

The Service will continue the transition to prescribed grazing across the refuge. The Service will identify habitat-based objectives to support the life requirements of wildlife species and, where applicable, use grazing as a tool to achieve the required vegetation structure and composition.

The Service will communicate with existing and future grazing permittees as HMPs are developed. This will help permittees to plan and adapt their operations at the same time the Service is applying prescriptive grazing as a management tool to meet habitat and vegetation objectives.



Section 1.2 in chapter 1 has more information on the Service's biological integrity policy. Section 3.2 in chapter 3 describes the history of livestock grazing on the refuge and upland vegetation monitoring.

HABITAT MANAGEMENT

Where feasible, the Service will apply management practices that mimic and restore natural processes on the refuge, managing for a diversity of plant species in upland and riparian areas. The Service will maintain plant diversity and health using fire in combination with wild ungulate herbivory (wildlife feeding on plants) or prescriptive livestock grazing, or both, to ensure viable populations of sentinel plant species (species that decline first when management practices are injurious).

The emphasis on ecological, or natural, processes recognizes the importance of fire, grazing by ungulates, hydrology, temperature, nutrients, and soil compaction in shaping and sustaining diverse, healthy habitats on the refuge. Initially, this will

include a concerted manipulation of habitats or wildlife populations (prescribed fire and grazing and hunting) through coordinated objectives. Eventually, the Service will favor more passive approaches using fire, grazing, or flooding, which require less manipulation and money.

The habitat objectives are split into four vegetation categories:

- upland
- river bottom
- riparian area and wetland
- shoreline

In addition, there are objectives for two major factors—invasive species and climate change—that influence habitat.

OBJECTIVES for HABITAT

UPLAND OBJECTIVES

Each species of wildlife that uses the uplands has unique habitat needs. Their needs for food, water, and protection are different. Ecological processes (disturbances) affect each species' habitat. The major disturbances that occur in the uplands are herbivory (ungulate grazing) and fire. Uplands exist in alternate states depending largely on the frequency and intensity of herbivory and fire.

The Service will promote ecological resilience, restore the pyric herbivory, promote animal movement with long periods of abandonment to reduce plant species selectivity, increase landscape species and structural heterogeneity, and improve wildlife diversity.

Although the upland habitat objectives are intended to improve conditions for a broad range of resident and migratory wildlife species that use the refuge, the objectives will complement the Service's efforts toward bird conservation and protecting and enhancing threatened and endangered species and species of concern (refer to section 1.4 in chapter 1).

The Service has identified six focal bird species for monitoring the health of uplands: long-billed curlew, Sprague's pipit, Baird's sparrow, brown creeper, sharp-tailed grouse, and greater sage-grouse (refer to the "Bird Objectives" below and section 3.2 in chapter 3).

Prescriptive livestock grazing, as described below, is one of the strategies the Service uses, where appropriate, to achieve upland habitat objectives. (Refer to the facing inset, "What is Prescriptive Livestock Grazing on the Refuge.")



Dave Menke / USFWS

Upland habitat is important to the lazuli bunting.

UPLAND OBJECTIVE 1. Within 5 years, develop new HMPs including inventory and monitoring plans based on soil characteristics, historical fire occurrence, and hunting district boundaries. Include effective implementation of new management strategies (prescriptive pyric herbivory, prescribed fire and wildfire return, and sentinel plant monitoring and enhancement) that achieve desired habitat conditions and restore ecological resilience.

(Refer to the end of Upland Objective 7 for criteria for successful implementation.)

UPLAND OBJECTIVE 2. Within 6–9 years, consolidate the 65 habitat units into 3–8 units for restoration of the pyric herbivory, long-distance animal movement, long periods of abandonment, reduced selectivity for sentinel species, and increased landscape species and structural heterogeneity (diversity or dissimilar species within a landscape) to promote resilience and stability of ecological systems.

UPLAND OBJECTIVE 3. Over 15 years, evaluate the success of prescriptive grazing and the pyric herbivory program with HDPs and sentinel plant monitoring in locations where the Service has the capability to manage ungulates effectively (no common pastures, and large enough refuge acreage). Measure success through a comprehensive monitoring program that evaluates changes in viability, distribution, and robustness of individual sentinel plants within established plots. Develop adaptive management changes if sentinel plants continue to decline (refer to section 4.11 and figure 42). Adhere to the Service's information quality guidelines and peer review of scientific information (FWS 2011a).

UPLAND OBJECTIVE 4. Within 2–4 years, begin working with range ecologists and biostatisticians to develop and establish a protocol to assess the effectiveness of the sentinel species concept on select areas of the refuge absent of livestock. Every 7–10 years, monitor habitat health, heterogeneity, and ecosystem resilience (the ability to recover from disturbance or stress).

UPLAND OBJECTIVE 5. Over 15 years, increase both the population viability and a 10- to 15-percent increase in coverage by winterfat, saltbush, grey rubber rabbitbrush, and other fire-adapted sentinel species on sites with remnants of these species across 20–30 percent of the refuge.

(Refer to the end of Upland Objective 7 for criteria for successful implementation.)

UPLAND OBJECTIVE 6. Over 15 years, maintain existing stands or densities of fire-intolerant big sagebrush on fire refugia to support sage-dependent wildlife species in each of the habitat units while restoring shrub diversity in the shrub-steppe uplands (such as fire refugia, sage-grouse leks, and the UL Bend Refuge).

UPLAND OBJECTIVE 7. Over 15 years, increase both the population viability and 10- to 15-percent increase in coverage by purple prairieclover, white prairieclover, dotted gayfeather, purple coneflower, stiff sunflower, and other sentinel forb species as appropriate to the sites with remnants of these species across 20–30 percent of the refuge to restore diversity, promote the ecological resilience of highly palatable, summer-growing forbs, and enhance the required



Maximilian Sunflower

habitat of the focal bird species identified in the bird objectives.

Successful implementation of Upland Objectives 5–7 is defined as follows:

- Fifty percent of populations of winterfat, salt-bush, grey rubber rabbitbrush, and other fire-adapted sentinel shrub species are able to reach their height and fruit-bearing potential and successfully recruit young plants into the populations on uplands without physical protection during normal weather conditions.
- Fifty percent of populations of chokecherry, golden currant, redosier dogwood, green ash, silver buffaloberry, aspen, cottonwood, limber pine, and other fire-adapted sentinel species are able to reach their height and fruit-bearing potential and successfully recruit young plants into the populations in coulees and riparian areas.
- Populations of purple prairieclover, white prairieclover, dotted gayfeather, purple coneflower, stiff sunflower, Maximilian sunflower, and other sentinel forb species increase in coverage on remnant sites by approximately 10 percent over 15 years.
- Fire-intolerant species are maintained in areas that did not burn or where there is a low fire-return interval.
- Habitat is enhanced to meet the needs of focal bird species (refer to bird objectives below).

Rationale for Upland Objectives 1–7. While several existing habitat units have recovered from past abuses, there are currently several units that are not meeting their stated habitat objectives as identified in the 1986 EIS and associated HMPs. A principal focus of upland management is the directive found in the Service’s Biological Integrity, Diversity, and Environmental Health Policy (FWS 2001). Additionally, using the concepts of resilience management (Resilience Alliance 2007), the Service will strive to improve the resilience in the refuge’s ecological systems. Key components of resilience management include major ecological processes or disturbances, alternate stable states, thresholds between states, adaptive cycles, cross-scale interactions, interventions, and management.

The concept of sentinel species monitoring is not new. In 1947, Aldo Leopold discussed diagnostic plant species that were early to respond to ungulate grazing pressure (Leopold et al. 1947). More recently, focal species are understood to be the individual wildlife species that have the most stringent limitations for area, dispersal, or resources or are limited by ecological processes (Lambeck 1997). While animal species are clearly the best indicators of habitat area and dispersal needs, plant species (as suggested by Landsberg and Crowley, 2004) are important indi-

cators of habitat quality and the ecological processes that sustain it. An important limiting component for many, if not most, animals is the availability of quality foods (White 1978). Even generalist herbivores prefer the highest quality plants (Mysterud 2006), which are the first to decline or disappear. Sentinel plant species include the most valuable wildlife forage, fruit, and pollen-producing food plants. Sentinel species are also important indicators for monitoring biological diversity (Cousins and Lindborg 2004, Cushman et al. 2008, Gibson and Bosch 1996, Noss 1990, Rogers and Biggs 1999, Simberoff 1998), which are a critical component of wildlife conservation and a defining purpose of the Refuge System. Monitoring for sentinel plants is a key measure of success or failure of the Service’s desire to promote ecological resilience by managing for natural and diverse processes.

Resilience is the ability to absorb disturbances, to be changed, and then to reorganize and still have the same identity, that is, keep the same basic structure and ways of functioning. A resilient system is forgiving of external shocks; a disturbance is unlikely to affect the whole. As resilience declines, the magnitude of a shock from which it cannot recover gets smaller. A resilient habitat (1) sustains many species of plants and animals and a highly variable structural composition; (2) is asymmetric; (3) exemplifies biological integrity, biological diversity, and environmental health; and (4) adapts to climate change (Resilience Alliance 2007).

In contrasting stability and resilience, Holling (1973) writes, “A management approach based on resilience, on the other hand, would emphasize the need to keep options open, the need to view events in a regional rather than local context, and the need to emphasize heterogeneity. Flowing from this would be not the presumption of sufficient knowledge, but the recognition of our ignorance; not the assumption that future events are expected, but that they will be unexpected. The resilience framework can accommodate this shift of perspective, for it does not require a precise capacity to predict the future, but only a qualitative capacity to devise systems that can absorb and accommodate future events in whatever unexpected form they may take.”

The following sources have more information about managing ecological resilience: Gunderson and Holling (2002), Walker and Salt (2006), Norberg and Cumming (2008), and the Resilience Alliance (2007).

As part of the actions needed to improve the resiliency of the refuge’s habitats, there is emphasis on restoring the environmental processes, plants, and animals that have been damaged—for return of the evolutionary forces of fire and herbivory that shaped this landscape during the past 6,000 years (Higgins et al. 1986). Total ungulate effects and fire effects on

plant communities will be measured with sentinel species. More discussion on sentinel plants is in section 4.1 above, and a list of the sentinel species is in appendix G.

When declining trends are found or when competition for resources results in habitat damage, livestock numbers will be reduced or eliminated before wild ungulates. The Service estimates it could convert about 75 percent of the refuge to prescriptive grazing due to the need to add or remove fences. The Service will remove interior fences to facilitate management of environmental processes including patch burning and long-distance movement of animals. Much of the fencing work that remains is in rugged terrain, and the work will need to be prioritized. As money and resources allowed, the refuge will continue to convert to prescriptive grazing over 15 years.

Several refuge permittees have grazing permits that include Service lands, BLM, and DNRC lands. The implementation of prescriptive grazing on Service lands may negatively affect the ability of permittees to continue to graze DNRC lands within the refuge boundary. It is not the intent of the Service to negatively affect DNRC's ability to meet their obligation of generating revenue for local schools. The Service will work with local DNRC land managers to allow permittees continued access for grazing DNRC lands. If current permittees of DNRC lands do not want to keep their permits, the Service will work within current budget constraints to obtain leases that benefit refuge management activities.

Since the demise of the wild bison in 1881 (FWS 2010d), the fire-return interval has lengthened on the refuge, and the fires that do occur are often more intense than commonly happened historically (Frost 1998). Figure 13 in chapter 3 shows the fire frequency intervals found on the refuge. This map will continue to be checked and updated for accuracy, but it currently provides a good representation of fire frequency. The fire-grazing interaction (which included intense herbivory after fire, long-distance movement, and years of abandonment) was replaced by constant grazing and no fire with the transition to ranches, fences, and livestock. The landscape changed from patches of diverse habitats to a more uniform landscape as a result of constant fire suppression and annual grazing within fenced pastures (Fuhlendorf and Engle 2001). Today, many species of plants that are fire-adapted, fire-dependent, or highly palatable have been locally eliminated or reduced to remnants. In the uplands, the formerly diverse shrub-steppe community now supports extremely low populations of fire-adapted, palatable shrub species such as saltbush, winterfat, silver sagebrush, and grey rubber rabbitbrush. The landscape today is almost a monoculture of relatively unpalatable and fire-intolerant

big sagebrush. In addition, highly palatable forbs such as white prairieclover are gone from most sites. Introduced plants such as Japanese brome and yellow sweetclover have prospered in this environment and have replaced native species that are more valuable. The lack of variety in management strategies has additionally reduced the heterogeneity of plant community structure.

These changes have affected wildlife populations. For example, grassland bird species have declined at a faster rate than any other guild of terrestrial birds in North America (Fuhlendorf and Engle 2001, Knopf 1994). Particularly affected are the focal bird species and sentinel habitats that are positioned at the ends of natural processes such as those species that live in the wake of recent fire or require long periods of no disturbance, such as Baird's sparrow (Green et al. 2002) and Sprague's pipit (Robbins et al. 1999, FWS 2010e). Also affected are species that require a wide diversity of vegetation structure, plant species, and insect species within their home ranges such as sharp-tailed grouse and greater sage-grouse. There are similar concerns for some small mammals, invertebrates, and other wildlife groups. Refer to "Bird Objectives" below for more literature about focal birds.

Upland health will be restored on the refuge by reestablishment of historical fire-return intervals and the historical fire-grazing interaction. There will be careful control of the numbers of all ungulate species (both wild and domestic) to compensate for the overgrazing effects of the last 100–150 years. However, the Service will protect sagebrush areas that are important for greater sage-grouse (refer to prescribed fire objectives below).

Inventory and monitoring procedures will focus on sentinel plant species and focal bird species that have been most severely affected. Monitoring will also include the grasses and other plants to ensure that all species' populations are viable.

Strategies for Upland Objectives 1–7

- Within 2–4 years, fully determine the species of plants that are first to decline and the cause of the decline (refer to appendix G for the list of existing sentinel species). Tie habitat monitoring to focal bird species monitoring (for more information, refer to "Bird Objectives" below, section 3.2 in chapter 3, and appendix G).
- Continue to work with range ecologists and use current monitoring results, along with newly acquired information, to develop adaptive management strategies. Make sure monitoring protocols meet Service information quality guidelines (FWS 2011a).
- In cooperation with universities, NRCS, and other partner scientists and statisticians, con-

tinue to develop and monitor methods for identification, inventory, and monitoring of sentinel plant species. Reduce HDP monitoring as sentinel plant-monitoring procedures are developed that efficiently and consistently monitor habitat conditions.

- In cooperation with NRCS, reestablish populations of sentinel plant species on 50 percent of the sites where they have been eliminated.
- Evaluate important habitat areas for focal bird species where fire will be detrimental and protect those areas (refer to prescribed fire objectives in the next section).
- Improve the population viability of herbivory-sensitive sentinel plant species in four ways: (1) control numbers of ungulates (domestic and wild); (2) coordinate management of ungulates and fire; (3) reduce selectivity by ungulates for sentinel species through pyric herbivory; and (4) manage for long (several-year) periods of rest or abandonment.
- When monitoring of the population viability of herbivory sensitive sentinel plant species indicates a declining population, manage livestock grazing by reducing AUMs or the season of use or by resting areas. If sentinel plant populations continue to decline after elimination of livestock grazing, explore opportunities to promote periods of rest or abandonment for sensitive areas. If sentinels continue to decline due to herbivory pressure, work with MFWP to reduce the numbers of large ungulates throughout the Missouri River Breaks to levels lower than objectives in MFWP's management plans.
- Manage the landscape with pyric herbivory to restore historical fire-return intervals and the fire-grazing interaction including concentrated herbivory coupled with long periods of abandonment to increase the amount and diversity of palatable plants to reduce selectivity for sentinel species.
- Evaluate the success of habitat treatments (the population viability of all species and the structural heterogeneity of the landscape) using methods developed by universities, NRCS, the Service, or other scientists. Focus on viability analysis of sentinel plant species populations at permanent trend sites.
- As HMPs for prescriptive grazing are developed, conduct fence projects based on defined priorities to achieve removal of interior fences on about 10–25 percent of the refuge and construction of boundary fences where absent. Use practical fencing strategies in cooperation with other landowners in areas where topography is too rugged.
 - Hire seasonal employees for fence removal and professional fence builders for boundary fence construction; the remaining boundary fences are located in the most difficult terrain.
 - Within 6–9 years, implement prescriptive grazing and pyric herbivory across 50–75 percent of the refuge to restore the resilience and stability of ecosystems on the refuge through the development and implementation of HMPs by working with BLM, DNRC, conservation districts, and permittees. Use prescriptive grazing only on Service-managed lands (refer to the prescriptive grazing explanation in the introduction for “Habitat—Upland” objectives). Because it is possible that prescriptive grazing practices on Service lands may negatively affect current permittees that graze BLM, DNRC, and Service lands, work with DNRC as budgets allow to mitigate any loss of revenue by assuming leases on these pastures.
 - Coordinate the construction of boundary fences to facilitate moving to prescriptive grazing with BLM, DNRC, and local ranches. Communicate with permittees as HMPs are developed so they can make plan and adjust their operations for future grazing needs.
 - Continue to collect grazing fees in accordance with the region 6 grazing policy.
 - Continue to issue special use permits for grazing on the State school sections that recognize those AUMs allotted.

RIVER BOTTOM OBJECTIVES

River bottoms are areas above high pool of the lake exclusively on the west end of the refuge and within the original floodplain of the Missouri River. These areas consist of former agricultural fields that are now infested with invasive plants. There are 17 river bottoms totaling 5,000–7,000 acres on the west end of the refuge. Two river bottoms are undergoing restoration, and the other 15 areas have about 4,500–6,000 acres that need the removal of invasive plants (refer to figure 20 in chapter 3). The plant communities left on the river bottoms have now mostly been invaded by Russian knapweed, leafy spurge, smooth brome, and quackgrass, which have very little value to wildlife.

Restoration of the river bottoms will consist of a healthy native plant community including those that occurred on the river bottoms 150 years ago. Climax river bottom communities include, but are not limited to, Maximilian sunflower, diamond bark willow, sand bar willow, redosier dogwood, green ash, cottonwoods, and grasses.

Refuge staff started restoring 160 acres of bottomlands in 2005 and an additional 160-acre project began in 2009 on the west end of the refuge. Three



R.A. Howard Image Collection / Smithsonian Institution

Redosier Dogwood

bird species, all migratory birds, were selected as focal species that are important for monitoring the health of river corridors: red-eyed vireo, Brewer's blackbird, and veery. For more information about the objectives for these species, refer to "Bird Objectives" and "Threatened and Endangered Species and Species of Concern Objectives" below.

RIVER BOTTOM OBJECTIVE 1. Within 1–3 years, identify and rank according to priority and resource value all former farm fields on river bottoms that have been invaded by invasive plants. Develop a comprehensive plan that identifies methods and timeframes for completing each phase.

RIVER BOTTOM OBJECTIVE 2. Within 2–4 years, work with NRCS and cooperators to develop restoration plans for each bottomland necessary to carry out the comprehensive restoration plan. Address in treatment plans the equipment needs, invasive species control, a farming plan, native plant composition mix for planting, grants, and partnerships.

RIVER BOTTOM OBJECTIVE 3. Within 3–5 years, begin implementing the approved restoration plan on the first river bottom on the priority list.

RIVER BOTTOM OBJECTIVE 4. Over 15 years, develop and carry out a habitat-monitoring plan to determine success of invasive plant removal efforts. Make adjustments to ensure successful native plant restoration.

RIVER BOTTOM OBJECTIVE 5. Over 15 years, complete 20–30 percent of the identified restoration projects (more if funding is available). If time, personnel, and funding allows, start one new river bottom project every 2 years until all are restored to healthy native plant communities.

Rationale for River Bottom Objectives 1–5. A healthy diverse native plant community in the river bottoms will enhance wildlife diversity and populations in

addition to promoting biological diversity, ecological integrity, and environmental health. Healthy stands of native plants withstand or outcompete many non-native species and create many more niches than that of monoculture food plots or invasive plants.

Native plant communities that once existed on these bottoms have been unable to reestablish themselves. This is most likely due to a lack of viable seed sources and competition from nonnative species. Restoring river bottoms with native species will allow these areas to perform their natural ecological function of trapping sediment during floods, which promote cottonwood regeneration. In addition, these native plants provide valuable wildlife habitat for numerous species. Vibrant native species will promote resilience and resist invasive species invasions in the future. The approach toward removing invasive plants in river bottoms will be gradually carried out. This is due to the expense and time needed to establish native plants.

Once established, the correct combination of native forbs, shrubs and grasses, such as Maximilian sunflower, wild licorice, basin, wildrye, green needlegrass, redosier dogwood, and silver buffaloberry will be highly competitive with nonnative plants (Riley and Wilkinson 2007). NRCS' ecological site description has a complete list of native plants that most likely occurred on these sites (NRCS 2009).

In sensitive areas like river bottoms, fencing will be used to exclude livestock except at designated water gaps (areas where livestock can access water).

Refuge staff will continue to consult with NRCS range specialists and design a restoration program that includes prescribed fire, herbicide application, short-duration grazing to reduce invasive species (FWS 2011b), tilling, and native seed planting.

Strategies for River Bottom Objectives 1–5

- When native forbs and grasses are reestablished, plant native shrubs in the fields and protect them

from browsing by total exclosures until they are able to grow out of the browse zone. Water shrubs and trees four to six times during the first summer they are planted.

- Continue restricting domestic livestock grazing from the river bottoms unless a short-term grazing application is needed to control invasive species.
- Continue to seek partnerships for projects already in progress to remove invasive plants in river bottoms.
- Continue to seek outside funding opportunities such as grants from The Rocky Mountain Elk Foundation and other cooperators to secure necessary money to acquire equipment and supplies as needed.
- Hire a grant writer to pursue more funding avenues to secure money for weed removal projects.
- Clean former river bottoms through the application of herbicides and farming. If money permits, hire a biological technician who is knowledgeable in planting crops to start work on the first river bottom on the priority list.
- Work with NRCS and cooperators using knowledge gained from prior projects and experiences to establish methods of operation.
- Coordinate work with the road maintenance staff to fix roads necessary to safely access river bottoms. Some areas will have to be accessed by foot or horse.
- Initially burn areas to be planted and have the Service's weed strike team spray invasive plants. Plant areas with wildlife food crops to clear invasive plants. Follow with native plantings after invasive plants have been removed to meet national and regional priorities.
- Over 15 years, continue to monitor and spot treat all invasive plants that may become established.

RIPARIAN AREA and WETLAND OBJECTIVES

Riparian habitat areas include wetland and upland vegetation associated with rivers, streams, and other drainage ways. Riparian and wetland areas provide important habitat for a variety of wildlife species, ranging from reptiles and amphibians to upland mammals and many birds. While riparian areas occupy a small proportion of the landscape, wildlife and livestock depend on these areas more than any other habitat type (Kaufman and Krueger 1984, Johnson et al. 1977, Ames 1977). The ability of a riparian site and its associated stream reach to perform normal riparian functions determines the health of the site. Other important functions of riparian vegetation

include sediment filtering, streambank stabilization, water storage and aquifer recharge, and dissipation of streamflows (Hansen et al. 1995).

Select stock ponds will be maintained and rehabilitated. Riparian habitat will be restored where possible and standard watershed management practices will be enforced. Water rights will be adjudicated and defined. The Service will work with others to restore or encourage natural water development within streams such as increased flow, pools, and beaver ponds to restore ecological processes. The Service will refer to riparian area research and publications for guidance on improving water quality in identified areas. Additionally, the Service will assess the uses and needs of current reservoirs and remove those no longer needed for livestock or wildlife. Artesian wells will be capped to prevent depletion of ground water. The Service will carry out all refuge management activities for water development in accordance with the final outcome as decided by the Montana Reserved Water Rights Compact Commission (refer to "Water Resources" under section 3.1 in chapter 3).

Four focal bird species have been identified for monitoring the health of riparian areas and wetlands: ovenbird, Cordilleran flycatcher, black-billed cuckoo, and western wood-pewee. (Refer to "Bird Objectives" and "Threatened and Endangered Species and Species of Concern Objectives" below.)

RIPARIAN AREA and WETLAND OBJECTIVE 1. Within 2–4 years, carry out management actions to restore the health of those streams identified as "nonfunctional" (unhealthy) or "functional at risk" (healthy, but with problems). Reassess in 10–15 years using the Lotic Wetland Health Assessment Survey (Ecological Solutions Group 2011) to measure achievement of at least 75 percent of the 82 miles of stream and 1,300 acres of riparian areas that, when resurveyed, have improved to the next category ("nonfunctional" improved to "functional at risk" and "functional at risk" improved to "functioning"). Maintain 90 percent of the reaches assessed as "functioning" (healthy) in the 2009 survey (Ecological Solutions Group 2009) at that level.

RIPARIAN AREA and WETLAND OBJECTIVE 2. Over 15 years, remove all reservoir and stock ponds that do not support species of concern (for example, northern redbelly dace and finescale dace) and, adhering to any permit requirements, begin restoration of the natural hydrology of the drainage. Determine if more stock ponds are needed to meet the needs of target species. Coordinate with Montana Department of Environmental Quality for impoundment plans to ensure consistency with the total maximum daily load assessments and water quality restoration plans.

Any stock pond removal will depend on the outcome of the adjudication of water rights through the Montana Reserved Compact Commission (refer to “Water Resources” under section 3.1 in chapter 3). Stock pond removal and riparian area restoration could require more permitting through USACE or through coordination with other Federal and State agencies.

RIPARIAN AREA and WETLAND OBJECTIVE 3. Within 4–6 years, for those reservoirs and stock ponds that cannot be removed due to species of concern, maintain or improve these areas for amphibian, reptile, bird, or fish use.

RIPARIAN AREA and WETLAND OBJECTIVE 4. Over 15 years, survey the current health of a representative sample of segments of the Missouri River using the “U.S. Lotic Wetland Health Assessment for Large River Systems” (Ecological Solutions Group 2011).

RIPARIAN AREA and WETLAND OBJECTIVE 5. Within 5–7 years, resurvey the current health of segments previously surveyed on the Musselshell River by the University of Montana, Riparian and Wetland Research Program, between 1999 and 2000 using the “U.S. Lotic Wetland Health Assessment for Large River Systems” (Ecological Solutions Group 2011).

RIPARIAN AREA and WETLAND OBJECTIVE 6. Over 15 years, construct wildlife-friendly fence based on highest need as determined by current river health assessments along Missouri and Musselshell Rivers where prescriptive livestock grazing will be occurring (Paige 2008).

RIPARIAN AREA and WETLAND OBJECTIVE 7. Over 15 years, provide alternate water sources for cattle away from riparian areas and sensitive upland sites, on a priority basis, where prescriptive grazing is needed to accomplish habitat objectives.

RIPARIAN AREA and WETLAND OBJECTIVE 8. Over 15 years, identify locations along riverbanks in need of stabilization and revegetation, and restore 50–75 percent of those locations.

RIPARIAN AREA and WETLAND OBJECTIVE 9. Over 15 years, restore the natural hydrology of five first-, second-, and third-order streams that would normally flow into the Missouri and Musselshell Rivers.

Rationale for Riparian Area and Wetland Objectives 1–9. The first priority for riparian area restoration is those sites already found to be nonfunctioning as identified by the latest riparian area study completed in the summer of 2009 (Ecological Solutions Group 2009).

Restoration measures will vary depending on the condition and trend of the riparian-wetland habitat. Considerations should include the potential of



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Restoration will benefit riparian areas and associated wildlife that are currently impacted.

the site; desired plant community; stabilization of streambanks and elimination of hoof bank-shearing (where impacts from hooves shear off bank segments); value of site for forage production; and amount of vegetation stubble required to trap and hold sediment deposits during runoff events. For instance, if one of the objectives for a riparian-wetland area is streambank stability, then woody vegetation vitality should be of utmost importance due to the vastly different streambank stability protection afforded by the woody vegetation when compared to the herbaceous vegetation (Hansen 1992). Also to be considered are water quality and quantity issues, wildlife, aesthetic values, amount of time for restoration, and reduction of erosion and maintenance of soil production (Hansen 1992).

Key species vary with the potential of each site. The Riparian and Wetland Research Program, University of Montana, developed the key to riparian and wetland sites of the refuge (Hansen 1995, Parker et al. 1996). This reference should be used whenever possible. Willows and other large woody vegetation (such as trees) filter large waterborne organic material and their root systems provide streambank stabilization. Sedges, rushes, grasses, and forbs capture and filter out the finer materials while their root masses help stabilize streambanks and colonize filtered sediments (Hansen 1992).

The objectives and strategies recognize the habitat value of stock ponds. Phytoplankton (algae) is consumed by zooplankton, insects, crustacean, and tadpoles that live in ponds. Larger invertebrates, amphibians, reptiles, fish and birds also will use a stock pond. (NRCS 2005b).

Fencing will be used to exclude livestock from the vast majority of the riparian habitats along the Missouri and Musselshell Rivers. Livestock has been excluded by fencing in a few other important riparian areas (for example, Rock Creek in Phillips County and Bobcat Creek in McCone County). Through changes in ranch ownership, management

changes and other factors, livestock grazing has been reduced or eliminated from several other habitat units and conditions in these riparian habitats are improving.

Strategies for Riparian Area and Wetland Objectives 1–9

- Contract with a qualified riparian habitat consultant to resurvey riparian areas surveyed by Cook et al. (1996), Parker and Hansen (1996), Thompson and Hansen (1998 and 1999), Montana Department of Environmental Quality (2001), and Ecological Solutions Group (2009) to determine current health.
- Set priorities for stream restoration using Thompson and Hansen (1999) (functioning versus nonfunctioning streams) and USGS gauge information. Establish more permanent stream gauging stations on refuge. Identify species of concern that are being affected by nonfunctioning streams, and identify dams on private and BLM land off refuge that have the ability to influence stream health on the refuge. Define realistic and attainable management objectives for the site or stream reach.
- Set priorities for stream restoration based on water rights or the ability to influence stream health.
- Locate key areas for monitoring in representative parts of the riparian-wetland areas as well as in the uplands.
- Determine the amount of vegetation stubble required to trap and hold sediment deposits during runoff events to rebuild streambanks and restore and recharge aquifers.
- Reestablish vegetation along streambanks using willow cuttings, tree revetments, perennial grasses or other streambank stabilization planting techniques.
- Restore the refuge prairie streams by using enclosures in riparian areas, applying prescriptive livestock management, rehabilitating stock reservoirs that are no longer needed and planting riparian species, placing salt and mineral blocks, establishing or improving off-stream watering sites, installing stable access points to limit streambank trampling, requiring permittees to use riders to keep herds out of riparian areas, considering different turn-in locations, placing instream structures such as boulders to increase the water tables (Fitch and Adams 1998, Leonard et al. 1997, Kaufman and Krueger 1984, Ehrhart and Hansen 1997, Wyman et al. 2006).
- Restore the beaver colonization of perennial and intermittent streams.
- Seasonally restrict livestock access to wetlands or limit duration and intensity of use and establish water troughs with escape ramps (troughs should not be placed in locations that lead to unacceptable effects on important upland habitats (Pilliod and Wind 2008). Where livestock have to cross a stream, construct a bridge, water gap, or streambed crossing.
- Encourage livestock to move away from the stream through several methods such as conducting prescribed burns of uplands to regenerate desirable species or placing salt and supplemental feed in upland areas.
- Apply rangeland rest wherever and whenever possible.
- Incorporate applicable regulatory compliance (such as wetlands permitting or dam safety requirements) into stock pond removal efforts.
- Within stock ponds, incorporate logs for amphibians and turtles to bask; fish, frogs, and salamanders to lay eggs; and birds to perch.
- Provide a buffer of woody vegetation around part of constructed earthen livestock watering ponds.
- Design a monitoring plan that evaluates the effectiveness of the management plan (grazing management must be flexible enough to accommodate changes).
- Monitor vegetation community change in response to management actions by using the U.S. Lotic Wetland Inventory (Ecological Solutions Group 2011) to record species canopy and habitat type or community type covers on a reach of stream and its riparian zone. Quantify such vegetative variables as invasive plants, undesirable herbaceous species, and the structure and diversity of the plant community.
- Determine site potential, existing vegetation types and desired plant community or desired future condition. Continue to exclude livestock from riparian areas if possible.
- Follow Hoitsma Ecological, Inc.'s (2006) recommendations for future riparian area efforts along Telegraph Creek as well as the refuge staff's restoration efforts from 1991 to 1993 in the Rock Creek/Bug Creek Habitat Unit and Hawley Creek.
- Supervise frequently to avoid adverse effects such as trampling damage to streambanks and excessive use.

SHORELINE OBJECTIVES

The shoreline is a highly dynamic area that fluctuates based on lake levels. Shoreline habitat is defined as the vegetation found between current lake level and high pool elevation. This habitat type is used by wildlife during periods of drought when lake levels drop.

The Service does not manage the shoreline but does cooperate with USACE in their efforts to treat invasive species along the shoreline.

Focal bird species were not selected for shoreline habitat because the shoreline is a highly dynamic area that fluctuates based on lake levels. Potential focal bird species such as piping plover and least tern are totally dependent on the shoreline for nesting and the adjacent water for food.

SHORELINE OBJECTIVE 1. When completed, cooperate with USACE and others in implementing the Missouri River Ecosystem Restoration Plan, to address habitat needs for threatened and endangered species and other species along the shoreline.

SHORELINE OBJECTIVE 2. Over 15 years, continue to cooperate with USACE and other partners—such as nongovernmental organizations, neighboring counties, and the State of Montana—in treating a minimum of 200 acres of invasive plant species per year that colonize Fort Peck Reservoir and the Missouri River shorelines.

Rationale for Shoreline Objectives 1–2. USACE has primary jurisdiction for management of the lakeshore areas including treating saltcedar infestations; therefore, the refuge does not take the lead role in managing the shoreline. The Service will defer to the Missouri River Ecosystem Restoration Plan to guide management of this habitat and provide aid as requested. The Service is working in cooperation with USACE and other partners to develop the plan (USACE 2009b) to meet the habitat needs of various threatened and endangered species such as piping plover, least tern, and pallid sturgeon. Once this restoration plan is completed, refuge staff will cooperate to carry out any recommendations that come out of the plan.

Continual water fluctuations and changes in shoreline exposure result in constant infestations of saltcedar along the exposed shoreline. The Service will continue to collaborate with USACE in treating saltcedar, both above and below the high water line. The invasive species discussion below has more details.

Strategies for Shoreline Objectives 1–2

- Maintain water gap structures as the shoreline recedes.
- Coordinate invasive plant control by meeting and cooperating with USACE and other partners to share information and discuss control strategies.
- Use integrated pest management and review literature for updated information on control techniques.
- Map all treatment sites.
- Monitor and re-treat areas to prevent reinfestation.

- Restore bare areas resulting from saltcedar removal to native plant cover and monitor results.
- Obtain help with invasive plant control and monitoring by pursuing additional money through partnerships, grants, and invasive species programs.
- Deploy early detection and rapid response strategies to attack newly found infestations before they become large and costly initiatives.
- Within 1 year, invite all parties who have an interest in invasive plant control to pool their resources and to coordinate control and restoration methods.
- Over 15 years, when money is available, continue to help USACE in controlling saltcedar and restoring cottonwood.
- Over 15 years, continue to help USACE with historical plover and tern surveys so that data remains consistent.

INVASIVE SPECIES OBJECTIVES

The Service will work with many partners to combat invasive plants and encourage growth of native vegetation. When feasible, the Service will also work with USACE and others on habitat enhancement to benefit plovers, terns, or other species of Federal and State concern along the shoreline. The biological potential and economical feasibility of using additional biological control measures will be evaluated for safety and effectiveness as a way to reduce the use of chemical controls for treatment of invasive plant infestations.

The control of invasive weeds and integrated pest management will be done using a variety of tools such as biological and mechanical controls, grazing, and herbicides. The Service will continue to update invasive species mapping, use the Service's weed strike team, and work in partnership with others to reduce weed infestations.

Invasive species objectives apply to both woody and nonwoody invasive plants and aquatic invasives such as zebra mussels.

INVASIVE SPECIES OBJECTIVE 1. Over 15 years, maintain the existing invasive species control program including mapping, use of biocontrol and chemical spraying, weed wash stations, and requiring horse users to use weed-seed-free hay.

INVASIVE SPECIES OBJECTIVE 2. Within 1–3 years, develop an integrated pest management plan (step-down plan) for control of invasive plants.

INVASIVE SPECIES OBJECTIVE 3. Within 5–7 years, map current infestations, and develop a strategy to achieve a 25-percent reduction in acres affected by noxious nonwoody plants.

INVASIVE SPECIES OBJECTIVE 4. Over 15 years, achieve a 25-percent or greater reduction in acres affected by noxious nonwoody plants.

INVASIVE SPECIES OBJECTIVE 5. Within 5–7 years, target further encroachment of invasive woody plants (such as saltcedar and Russian olive) on Fort Peck lakeshores and bays.

INVASIVE SPECIES OBJECTIVE 6. Within 5 years and with adequate funding, reduce the occurrence of invasive, woody plants in riparian areas, primarily the Missouri River and Musselshell River corridors above the full-pool elevation by 10–25 percent.

INVASIVE SPECIES OBJECTIVE 7. Over 15 years, measure trends of invasive species not classified as noxious including Japanese brome, sweetclover, and cheatgrass. Implement adaptive management as appropriate.

INVASIVE SPECIES OBJECTIVE 8. Over 15 years, work with partners to increase public awareness of invasive plants on the refuge and surrounding lands by establishing an improved, coordinated signage system at major entrance points.

INVASIVE SPECIES OBJECTIVE 9. Continue current educational and monitoring efforts in cooperation with MFWP and USACE. Prevent further spread of aquatic invasive species through 2027.

Rationale for Invasive Species Objectives 1–9. Shrub-steppe, grassland mosaic areas throughout western North America continue to decline in quantity and quality due, in part, to invasion by exotic plant species (Samson and Knopf 1994, Bragg and Steuter 1995). River bottoms, lakeshore, and, now, the refuge uplands are experiencing an increase in invasive species. To date, only a small part of the uplands has been mapped for invasive species, and numerous acres could be infested. Studies suggest that shrub-steppe, grassland mosaic bird species favor areas dominated by native vegetation. These bird species include focal

species such as grasshopper sparrow, Baird's sparrow, long-billed curlew, upland sandpiper, mountain plover, lazuli bunting, chestnut-collared longspur, burrowing owl, and greater sage-grouse (Davis and Duncan 1999, Dhol et al. 1994, Fairfield 1968, Johnson and Igl 2001, Kantrud and Higgins 1992, Lindmeier 1960, Maher 1974, Owens and Myres 1973, Stewart 1975, Wilson and Belcher 1989). The degradation of remaining grassland areas in the northern Great Plains is a principle factor in the declining populations of grassland bird species and is likely due to inadequate or improper management.

Monotypic stands of invasive or nonnative species not only have the ability to negatively affect biodiversity but they also alter the flow energy and nutrients in the ecosystem and reduce the resilience of the system.

Invasive species such as Russian knapweed, spotted knapweed, leafy spurge, saltcedar and other species are increasing on refuge due to spread from illegal off-road vehicle use, infestations from upstream sites, and changes in lake levels that expose bare lakeshore areas. In 2008, about 1,431 upland acres of undesirable plant species, excluding saltcedar below the high-watermark, were mapped on the refuges.

The Service has been treating new infestations, working with partners to treat high public use areas, sponsoring weed wash stations, promoting education among users toward identifying weeds, and exploring other ways to reduce their spread. The Service will continue to work with partners to improve overall habitat conditions across the refuge. Healthy ecosystems with a diversity of native plants are resilient to new infestations of invasive species (Kennedy et al. 2002).

Long-term control requires the cooperation of public and private land managers throughout the area. A joint effort by all partners is needed to conduct research on finding the best management practices to control or eliminate individual species.

Strategies for Invasive Species Objectives 1–9

- Continue work with partners to provide at least one weed wash station during the hunting season.
- Work with partners to explore options for boat-washing stations.
- Continue to provide educational materials to all contacted hunters and develop additional outreach methods to educate various users on the threat of invasive species to wildlife habitat.
- Work with partners and assess traffic-count data to prioritize areas for location of informational invasive species signage.
- Over 15 years, in cooperation with USACE, treat 200 acres of Service lands plus other USACE acres of saltcedar along the shoreline each year,



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Saltcedar is the most prolific invasive species on the refuge.

depending on funding by contractor and strike team members. Maintain native vegetation in treated areas.

- Emphasize efforts to test and introduce biological controls for saltcedar.
 - Continue to work with Service's invasive species strike team, county weed boards, neighbors and conservation organizations to maintain and update mapping of weed infestations. Review and update the integrated pest management plan every 5 years.
 - Employ hunters in weed monitoring efforts by encouraging them to use their GPS devices to mark infestation sites.
 - Prepare annual progress reports or have meetings to share current treatment techniques and results. In annual updates, include information on what treatment protocols may, or may not, have been successful in achieving stated objectives and any future plans.
 - Conduct inventories, following the Service's invasive species strike team operational guidelines, and include mapping criteria.
 - Store all inventory data in the refuge land Geographic Information System (RLGIS).
 - Repeat inventories at a minimum of 10-year intervals.
 - Apply early detection, rapid response strategies to attack new infestations before they become large and costly to treat.
 - Use GIS to predict areas at greatest risk of new infestations.
 - Conduct a surveillance program for new infestations of invasive plants every 2 years.
 - Every 5 years, complete surveys for invasive plants using GPS map locations. Create a baseline map and collaborate with partners to map records for neighboring lands.
 - Monitor change over time by collecting RLGIS cover-type data for all invasive plant species.
 - Map and store in RLGIS anecdotal observations of infestations made by Service staff while conducting other work activities.
 - Map sites of invasive plant treatment each year in RLGIS.
 - Monitor infestation rates and effectiveness of control efforts.
 - Share GIS layers of invasive plant infestations with partners.
 - Get help with invasive plants (applications and monitoring) by pursuing more money through partnerships, grants, and invasive plant programs.
 - Communicate with local, State, and Federal agencies and the public about invasive plant issues.
- Promptly make information known about new infestations, effective or ineffective treatment methods, and new treatment options.
 - Coordinate invasive plant control by meeting at least once per year with county weed boards, representatives from weed management areas, and other partners to share information and discuss control strategies.
 - Respond promptly to all landowner or other public complaints and address public complaints about invasive plants on Service lands, while using integrated pest management strategies.
 - Ensure seed used to restore habitat is certified weed-free. Avoid buying seed from sources known to have violated the weed-free seed regulation.
 - Begin habitat management treatments to develop habitat that is more resilient to invasive plants.
 - Use short-term livestock grazing applications (prescriptive) to treat infested areas (FWS 2011b).

CLIMATE CHANGE OBJECTIVES

Over the past century, human activities have led to increases in "greenhouse" gases in the atmosphere. These gases are primarily carbon dioxide and methane, nitrous oxide, and halocarbon emissions. Places where atmospheric carbon may be sequestered are the ocean and in plants. About half the carbon emitted during the last 50 years is now stored in these places. The rest has remained in the air. Global temperatures have risen, and sources and sinks of carbon will likely change as climate continues to warm. The following information summarizes information from a comprehensive report produced by the U.S. Global Change Research Program (Karl et al. 2009), which influenced the climate change objectives herein.

Global average temperature and sea level have increased, and precipitation patterns have changed. Global temperatures are expected to rise at least 1 °F over the life of the CCP. Current climate change studies indicate that a further 2 °F increase will lead to severe, widespread, and irreversible negative effects. Global temperatures are expected to continue rising and precipitation patterns will change. Dry areas will be drier and wet areas will be wetter. Sea levels will continue to rise. Currently, rare, extreme weather events will become more common and abrupt changes are possible due ice level collapse, the thawing of frozen soil, and changes in ocean current circulation.

The average U.S. temperature has risen more than 2 °F over the past 50 years and is expected to rise more in the future. Projections of future precipitation indicate that northern areas will be wetter and southern areas, particularly in the west, will be

drier. Extreme weather events, such as heavy downpours of rain, heat waves, regional drought, and hurricanes, have increased in the past 50 years and likely will increase further in the future. Sea levels have risen along the United States' coasts and will continue to rise. Cold-season storm tracks are shifting northward and the strongest storms are likely to become stronger and more frequent. Arctic sea ice is declining rapidly and this is very likely to continue.

As in much of the rest of the Nation, the Great Plains, including the refuge, is projected to experience increases in temperature, evaporation, and drought frequency. The average temperature is expected to increase 2–4 °F by the year 2020 in the plains.

Agriculture and ranching will be stressed by an increasingly limited water supply. Drought- and grazing-adapted weeds will increasingly compete with native vegetation on rangelands. Wetland and riparian areas will decrease in size or be lost. Preservation of native vegetation, wetlands, and riparian areas will require increased vigilance, adaptation, and mitigation as the climate changes.

Based on climate change predictions and following Service and departmental policies and initiatives, the Service will identify (1) species of plants that are likely to be first to decline, (2) animals that are associated with these plant species including insects, birds, and mammals, and (3) species of plants and animals that could increase. Additionally, the Service will design science-based, long-term monitoring protocols to document changes in plant and animal composition or health due to climate change. The Service will coordinate with adjoining agencies and partners to immediately alleviate declines, if needed, using tools such as prescriptive grazing, prescribed fire, or flooding. The Service will cooperate on national and international projects to maintain biological diversity, integrity, and environmental health on a global basis.

Following Service policy and guidelines on climate change initiatives, the Service will carry out the following actions: (1) replace all vehicles with more fuel-efficient vehicles; (2) upgrade offices to “green” standards; (3) consider installing solar panels or small wind turbines for offices and field stations; (4) provide more recycling bins; (5) encourage teleconferencing instead of meetings; (6) encourage staff to be energy efficient (such as turning off lights, recycling, and turning down heat); (7) study and promote the carbon sequestration benefits of the refuge; and (4) consider what conditions precipitated by climate change the refuge may deal with, such as increased drought, longer fire seasons, hotter fires, loss, or increase, of plant and wildlife species, change in migration patterns, and relocation of species.

The Service will implement climate change objectives within the existing habitat management practices.

CLIMATE CHANGE OBJECTIVE 1. Over 15 years, follow Secretarial Order 3289 (DOI 2009) and Executive Order 13514, and implement the Service's climate change initiatives (FWS 2010c) as they apply to the refuge:

- biological planning and conservation design at broad landscape scales
- landscape conservation that supports climate change adaptations by fish, wildlife, and plant populations of ecological and societal significance
- monitoring and research partnerships
- achieving carbon neutrality by 2020
- building capacity to understand, apply, and share terrestrial carbon sequestration science, and work with partners to sequester atmospheric green house gases while conserving fish and wildlife habitat at landscape scales
- providing educational and training opportunities for Service employees about the implications and urgent nature of climate change as it relates to the Service mission and will engage them in seeking solutions
- public education
- partnerships—locally, nationally, internationally.

CLIMATE CHANGE OBJECTIVE 2. Within 3 years, develop a climate change research project with other partners that can be carried out across the Great Plains, which looks at fire, sentinel plants, pollinators, riparian area health, and sentinel animal changes in behavior or use due to climate change.

Rationale for Climate Change Objectives 1–2. Ecological systems store large amounts of carbon in plants and soils, they regulate waterflow and quality, and they stabilize local climates. These functions are not accounted for financially, but society depends on them. Ecosystem processes underpin photosynthesis, the plant and soil processes that recycle nutrients from decomposing material and maintain soil fertility, herbivory, predation, natural fire, flooding, and the processes by which plants draw water from the soil and return water to the atmosphere. These ecosystem processes are affected by climate and the concentration of carbon in the atmosphere.

Biological diversity in ecological systems is, in and of itself, an important resource that maintains the ability of these systems to provide functions on which society depends. Many factors affect biodiversity including: climate conditions; the influences of competitors, herbivores, predators, parasites and diseases; and disturbances such as herbivory and fire. Human-induced climate change, in conjunction with nonclimate stresses, is exerting major influences on natural environments and biodiversity, and these influences are expected to grow with increased warming.

The following information is from the publication *Global Climate Change Impacts in the United States* (Karl et al. 2009). Large-scale shifts have occurred in the ranges of species and in the timing of seasons and animal migration. These factors are very likely to continue. The range and timing of each species shift will be in response to its sensitivity to climate change, its mobility, its lifespan, and the availability of the resources it needs, such as soil, moisture, food, and shelter. The speed with which species can shift their ranges is influenced by factors including their size, lifespan, and seed dispersal techniques in plants. Some migration pathways will be blocked by development and habitat fragmentation. All of these variations result in the breakup of existing ecosystems and the formation of new ones, with unknown consequences. Interactions among effects of climate change and other stressors will greatly increase the risk of species extinctions. At the same time, insect pests, disease pathogens, and invasive weeds have increased, and these trends are likely to continue.

A first step to mitigate climate change is to advance the management of ecological processes on the site to reduce nonclimate stressors (Hansen et al. 2003). In many places, habitat fragmentation, over use, invasive species, and herbivory, are nonclimate stressors that are having a greater affect on species viability than climate change at this time. Reduction of nonclimate stressors will promote ecological resilience and insulate species from subtle changes in climate.

To reduce the effects of these stressors and the future effects of climate change, the refuge will improve heterogeneity of species and structure, protect grassland types across environmental gradients, promote connectivity and corridors to facilitate migration, restore natural fire regimes, promote riparian area health, and promote sustainable herbivory.

The refuge staff is currently working with multiple partners to restore ecological processes, promote heterogeneity, and build habitat linkages and ecological resilience within the Missouri River Breaks and the northern Great Plains. Habitat linkages and corridors will be developed through partnerships with the landscape conservation cooperative sphere of influence (refer to section 1.5 in chapter 1).

The refuge will continue to take reactive and anticipatory approaches to managing landscapes for carbon sequestration and climatic resilience, heterogeneity of species, structure, and succession. Fire-herbivory interactions are keys to resilience in this region. The focus is on the research, monitoring, and management of carbon sinks and sources, black carbon, climate sentinel plants and dependent animals, and ecological-process sentinel plants and the food web that uses them, beginning with pollinators.

The refuge will evaluate the response of ecosystems to fire, herbivory, and other ecological processes using sentinel plant species. These diagnostic plant species warn of impending ecosystem-wide changes to plant and animal populations and can guide adaptive management actions. They are the first to vanish. They serve primarily not as management goals themselves but as diagnostic lookouts for fully functional ecological processes. The sentinel approach to ecological systems management uses first-to-decline species as diagnostic and direct indicators of ecosystem well-being and management direction.

The refuge will assess and reduce carbon footprints associated with using adaptive management to achieve resilience to climate change, including the role of wildland fire.

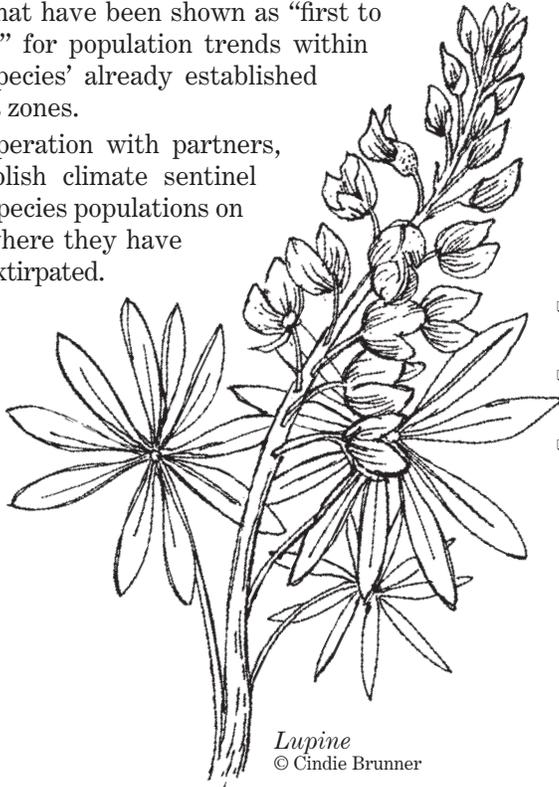
Because fire happens in the region as both wild-fire and prescribed fire, the refuge will focus much of the research on pyrogenic carbon sequestered in the soil from fire. Fire is also important for the climatic resilience associated with diversity of species and succession (DeLuca and Aplet 2008, DeLuca et al. 2006, DeLuca and Sala 2006).

The refuge will serve as a model for other land management agencies and landowners to manage for wildlife first with best management practices for climate resilience and carbon sequestration. The components of this program will include a focus on carbon sequestration, monitoring, and management and on climate sentinels, ecological-process sentinels, and resilience adaptation.

Strategies for Climate Change Objectives 1–2

- Continue maintaining a small wind turbine, recycling, increasing energy efficiency, and adopting other ways to reduce the refuge's carbon footprint.
- Consider what conditions precipitated by climate change that the refuge may deal with like increased drought, longer fire seasons, hotter fires, loss of plant and wildlife species, increase of other plant and wildlife species, change in migration patterns, and relocations of species.
- Help with the implementation of the Service's Climate Change Plan (refer to chapter 1).
- Monitor the effects of climate change on the spread of West Nile virus and the decline of buffaloberry.
- In cooperation with universities and other partner scientists and statisticians, develop methods to identify, inventory, and monitor climate sentinel plant species and potentially affected wildlife species.
- Evaluate climate sentinel plant species population viability analysis at permanently established trend sites.

- Continue to monitor wildlife populations that have been shown as “first to decline” for population trends within each species’ already established habitat zones.
- In cooperation with partners, reestablish climate sentinel plant species populations on sites where they have been extirpated.



- Reduce the carbon footprint of refuge operations and continue “greening” efforts to meet climate change initiatives (for example, upgrade offices to “green standards:” encourage teleconferencing, turning off lights, recycling, turning down heat, and installing solar panels or a small individual wind turbine for new facilities like that at the Sand Creek Field Station). Carefully locate any new structures or energy-efficient equipment to limit visual obstructions.
- Study the carbon sequestration benefits of the refuge.
- Incorporate the Service’s climate change messages in the refuge’s public use programs.
- Assess the vulnerabilities of refuge resources to climate change.

WILDLIFE MANAGEMENT

In collaboration with MFWP and others, the Service will maintain the health and diversity of all species' populations (including game, nongame, and migratory bird species) by restoring and maintaining balanced, self-sustaining populations. This could include manipulating livestock grazing and using hunting to control wildlife numbers, or both, if habitat monitoring shows that conditions are declining or plant species are being affected by overuse.

At a landscape scale, the Service will work with others on ways to benefit wildlife diversity and health such as (1) promoting private conservation easements and conservation incentives to benefit species diversity or restore extirpated (eliminated) species, and (2) cooperating with MFWP to consider

species reintroductions or expansion of species when there is adequate habitat to support the species.

Predator control by the USDA Wildlife Services will stop, and predators will be managed to benefit the ecological integrity of the refuge.

While the habitat objectives will benefit most wildlife on the refuge, the following categories of wildlife were identified based on scoping comments and have specific objectives: birds, threatened and endangered species and species of concern, furbearers and small predators, American bison, gray wolf, big game (elk, deer, pronghorn, Rocky Mountain big-horn sheep, and mountain lion), and other wildlife (invertebrates, amphibians, reptiles, fish, and small mammals). Although wild American bison and gray wolf are not currently found on the refuge, they are discussed.

OBJECTIVES for WILDLIFE

BIRD OBJECTIVES

The refuge has been designated an Important Bird Area by the National Audubon Society because "The site regularly holds significant numbers of a globally threatened species, or other species of global conservation concern" (National Audubon Society 2009). More than 250 species of birds have been documented on the refuge including both migratory birds and residents.

As described in chapter 1, the Service works closely with many partner organizations in achieving its bird conservation priorities and mandates (FWS 2011c). Objectives for birds on the endangered species list are discussed following these bird objectives in the section on threatened and endangered species and species of concern.

The Service will review plans for the Partners in Flight program and joint ventures to identify key parameters for improving habitats to support grassland-dependent birds. Additionally, the Service will collaborate with others to prevent species from being listed, primarily through restoring biological diversity, integrity, and environmental health across the landscape.

In 2005, the Service initiated the focal species strategy to better measure success in achieving its bird conservation priorities and mandates. The Service will maintain plant diversity and health using fire in combination with wild ungulate herbivory (wildlife feeding on plants) or prescriptive livestock grazing, or both, to ensure the viability of focal bird species (species that are representative of a broader group of species that share similar conservation needs). The bird objectives are closely associated with the previous habitat objectives.

BIRD OBJECTIVE 1. Within 7 years, design and complete a bird atlas collection of data and information on the refuge to determine the existing composition, distribution, and relative abundance of breeding, nonbreeding, resident, and migratory bird species using the refuge during each season of the year.

BIRD OBJECTIVE 2. Within 8–15 years, repeat the bird atlas of the refuge to help establish a permanent, refuge-wide, bird-monitoring program and determine and describe the sentinel plant associations and habitat requirements of 90 percent of high-priority species and focal bird species.

BIRD OBJECTIVE 3. Within 10 years, complete bird management plans for each of the four habitat types (upland, river bottom, riparian area and wetland, and shoreline) for resident, wintering, breeding, and migratory bird species, with an emphasis on designated focal birds.

Rationale for Bird Objectives 1–3. The land base within the refuge has never had a comprehensive baseline inventory of bird species present throughout the different seasons of the year. Collecting baseline inventory data and conducting monitoring on wildlife refuges are essential for identifying conservation targets, detecting climate-related system changes, identifying vulnerable species and habitats, and evaluating management choices (Defenders of Wildlife 2008).

To help plan management actions for the greatest benefit for migratory and resident birds in upland areas, Federal, State, and nongovernmental lists were reviewed to determine birds of conservation concern that use this habitat during breeding, nonbreeding, and migration. The refuge does not cur-

rently have a completed bird species list. However, based on a preliminary refuge list of 286 birds, one species is listed as endangered (least tern); one species is threatened (piping plover); two species are candidate species, meaning they are warranted but are currently precluded from listing (Sprague's pipit and greater sage-grouse); and 21 birds are on the Service's birds of conservation concern list.

Birds of conservation concern are the migratory and nonmigratory bird species beyond those already designated as federally threatened or endangered that represent the highest Service conservation priorities (FWS 2011c). The refuge is located within the Badlands and Prairies Bird Conservation Region "BCR 17". Twenty-eight birds are listed for BCR 17, and 23 of these birds are on the refuge bird list.

The Service's migratory bird program has a focal species strategy from August 2005 that identifies migratory bird species in need of focused conservation action and leads targeted campaigns to return the species to healthy and sustainable levels (FWS 2011c). Of 139 focal birds on the list, 39 are on the refuge bird list.

The refuge's focal bird species (tables 20, 21, and 22) are birds officially documented as being found on the refuge and have restrictive habitat needs that can serve as an umbrella for ecological processes as well as for other, generalist, bird species found in the same habitat type. For example, an area that supports Sprague's pipit also supports western meadowlark. Whereas, an area that supports western meadowlark does not necessarily support Sprague's pipit (Lambeck 1997).

Literature shows that 90 percent of birds rely on arthropods (insects, spiders, and other inverte-

brates) during at least one stage in their life. Pollinating insects are food for birds and, therefore, are a central part of a very important food web for resident and migratory birds. The resulting insect-pollinated seeds and fruits also feed birds, especially in the months when insects are not present. One very effective way to increase local pollinator numbers is to increase the native flower-producing forbs and shrubs, which not only increases the numbers of invertebrates that can be directly eaten by birds but also increases the amount of seed and fruit available for winter bird foods. By managing for the highly specialized butterflies and bees, other invertebrates such as pollinating flies, beetles, spiders, and aphids, also benefit. A landscape rich in quality nectar and pollen plants is central to any pollinator and bird conservation effort. (Mader et al. 2011)

Unlike many forbs and shrubs, grass flowers are wind-pollinated. Therefore, they do not attract the insect pollinators needed by most birds. Grasses do attract specific arthropods because, unlike some forbs and shrubs, most grass species lack the variety of compounds that deter herbivory, so they are readily grazed by some insects. Grasses can be the hosts of many specialized endophagous insects, which are concealed inside leaf tissue for much of their life cycle, and ectophages insects, which feed externally on leaf tissue by chewing, scraping, and sucking. Birds take advantage of these during the breeding season. Grasses can serve as host plants for some butterflies as well as potential nesting sites for colonies of bumblebees and as overwintering sites for many insects.

As with many grassland birds, heavy stocking with domestic animals negatively affects insect communities; whereas, a reduction of grazing pressure increases the insect species richness and abundance as well as bird species richness and abundance. Grassland management practices can enhance invertebrate diversity by increasing grassland diversity for healthy populations of forbs and fruit-producing shrubs as well as healthy stands of grass species (Tscharrntke 1995).

Sentinel plants are the best food plants for wildlife, birds and many insects included, providing quality food in four ways: forage, pollen, fruits and seeds, and hosts to abundant insect species. Many of the refuge's sentinel plants (refer to habitat objectives above and appendix G) are also designated as Montana pollinator-friendly plants (NRCS 2005a). Several sentinel plants are also included as "most important forage and most important browse" for mule deer and elk in the Missouri River Breaks (Mackie 1970). Sentinel plants and focal birds are those species first to vanish due to changes in ecological processes. They are indicators of complete flora and avifauna (birds of a specific region or period) com-



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The long-billed curlew (a focal bird species) nests in wet and dry uplands.

munities. Focal birds often have the most restrictive needs within any given area; therefore, they can be indicators of a complete avifauna. Ultimately, they are dependent on a complete flora with its corresponding arthropod community. The tasks of management are to provide structural heterogeneity at multiple scales while sustaining the complete flora and avifauna. Sentinel plants and focal birds will be the measures of success or failure. Refer to “Birds” under section 3.2 in chapter 3 for a complete discussion of habitat needs for focal birds.

Upland. Six bird species—three migrants and three residents—were selected as focal bird species (table 20): long-billed curlew, Sprague’s pipit, Baird’s sparrow, brown creeper, sharp-tailed grouse, and greater sage-grouse. Each species was selected based on the following:

- uses the refuge for breeding
- is identified as needing conservation action
- has the most demanding requirements (late-successional stage trees and abundant insect-providing forbs and fruit-bearing shrubs) and can represent a broader group of species sharing the same or similar needs
- contributes to meeting the primary purpose for the refuge of protecting sharp-tailed grouse, which is declining in most of its range
- represents winter habitat requirements, which are of concern for the two grouse species. At times, there may be an influx of greater sage-grouse in the winter from areas outside the refuge

River Bottom. Three focal species—red-eyed vireo, Brewer’s blackbird, and veery (table 21)—were selected based on the following:

- nests on the refuge
- is identified as needing conservation action



Dan Sudia / USFWS

The veery is a “focal” species, one of the first to respond to changed conditions, for refuge river bottoms.

- has the most demanding requirements and can represent a broader group of species sharing the same or similar needs

Riparian Area and Wetland. Four focal species—ovenbird, Cordilleran flycatcher, black-billed cuckoo, and western wood-pewee (table 22)—were selected based on the following:

- nests on the refuge
- is identified as needing conservation action
- has the most demanding requirements, such as late-successional stage trees and abundant insect-providing forbs and fruit-bearing shrubs, and can represent a broader group of species sharing the same or similar needs
- represents species that are primarily nocturnal flocking birds like the black-billed cuckoo, whose numbers have experienced severe declines, possibly due to pesticide use

Shoreline. Focal birds were not selected for the shoreline habitat because it is a highly dynamic area that fluctuates based on lake levels. Potential focal bird species, such as piping plover and least tern, are totally dependent on the shoreline for nesting and the adjacent water for food. USACE has primary jurisdiction for management of the lakeshore.

Bird monitoring, if done correctly, can quantify the status of bird populations, measure trends or changes in status, reveal effects of natural or human-induced changes, and aid in the development and evaluation of management decisions (Lambert et al. 2009).

Strategies for Bird Objectives 1–3

- Conduct a refugewide bird atlas to collect data four times a year, during 24-hour blocks of time, for 7 years on the distribution, abundance, habitat use, and breeding and migratory phenology of the avifauna using each selected section of the atlas. Repeat the bird atlas during years 8–15 of the CCP.
- Work with partners, and gather historical data to add to the inventory database.
- Develop a data management system including a GIS database for recording bird sightings. Incorporate all habitat and management information into the bird data management system.
- Conduct studies to find specific connections between sentinel plant species and focal bird species.
- Carry out a vegetation monitoring program to assess if each focal bird’s habitat requirement is being met during each season of the year.
- Conduct a study to figure out the habitat needs of select focal birds from each of the refuge’s four habitat types, including evaluating the influence of herbivory and fire and the abundance and distribution of each species for each season of the year.

Table 20. Focal bird species for uplands at the Charles M. Russell and UL Bend Refuges, Montana.

<i>Breeding habitat*</i>	<i>Sentinel plant association</i>
<p>BROWN CREEPER</p> <p><i>Associated bird species*</i>: No data available from the refuge</p> <p><i>Species of concern lists</i>: Montana Partners in Flight, Montana Natural Heritage Program, Montana Comprehensive Fish and Wildlife Conservation Strategy</p>	
<p>HABITAT: Late-successional stages of coniferous forests and mixed coniferous–deciduous forests</p> <p>MICROHABITAT: Large trees and snags for foraging and nesting; late-successional stages of coniferous forests and mixed coniferous–deciduous forests</p> <p>NEST SITE: Between the trunk and a loose piece of bark on a large, typically dead or dying, tree</p> <p>FOOD: Variety of insects and larvae, spiders, and ants (no vegetation)</p> <p>WINTER FOOD and HABITAT: Variety of insects and larvae, spiders, and ants and some vegetation; large trees and snags for foraging and nesting; late-successional stages of coniferous forests and mixed coniferous–deciduous forests</p>	<p>SHRUBS and TREES: Douglas-fir ponderosa pine (fire sentinels)</p>
<p>LONG-BILLED CURLEW</p> <p><i>Associated bird species*</i>: gadwall, northern shoveler, marbled godwit, northern harrier, horned lark, mourning dove, vesper sparrow, lark bunting, Brewer’s sparrow, western meadowlark, brown-headed cowbird</p> <p><i>Species of concern lists</i>: Service Birds of Conservation Concern (focal species), Montana Partners in Flight, BLM, Audubon Watchlist 2007</p>	
<p>HABITAT: Shortgrass or mixed prairie with flat to rolling topography</p> <p>MICROHABITAT: Areas with trees; high density of shrubs and tall, dense grass generally avoided</p> <p>NEST SITE: On the ground, in patchy areas and relatively dry, exposed sites; often near conspicuous objects</p> <p>FOOD: Entirely carnivorous; terrestrial insects and benthic invertebrates; pecks for food on breeding grounds; feeds on ground-nesting bird eggs and young birds in the nest; forages in shortgrass</p> <p>WINTER FOOD and HABITAT: Not applicable</p>	<p>FORBS: purple coneflower stiff sunflower dotted gayfeather white prairieclover purple prairieclover Maximilian sunflower</p>
<p>SPRAGUE’S PIPIT</p> <p><i>Associated bird species*</i>: Canada goose, upland sandpiper, mourning dove, American crow, horned lark, house wren, vesper sparrow, lark sparrow, grasshopper sparrow, western meadowlark, red cross-bill</p> <p><i>Species of concern lists</i>: Service Endangered Species list, Service Birds of Conservation Concern (focal species), Montana Partners in Flight, Partners In Flight Watchlist 2010, Montana Natural Heritage Program, BLM, Audubon Watchlist 2007, Montana Comprehensive Fish and Wildlife Conservation Strategy</p>	
<p>HABITAT: Native grasslands with no shrubs</p> <p>MICROHABITAT: Intermediate grass height and thickness with moderate litter depth</p> <p>NEST SITE: Open grassland, usually at the base of a dense tussock of grass</p> <p>FOOD: Arthropods, primarily grasshoppers and crickets, including forb-eating insects such as leaf hoppers and caterpillars; forages on the ground in shortgrass</p> <p>WINTER FOOD and HABITAT: Not applicable</p>	<p>FORBS: purple coneflower stiff sunflower dotted gayfeather white prairieclover purple prairieclover Maximilian sunflower</p>

(continued)

Table 20. Focal bird species for uplands at the Charles M. Russell and UL Bend Refuges, Montana.

<i>Breeding habitat*</i>	<i>Sentinel plant association</i>
<p>BAIRD'S SPARROW</p> <p><i>Associated bird species*</i>: ferruginous hawk, horned lark, clay-colored sparrow, Brewer's sparrow, western meadowlark, brown-headed cowbird</p> <p><i>Species of concern lists</i>: Service Birds of Conservation Concern, Montana Partners in Flight, Partners in Flight Watchlist 2010, Montana Natural Heritage Program, BLM, Audubon Watchlist 2007, Montana Comprehensive Fish and Wildlife Conservation Strategy</p>	
<p>HABITAT: Mixed native-grass prairie with scattered low shrubs (<25%) and residual vegetation; returns to burns after 3 years</p> <p>MICROHABITAT: Ungrazed to moderate grazing with high forb coverage</p> <p>NEST SITE: On the ground in tall vegetation, oftentimes at the base of shrubs</p> <p>FOOD: Insects and some seeds; insects gleaned from grass and forbs; forages on the ground between grass clumps</p> <p>WINTER FOOD and HABITAT: Not applicable</p>	<p>FORBS:</p> <p>purple coneflower stiff sunflower dotted gayfeather white prairieclover purple prairieclover Maximilian sunflower</p>
<p>GREATER SAGE-GROUSE</p> <p><i>Associated bird species*</i>: No data available from the refuge</p> <p><i>Species of concern lists</i>: Service Endangered Species List (warranted but precluded), Montana Partners In Flight, Partners in Flight Watchlist 2010, Montana Natural Heritage Program, BLM, Audubon Watchlist 2007, Montana Comprehensive Fish and Wildlife Conservation Strategy</p>	
<p>HABITAT: Mosaic of sagebrush habitats; tall sagebrush; low sagebrush; forb-rich mosaics of low and tall sagebrush; riparian meadows; native grass and forb steppe; scrub-willow; and sagebrush savannas with juniper, ponderosa pine, or quaking aspen</p> <p>MICROHABITAT: Leks situated on broad ridgetops, grassy swales, and disturbed sites such as burns and dry lakebeds, all having less herbaceous and shrub cover than surrounding habitats; broods found in rich mosaics of sagebrush, riparian meadows, and greasewood bottoms, all rich in forbs and insects</p> <p>NEST SITE: In relatively thick vegetative cover usually dominated by big sagebrush; also can be dominated by grasses or other species of shrubs such as rabbitbrush, greasewood, and bitterbrush</p> <p>FOOD: Leaves (dominant throughout year), buds, stems, flowers, fruit, and insects; forbs are particularly important for prelaying females; insects such as grasshoppers, beetles, and ants are important for juveniles; forb use increases as juveniles age; forages on the ground and in open habitats</p> <p>WINTER FOOD and HABITAT: Sagebrush—big, low, silver, and fringed—is essential for food with low sagebrush preferred over big sagebrush; areas are dominated by 6–43% cover of big sagebrush, low sagebrush, and silver sagebrush; variation in topography and height of sagebrush ensures the availability of sagebrush in different snow conditions</p>	<p>FORBS:</p> <p>purple coneflower stiff sunflower dotted gayfeather white prairieclover purple prairieclover Maximilian sunflower</p> <p>SHRUBS:</p> <p>big sagebrush (fire sentinel)</p>
<p>SHARP-TAILED GROUSE</p> <p><i>Associated bird species*</i>: mourning dove, vesper sparrow, grasshopper sparrow, western meadowlark</p> <p><i>Species of concern lists</i>: Montana Partners in Flight</p>	
<p>HABITAT: Dense herbaceous cover and shrubs mixed with grass</p> <p>MICROHABITAT: Leks occur on elevated areas with less vegetation; broods depend on areas with abundant forbs and insects with a high diversity of shrubs and cover types</p> <p>NEST SITE: Under or near shrubs or small trees or thick and taller residual grass cover</p> <p>FOOD: Forbs, grasses, insects (ants crickets, moths, grasshoppers, and beetles), fruits, and flowers; forages in areas dominated by forbs and sparse grass cover</p> <p>WINTER FOOD AND HABITAT: Buds, seeds, herbaceous matter, and fruits and forages on the ground where succulent forbs or grains are available or in shrubs and trees on fruits and buds; riparian areas, deciduous hardwood shrub draws, and deciduous and open coniferous woods; deciduous trees and shrubs important for feeding, roosting, and escape cover</p>	<p>FORBS:</p> <p>purple coneflower stiff sunflower dotted gayfeather white prairieclover purple prairieclover Maximilian sunflower</p> <p>SHRUBS and TREES:</p> <p>silver buffaloberry aspens peachleaf willow chokecherry</p>

* Birds found in conjunction with Sprague's pipit, Baird's sparrow, long-billed curlew, and sharp-tailed grouse on refuge transects (Rocky Mountain Bird Observatory data, 2009–10). Breeding habitat data is from Cornell Lab of Ornithology (2010).

Table 21. Focal bird species for river bottoms at the Charles M. Russell and UL Bend Refuges, Montana.

<i>Breeding habitat*</i>	<i>Sentinel plant association</i>
RED-EYED VIREO	
<i>Associated bird species*</i> : American goldfinch, American kestrel, American redstart, American robin, black-capped chickadee, brown-headed cowbird, black-headed grosbeak, Bullock's oriole, common grackle, cedar waxwing, common yellowthroat, downy woodpecker, gray catbird, eastern kingbird, house wren, lazuli bunting, least flycatcher, mourning dove, ovenbird, northern flicker, red-winged blackbird, spotted towhee, song sparrow, tree swallow, warbling vireo, western wood-pewee, yellow-breasted chat, yellow warbler	
<i>Species of concern lists</i> : Montana Partners in Flight	
HABITAT: Deciduous and mixed deciduous–coniferous forest	SHRUBS and TREES: chokecherry green ash plains cottonwood redosier dogwood boxelder golden currant peachleaf willow
MICROHABITAT: Absent from sites where understory shrubs sparse or lacking	
NEST SITE: Terminal or subterminal fork of a branch in live midstory to understory trees or shrubs	
FOOD: Mostly insects, particularly caterpillars; forages in the middle and upper third of trees; ground foraging rare	
WINTER FOOD and HABITAT: Not applicable	
BREWER'S BLACKBIRD	
<i>Associated bird species*</i> : American goldfinch, American kestrel, American redstart, American robin, black-capped chickadee, brown-headed cowbird, black-headed grosbeak, Bullock's oriole, common grackle, cedar waxwing, common yellowthroat, downy woodpecker, eastern kingbird, house wren, lazuli bunting, least flycatcher, mourning dove, ovenbird, northern flicker, red-winged blackbird, spotted towhee, tree swallow, warbling vireo, western wood-pewee, yellow-breasted chat, yellow warbler	
<i>Species of concern lists</i> : Montana Partners in Flight	
HABITAT: Riverbanks	SHRUBS and TREES: plains cottonwood green ash peachleaf willow
MICROHABITAT: Forages on relatively bare ground	
NEST SITE: In colonies near water	
FOOD: Insects and other invertebrates; some small fleshy fruits	
WINTER FOOD and HABITAT: Not applicable	
VEERY	
<i>Associated bird species*</i> : No data from the refuge	
<i>Species of concern lists</i> : Montana Partners in Flight, Montana Natural Heritage Program, Montana Comprehensive Fish and Wildlife Conservation Strategy	
HABITAT: Deciduous riparian forest	SHRUBS and TREES: boxelder redosier dogwood golden currant peachleaf willow plains cottonwood
MICROHABITAT: Requires dense understory, primarily shrubs or early successional trees	
NEST SITE: On or near the ground in deciduous trees or shrubs, often near moist areas	
FOOD: 60% insects and 40% fruits; feeds on the ground and in shrubs and trees	
WINTER FOOD and HABITAT: Not applicable	

* Birds found in conjunction with red-eyed vireo and Brewer's blackbird on refuge transects (Avian Science Center, University of Montana bird surveys within the refuge 2005–10). Breeding habitat data is from Cornell Lab of Ornithology (2010).

Table 22. Focal bird species for riparian areas and wetlands at the Charles M. Russell and UL Bend Refuges, Montana.

	<i>Breeding habitat*</i>	<i>Sentinel plant association</i>
OVENBIRD	<i>Associated bird species*</i> : Unknown <i>Species of concern lists</i> : Montana Partners in Flight, Montana Natural Heritage Program	
HABITAT: Contiguous tracts of large, mature trees in deciduous or mixed deciduous-coniferous closed-canopy forest		SHRUBS and TREES: plains cottonwood green ash Douglas-fir
MICROHABITAT: Less ground cover; deeper leaf litter and high prey biomass		
NEST SITE: Ground nester in sparse shrubs and small trees		
FOOD: Forest invertebrates; forages low to the ground		
WINTER FOOD and HABITAT: Not applicable		
CORDILLERAN FLYCATCHER	<i>Associated bird species*</i> : Unknown <i>Species of concern lists</i> : Montana Partners in Flight	
HABITAT: Forest on or near streams		SHRUBS and TREES: ponderosa pine Douglas-fir aspen plains cottonwood peachleaf willow
MICROHABITAT: Coniferous trees overhanging streams and steep banks; thick shrub undergrowth		
NEST SITE: Cool, shaded areas associated with water and forest openings		
FOOD: Exclusively insects caught in the air or from the foliage of trees and shrubs		
WINTER FOOD and HABITAT: Not applicable		
BLACK-BILLED CUCKOO	<i>Associated bird species*</i> : Unknown <i>Species of concern lists</i> : Service Birds of Conservation Concern, Montana Partners in Flight, Montana Natural Heritage Program	
HABITAT: Groves of trees and thickets frequently associated with water		SHRUBS and TREES: chokecherry boxelder green ash plains cottonwood aspen peachleaf willow
MICROHABITAT: Thickets of small trees and scrubs. Usually feeds within canopy but occasionally takes prey from ground		
NEST SITE: Thick bushes sometimes associated with streams and marshes, between branches or in the crotch against the main trunk		
FOOD: Large insects Consumes a variety of caterpillars		
WINTER FOOD and HABITAT: Not applicable		
WESTERN WOOD-PEWEE	<i>Associated bird species*</i> : American flicker, least flycatcher, yellow warbler, lazuli bunting, spotted towhee, clay-colored sparrow, American goldfinch, eastern kingbird, common yellowthroat, field sparrow, Brewer's blackbird, Say's phoebe, western meadowlark, northern oriole, American kestrel, mourning dove, black-headed grosbeak, chipping sparrow <i>Species of concern lists</i> : Montana Partners in Flight	
HABITAT: Riparian woodland and forest, especially along the forest edge		SHRUBS and TREES: plains cottonwood green ash aspen
MICROHABITAT: Large tree diameters, open understory, and dead trees or trees with dead limbs		
NEST SITE: Trees, primarily cottonwoods and also mature aspens; both living and dead trees		
FOOD: Flying insects, especially flies, ants, bees, wasps, beetles, moths, and bugs; forages in the upper 25% of the canopy		
WINTER FOOD and HABITAT: Not applicable		

* Birds found in conjunction with ovenbird, Cordilleran flycatcher, black-billed cuckoo, and western wood-pewee on refuge transects ("Second Survey of Birdlife in Two Coulees near Bobcat Creek on Charles M. Russell National Wildlife Refuge," 1993; "Bird Species Composition and Abundance in Two Riparian Areas with Differing Grazing Histories on Charles M. Russell National Wildlife Refuge," 1994; "Avian Community Composition and Nesting Productivity Relative to Cattle Grazing in North-Central Montana," 2001; and "Avian Species Detected during Point-Count Surveys on Riparian Sites," 1998). Breeding habitat data is from Cornell Lab of Ornithology (2010).



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American Badger

FURBEARER and SMALL PREDATOR OBJECTIVES

Furbearers include beaver, muskrat, river otter and mink, raccoons, badgers, and other small mammals. Small predators include coyotes, swift fox, weasel, and civet cat (spotted skunk).

FURBEARER and SMALL PREDATOR OBJECTIVE 1. Within 5 years, begin a comprehensive monitoring program to determine density levels and distributions if considering opening furbearer species for harvesting by either hunting or trapping.

FURBEARER and SMALL PREDATOR OBJECTIVE 2. Over 15 years, maintain self-sustaining populations of furbearers by restricting and regulating harvest opportunities on the refuge when harvest begins for species regulated by MFWP (muskrat, beaver, mink, swift fox, and bobcat) and those unregulated by MFWP (least weasel, long-tailed weasel, striped skunk, badger, raccoon, red fox, and coyote).

FURBEARER and SMALL PREDATOR OBJECTIVE 3. By 2017, evaluate habitat and determine the habitat suitability of reintroducing populations of swift fox to the refuge and, if so, the number of breeding population pairs that could be reintroduced into suitable habitat. If reestablishment does not occur by 2020, increase active management to establish a viable population on the refuge.

FURBEARER and SMALL PREDATOR OBJECTIVE 4. Within 10 years, have viable beaver populations in a minimum of two tributaries of the Missouri River on the refuge.

FURBEARER and SMALL PREDATOR OBJECTIVE 5. Over 15 years, encourage research on priority furbearer species on the refuge to determine their ecological role. Universities or other organizations conduct research with refuge help in the form of money, supplies, volunteers, or technical assistance.

FURBEARER and SMALL PREDATOR OBJECTIVE 6. As part of the Service's programs for strategic habitat conservation and landscape conservation cooperatives (refer to chapter 1), evaluate the potential for natural colonization of extirpated species into suitable habitats by evaluating current corridors. If extirpated species naturally colonize the refuge, work with the State and others to ensure refuge management is compatible with State and Federal management plans.

Rationale for Furbearer and Small Predator Objectives 1–6. Little is known about the limiting factors for these species on the refuge, but habitat management for diversity and health should benefit them. Expanding suitable riparian habitats will provide the basis for increased populations of muskrat, beaver, river otter and mink.

A few swift fox sightings have been reported on or near the refuge and reintroduction into suitable habitat will help speed population establishment.

A research project on bobcats conducted in 1979 and 1980 showed illegal hunting to be the largest mortality factor among radio-collared bobcats on the refuge (Knowles 1981). Current population numbers on the refuge remain relatively unknown; however, continued restrictions will help support a viable bobcat population in the Missouri River Breaks as areas around the refuge continue to be hunted.

The Service will evaluate the harvest potential for furbearers and small predators to provide a wildlife-dependent recreational opportunity (refer to "Hunting Objectives" in section 4.6 below). A stable or growing population of furbearers and small predators will be maintained for its contribution to the overall biological diversity and integrity and to the environmental health of the refuge.

Similar to the mountain lion, Federal law prohibits any hunting or trapping on a national wildlife refuge unless specifically authorized. To open the refuge for the hunting or trapping of furbearers or small predators, a proposal, or hunt plan, needs to be prepared that includes a justification with population status, determination of harvest levels, and monitoring results. Proposals are subject to additional public input and National Environmental Policy Act compliance.

USDA Wildlife Services conducts predator control activities along the southeast part of the refuge on private and BLM lands under cooperative agreements. This activity has declined in recent years due

to fewer domestic sheep populations (personal communication with John Steuber, Wildlife Services, on November 7, 2011). Wildlife Services does not conduct predator control on the refuge unless they are in pursuit of an animal or are requested by the refuge for help (by earlier agreement with the Service); however, it is difficult to discern private lands from refuge lands, which may result in some taking that occurs on the refuge by contracted aerial shooters. Aerial shooting of coyotes on the refuge will not be allowed.

Strategies for Furbearer and Small Predator Objectives 1–6

- Maintain current protection and do not permit any harvest until population surveys are completed and it has been found that a harvest strategy could be carried out without affecting the naturally occurring population dynamics.
- Consider reintroducing swift fox.
- Restore riparian communities in Missouri River tributaries to promote beaver, muskrat, river otter, and mink expansion.
- Increase law enforcement to reduce potential illegal take of bobcat or coyote.
- Within 1 year, end taking of coyotes on the refuge by USDA Wildlife Services or other contracted shooters.
- Maintain current oversight for those species already protected on the refuge.
- With stable population levels, allow furbearers and small predators (coyote, long-tailed and least weasel, swift fox, skunk, beaver, muskrat, mink, river otter, bobcat, badger, raccoon, and red fox), as defined by MFWP, to be managed for naturally occurring population dynamics.
- Allow hunting of red fox. Permit limited coyote hunting (mid-October through March 1).
- Develop a standardized data sheet for furbearing animals to collect information for input into a newly designed database to establish a GIS layer for mapping their locations.

AMERICAN BISON RESTORATION OBJECTIVES

The American bison historically ranged throughout the Great Plains, and the last wild bison was extirpated from this area in the late 1800s (FWS 2010d). Wild bison played a significant ecological role with fire to shape the landscape. Restoring historical fire-return intervals and wild bison will be a major step in restoring the biological integrity and natural ecosystem functions on the refuge and surrounding areas.

The momentum and interest in wild bison restoration in North America has increased substantially in recent years. The International Union for Conservation of Nature established the Bison Specialist

Group, which was charged in 2005 with developing a “North American Strategy for Bison Conservation.” That comprehensive plan is expected to be released in the near future and will provide scientifically based guidelines for proponents interested in restoring wild bison at an ecologically functional scale.

The Wildlife Conservation Society has recently reestablished the American Bison Society to promote bison conservation. The society, originally active from 1905 to 1935, was largely responsible for keeping bison from going extinct and establishing the conservation herds that are managed today by the Service and the National Park Service for the American public.

MFWP’s Comprehensive Fish and Wildlife Conservation Strategy (MFWP 2005a) lists the American bison as a priority, tier 1, species for conservation. MFWP and others have invested time and effort trying to produce brucellosis-free bison from the genetically valuable Yellowstone herd as stock to establish herds managed for conservation and ecological purposes elsewhere. In 2010, MFWP began a process to evaluate the opportunity for establishing a wild plains bison population in Montana. In 2011, MFWP published its findings. The purpose was not to make management decisions but to create the foundation for an informed public dialogue about the future of bison in the State of Montana (Adams and Dood 2011).

There will be multiple agencies, partners, and cooperators in any proposed wild bison restoration effort. The Service has taken the position that it will not consider reintroducing wild bison on the refuge unless MFWP initiates an effort to restore wild bison (Adams and Dood 2011) on a large landscape. The Service recognizes the State’s role in managing native wildlife and will work cooperatively with MFWP in the development of a wild bison restoration plan. MFWP does not have any plans at this time to consider reintroducing a free-ranging herd of wild bison in the area.

AMERICAN BISON RESTORATION OBJECTIVE 1. Over 15 years, continue to work with MFWP, conservation organizations, and neighbors to evaluate the economic, social, and biological feasibility of restoring wild bison as a natural component on the surrounding landscape.



AMERICAN BISON RESTORATION OBJECTIVE 2. On advancement of a MFWP proposal that includes refuge lands in a wild bison restoration effort, develop a stepdown framework defining the conditions under which the refuge will participate.

AMERICAN BISON RESTORATION OBJECTIVE 3. Within 1 year of framework development (refer to American Bison Objective 2), and in cooperation with MFWP and other partners, develop a wild bison management plan that specifies and ranks areas of suitable habitat; establishes abundance, composition and distribution targets based on habitat conditions and appropriate wildlife and recreation management on a national wildlife refuge; and details cooperative management responses to be applied to anticipated conflicts.

AMERICAN BISON RESTORATION OBJECTIVE 4. Over 15 years, continue to develop, and carry out, research proposals to better understand the interaction of wild bison, livestock, wild ungulates and other wildlife and vegetation in relation to fire and other life-threatening influences.

Rationale for American Bison Restoration Objectives 1–4. Any reintroduction of wild bison will need to be a cooperative venture with MFWP. At this time, the State does not have an ongoing plan to reintroduce wild bison in the Missouri River Breaks.

The Service will cooperate with MFWP, BLM, DNRC, conservation organizations, and others to conduct the necessary biological, social and economic research to determine the feasibility of such a proposal.

The Service recognizes the ecological importance of such an effort, but also recognizes the complexity and controversy that is associated with any such effort. Therefore, the approach is to work cooperatively and collaboratively with others as a full partner in any proposal, with full engagement of the public.

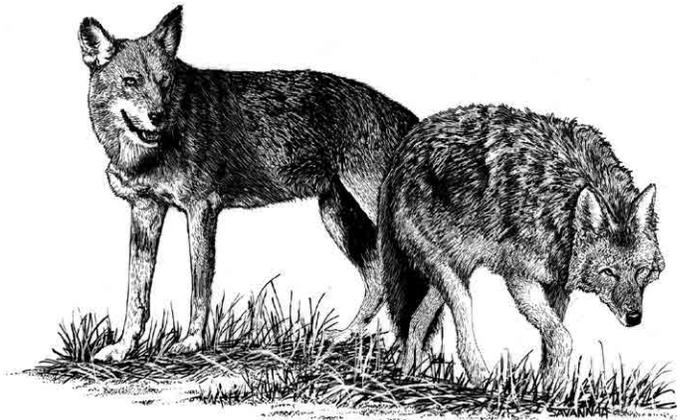
The following strategies will be conducted concurrently with any proposal by MFWP for wild bison restoration in areas around the refuge.

Strategies for American Bison Restoration Objectives 1–4

- Work with MFWP, major universities, National Wildlife Federation, World Wildlife Fund, The Nature Conservancy, American Prairie Reserve, and others to develop and carry out research proposals to evaluate the biological, social, and economic feasibility of restoring free-ranging wild bison in and around the refuge.
- Work with a variety of economists to determine the potential economic benefits and negative effects of a free-ranging wild bison herd in the area.
- Before any wild bison reintroduction, complete a cooperative wild bison management plan developed and agreed-on by all involved management parties, which addresses population objectives and management, movement of animals outside restoration areas, genetic conservation and management, disease management, and conflict resolution procedures.

NORTHERN GRAY WOLF OBJECTIVE

Wolves were reintroduced into Yellowstone National Park in 1995 and have steadily increased in numbers to an estimated population of 566 wolves in Montana with at least 35 breeding pairs (MFWP 2011). There have not been any confirmed sightings of wolves on the refuge since they were extirpated in the late 1800s or early 1900s. There are no plans to reintroduce wolves on the refuge.



Gray Wolf
Bob Savannah / USFWS

NORTHERN GRAY WOLF OBJECTIVE. Manage the northern gray wolf in cooperation with MFWP and in accordance with the State management plan and Service policy.

Rationale for the Northern Gray Wolf Objective. Should the northern gray wolf naturally colonize the refuge, the Service will adopt the State's plan and follow Service policies in monitoring and managing the species. Hunting will not be established until a proposal, or hunt plan, was developed in accordance with National Environmental Policy Act requirements and until regulations were published in the Federal Register.

Strategies for the Northern Gray Wolf Objective

- Work with MFWP and others to document wolf presence on the refuge and to monitor abundance, distribution, and population trends if wolves become established.
- Collaborate with others to educate the public and refuge users about the ecological role wolves play in the environment.

- On a case-by-case basis, remove wolves that are documented depredating livestock.
- Promote, help sponsor and conduct research on wolf ecology in the Missouri River Breaks.

BIG GAME OBJECTIVES

There are six big game species of primary importance that are found on the refuge: Rocky Mountain elk, mule deer, white-tailed deer, pronghorn, Rocky Mountain bighorn sheep, and mountain lion.

The Service will work collaboratively with MFWP and adjoining landowners to identify suitable habitat for Rocky Mountain bighorn sheep and establish new populations using modeling and transplant criteria.

BIG GAME OBJECTIVE 1. Develop cooperative big game population and habitat monitoring programs with MFWP by 2015. Establish population levels, sex and age composition targets, and harvest strategies that are jointly agreed to and tailored to the varied habitat potential on the refuge during the development of HMPs. To provide a variety of quality recreational opportunities, design hunting regulations to include population objectives with diverse male-age structures not generally managed for on other public lands.

Rationale for Big Game Objective 1. In accordance with national policy, striving to the extent practicable to achieve consistency with State management objectives and regulations (MFWP 2001, 2004, 2009a), refuge-specific objectives for abundance and population composition will be established through HMPs and tailored to regional habitat conditions, productivity, and other considerations. The objectives will consider naturally functioning ecosystem processes, biological integrity, hunting opportunities, and quality of recreational experiences.

Early explorers left vivid accounts of the abundant big game populations that inhabited the region (Moulton 2002). With restoration of natural ecological processes the focus, the aim is to restore such game abundance and diversity within the current limits of habitat capability. Before those visits of early explorers, the intensity of human harvest of big game was different than today, as likely there was not the active selection for killing the largest antlered males possible that is the norm of some hunting programs today.

National wildlife refuges are the only Federal lands managed specifically for wildlife conservation, and the objectives reflect an emphasis on sustaining abundant and healthy wildlife populations. Such wildlife-priority management is not generally possible elsewhere because of multiple use mandates on other Federal lands and conflicting priorities on State and private lands. The big game objectives



White-tailed Deer

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reflect the wildlife-priority emphasis and for providing quality opportunities for wildlife-dependent recreation, which are described in the Improvement Act and the Service's hunting policy (FWS 2006f).

Big game hunting is the dominant public use activity on the refuge and surrounding lands, accounting for nearly 90,000 hunter visits (refer to "Hunting" under section 3.4 in chapter 3). Between Service lands, BLM lands, and MFWP block management areas, there are huge areas open to public hunting. Such free and open access to such large blocks of land is becoming increasingly valued by the hunting public as access to some private lands becomes more restrictive. The Service, together with its partners, will work to provide access and quality recreational experiences for hunting big game populations throughout the refuge. However, some limitations may need to be imposed, but the Service believes there is public support for this approach.

The Missouri River Breaks region including the refuge is recognized throughout Montana as a highly valued wildlife recreation sites anywhere in Montana (Dickson 2008) (for more information, see figure 34 in chapter 3).

The refuge views sex and age structure of big game populations as important considerations in managing human harvest of native ungulates to achieving ecological resilience and biological integrity (FWS 2001). Ungulate population management considers densities, social structures, and population dynamics. The aim is to strike the right balance between managing for natural wildlife populations (as called for in the Executive orders that established game ranges back in the 1930s), wildlife-dependent public uses, and other needs and responsibilities.

Strategies for Big Game Objective 1

- Continue to respond to inquiries and provide information about refuge hunting opportunities.
- Continue listening to refuge users throughout the year and annually review refuge hunting regulations to ensure clarity, address any emerging issues or concerns and adjust as necessary to achieve refuge objectives.
- Continue to publish the refuge hunting regulations brochure to inform the public of hunting opportunities (including accessible opportunities) and refuge-specific regulations.
- Distribute the refuge's brochure more widely.
- Continue to monitor boat use for accessing hunting areas along the river to ensure that wildlife species using the habitat along the river are not negatively affected over the long term.

BIG GAME OBJECTIVE 2 (elk and deer). Within 5 years, work with all partners to begin ecological studies of elk and mule deer habitat selection and response to management actions (for example, prescribed fire) and natural disturbances.

Rationale for Big Game Objective 2 (elk and deer). Comparatively conservative harvest levels for bull elk by MFWP in the Missouri River Breaks has likely contributed to the popularity (statewide and nationally) of the big game resources in this area. The long-term average adult bull-to-cow ratio in hunting district 410 is 32:100 (Tom Stivers, personal communication, June 2010). The objective in MFWP's elk management plan for the Missouri Breaks calls for a minimum of 30:100, or three times the objective of a minimum of 10:100 found in many western Montana areas. In many years the actual bull-to-cow ratio in the Missouri Breaks is substantially higher, averaging around 45:100 in Phillips County (Mark Sullivan, personal communication, June 2010). Such management for quality elk herds and recreational opportunities is one reason why the Missouri Breaks are valued by the public.

Strategies for Big Game Objective 2 (elk and deer)

- In collaboration with the partners, use previous survey data and habitat modeling to tailor big game density objectives to specific ecological regions of the refuge based on the ability of different areas to support big game. Regulate and monitor harvest levels.
- Develop habitat monitoring programs to detect when, where, and which ungulate populations negatively affect habitats.
- Continue or enhance current ungulate population monitoring surveys to document deer and elk abundance, distribution, and herd composition.
- Continue to meet with MFWP and other cooperators to implement habitat and population moni-

toring procedures to adjust management based on monitoring data.

- Continue throughout the life of the CCP with monitoring for chronic wasting disease in cervids, and respond as needed to the detection of chronic wasting disease as specified in the refuge's chronic wasting disease management plan (FWS 2007b).

BIG GAME OBJECTIVE 3 (bighorn sheep). Manage bighorn sheep ram harvest levels to result in a minimum age of 6.5 years old for harvested rams (MFWP's objective is at least 6.5 years old). Manage ewe harvest in the Mickey/Brandon Buttes area to maintain a population of 25–30 ewes (same as MFWP objective). Manage harvest levels to maintain a population of about 225 sheep for the currently occupied sheep habitat in hunting district 622. Establish more bighorn sheep in suitable habitat.

Rationale for Big Game Objective 3 (bighorn sheep). Bighorn sheep are a highly valued big game animal, and ram harvest levels across Montana are managed conservatively with an emphasis on having opportunities to harvest older rams. As stated in MFWP's Bighorn Sheep Conservation Strategy, the goal for Missouri River Breaks bighorn sheep is to manage for healthy and productive populations with a diverse age structure of rams.

Alternatively, harvest guidance from MFWP's Bighorn Sheep Conservation Strategy could be followed that is based on population size, ram:ewe ratio and number of 3/4+ curl rams observed.

Strategies for Big Game Objective 3 (bighorn sheep)

- Develop habitat potential maps using GIS, published literature and field surveys to delineate what is thought to be bighorn sheep habitat.
- Develop and carry out reintroduction plans in conjunction with MFWP to stock areas with bighorn sheep.
- Use GPS collars on current residents in established areas and newly translocated individuals into new areas to monitor survival, sightability, habitat use, and movement.
- Continue monitoring bighorn sheep populations with aerial winter and summer counts and ground-based surveys.
- Establish monitoring programs for habitat and disease risk to evaluate habitat and herd health conditions.
- Continue to restrict ewe permits east of Timber Creek until all available habitat is occupied and population levels suggest a need for reduction.
- Harvest ewes (in any area) when there is a demonstrated need to reduce sheep density for herd health (disease potential) or because of habitat degradation.

BIG GAME OBJECTIVE 4 (mountain lion). By 2015, with support from MFWP and other cooperators, develop the methodology and conduct a study of mountain lion to determine population levels, abundance, distribution and population trends. Consider harvest if monitoring shows a limited harvest could be sustained. (Refer to “Hunting Objectives” in section 4.6 below.)

Rationale for Big Game Objective 4 (mountain lion). A mountain lion study is ongoing within the refuge, Missouri Breaks, Bear Paws, and Little Rocky Mountains to determine density, movement, habitat, and causes of mortality. If the results show mountain lion populations are robust and healthy, the Service will consider a limited harvest (refer to “Big Game” under section 3.2 in chapter 3). Federal law prohibits any hunting or trapping on a national wildlife refuge unless specifically authorized. To open the refuge for a mountain lion hunt, a proposal (hunt plan) needs to be prepared that includes a justification including the population status, determination of harvest levels, and monitoring results. A proposal needs to comply with the National Environmental Protection Act.

Strategy for Big Game Objective 4 (mountain lion)

- Maintain and monitor GPS and very high frequency (VHF) collars on 5–10 percent of the estimated lion population on the refuge.

BIG GAME OBJECTIVE 5 (pronghorn). By 2015, collaborate with partners to begin a pronghorn ecology research study with a focus of documenting movements, habitat use, and what role refuge lands play in pronghorn ecology in a landscape context.

Rationale for Big Game Objective 5 (pronghorn). Although pronghorn use the refuge, their numbers are generally low, except during severe winters. Pronghorn migrate through the refuge, so it is important to understand their habitat use and needs during the time they spend on the refuge.

Strategies for Big Game Objective 5 (pronghorn)

- Establish pronghorn survey areas based on habitat potential modeling using GIS.
- Conduct aerial surveys and adjust as needed with information resulting from research studies.
- Based on pronghorn research results and habitat monitoring specific to pronghorn, manage livestock grazing and fire to maintain or enhance pronghorn habitat.
- Regulate harvest to keep big game populations at levels that promote healthy sentinel plant populations and other species. Consider effects on adjoining landowners.
- Identify and protect important wintering habitat for pronghorn by reducing hazardous fuel in these areas using prescribed fire.



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A mountain lion on the refuge.



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Pronghorn

OTHER WILDLIFE OBJECTIVE

Many species of invertebrates, amphibians, reptiles, fish, and small mammals are found on the refuge and serve as key indicators in evaluating the environmental health of the ecosystem.

OTHER WILDLIFE OBJECTIVE. Within 1–2 years, assess the need for baseline inventory plans, surveys, or research for fish, reptiles, amphibians, invertebrates, or other small mammals found on the refuge. Prioritize the highest needs (for example, top 7–10) particularly those that support or are tied to the monitoring efforts for upland, river bottom, and riparian area objectives. Within 5 years, begin and complete inventory plans or baseline surveys for about 30–50 percent of the highest priority needs. Over 15 years, complete 75–100 percent of the top 10 priorities. Prioritize monitoring needs based on sentinel species that support habitat goals and objectives or climate change effects.

Rationale for the Other Wildlife Objective. Limited information is available on the diversity of fish, reptiles, amphibians, invertebrates, and other small mammals such as bats and rodents that are found on the refuge including the composition and distribution of these species. As part of implementing the objectives for uplands, river bottoms, and riparian areas, baseline information or more survey work is needed to monitor and evaluate the success of the habitat objectives. While the need for understanding baseline information is important for habitat monitoring, money limitations and other staff priorities require the prioritization of these plans and surveys and coordination with MFWP, including getting necessary permits. The refuge staff currently helps with the large-scale North American Amphibian Monitoring Program and a refuge-specific monitoring strategy will be patterned on that effort.

The Missouri River Breaks provide unique habitats for the many nongame species including fish, amphibians, invertebrates, and small animal in the northern plains due to the topographic features and forest outliers present. This region has not had a comprehensive baseline inventory of species present. Establishing the species present is the foundational first step in species conservation. This step will lead to species and habitat associations and adaptive management actions that are tied to the habitat objectives.

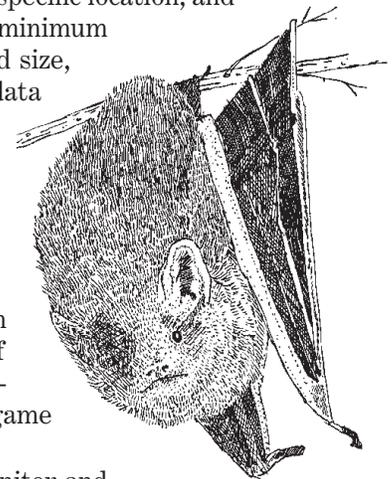
Terrestrial small mammals have limited distributions and small home ranges and require relatively high densities to maintain viable populations (Silva 2001). Therefore, they are susceptible to population declines resulting from habitat degradation or loss at many scales including local disturbances (Van Dyke 2003, Gaines et al. 1997, Rossenberg et al. 1997). However, detailed data about specific habitat influences on abundance and distribution are lacking, and this limits the ability of managers to effectively sustain healthy populations across the landscape.

Important habitats for plants and animals can be restricted or otherwise modified by prescribed fire, rotational grazing, or other types of habitat management such as thinning, reseeding, and chemical or mechanical weed control. Because populations can be sampled relatively easily, small mammal communities are often used as indicators for monitoring ecosystem responses to habitat restoration and management (Douglass 1984, Olson et al. 1994). As a prerequisite of using small mammals in such a conservation program; however, it is critical to identify and understand the structure and composition of small mammal communities in areas exposed to management.

Strategies for the Other Wildlife Objective

- Conduct stream surveys based on refuge priorities (functioning and nonfunctioning streams)

- using qualified aquatic ecologists versed in prairie stream survey techniques and methods.
- Work in partnership with Federal, State, non-governmental organizations, and others to write management plans and incorporate other plans or planning efforts such as the Missouri River Fish Management Plan, strategic habitat conservation and land conservation cooperatives, and the Montana Fish and Wildlife Conservation Strategy.
- Document fish inhabiting the refuge's ephemeral, intermittent, and perennial streams using Bramblett and Zale (1999) as a baseline.
- In cooperation with BLM, restore degraded riparian areas by limiting expansion of existing stock ponds or limiting additional stock ponds and other water developments.
- Remove fish passage impediments such as culverts, grade-control structures, or diversion structures on case-by-case basis.
- To preserve and enhance populations of nongame species on the refuge, develop habitat management strategies such as detailed prescriptions for habitat management, protocols to monitor species' status, and methods to evaluate the effectiveness of management actions.
- Hire more refuge staff and encourage universities or other organizations to conduct surveys on the effects of public use, wildland fire (wildfire and prescribed fire), and other management strategies throughout the calendar year on a yearly basis to determine changes in use.
- Establish standardized reporting methods for incidental sightings to include species, date, property, specific location, and habitat type as minimum information; and size, sex, and age data as additional information where possible.
- Develop and maintain a GIS database to record distribution and locations of incidental sightings of all nongame species.
- Continue to monitor and identify nongame species with limited distribution or specific habitat needs (for example, snake den sites and bat rookery or roosting sites) using 3-year rotation surveys.



Red Bat
© Cindie Brunner

4.3 GOAL for THREATENED and ENDANGERED SPECIES and SPECIES of CONCERN

Contribute to the identification, preservation, and recovery of threatened and endangered species and species of concern that occur or have historically occurred in the northern Great Plains.

There are objectives for threatened and endangered species of importance that are found on the refuge:

- black-footed ferret (endangered)
- least tern (endangered)
- piping plover (threatened)
- pallid sturgeon (endangered)

This section also addresses grizzly bear (threatened), which is not currently found on the refuge but could migrate within the 15-year period.

In addition, there are objectives for the following species of concern for the refuge:

- black-tailed prairie dog
- greater sage-grouse (candidate)
- mountain plover
- sicklefin chub
- sturgeon chub
- Sprague's pipit (candidate)

The Service will protect or enhance populations of threatened and endangered species such as the black-footed ferret, nongame species such as the black-tailed prairie dog, and bird species or other species of management concern through research, disease management, population augmentation, or habitat manipulation.

With approved MFWP management plans and in cooperation with MFWP and others, the Service will consider reintroduction of more black-footed ferrets, swift foxes, black-tailed prairie dogs, pallid sturgeons, and bighorn sheep into the landscape. Populations of the black-tailed prairie dog will be expanded to maintain or increase the health and diversity of all species' populations where prairie dogs are a critical component.

The Service will develop management plans for the grizzly bear, in accordance with Federal and State regulations and plans to address potential immigration of this species to the refuge.

Predators will be managed as an important component of the wildlife community, and predator management by the USDA will be stopped.

A biological evaluation ("Appendix H, Section 7 Biological Evaluation") assessed the management actions in this plan. The evaluation determined that these actions will have "no effect" on or "may affect, but not likely to adversely affect" the threatened and endangered species on the refuge.



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Black-footed ferrets were "rediscovered" in Wyoming in 1981.



Gene Nieminen / USFWS

Piping Plover

OBJECTIVES for THREATENED and ENDANGERED SPECIES and SPECIES of CONCERN

THREATENED and ENDANGERED SPECIES (TES) and SPECIES of CONCERN OBJECTIVE 1 (black-footed ferret). Maintain habitat for, and maintain a minimum of, 30 breeding pairs of black-footed ferrets on six or more prairie dog towns when animals are available and there is successful management of plague outbreaks.

TES and SPECIES of CONCERN OBJECTIVE 2 (black-footed ferret). Over 15 years, continue to provide technical and scientific assistance where possible in black-footed ferret recovery to State, conservation organization, and private landowners interested in black-footed ferret recovery.

TES and SPECIES of CONCERN OBJECTIVE 3 (black-footed ferret). Continue the monitoring of the existing UL Bend population and consider additional releases of captive-reared ferrets.

Rationale for TES and Species of Concern Objectives 1–3 (black-footed ferret). With successful management of plague and with partner cooperation, the refuge could produce sufficient prairie dog habitat to support a black-footed ferret population that contributes to recovery of the species.

The Service has actively released and monitored ferrets at UL Bend Refuge since 1994. The refuge also built a captive-rearing and preconditioning facility near Malta that operated for several years, but has now been abandoned. The refuge staff have also helped with ferret reintroductions and monitoring on BLM lands, on the Fort Belknap Indian Reservation and on the Northern Cheyenne Indian Reservation.

A self-sustaining ferret population has yet to be established in Montana. MFWP is the leader in prairie dog conservation in Montana, and the refuge staff will collaborate with them on ferret recovery activities where possible.

Strategies for TES and Species of Concern Objectives 1–3 (black-footed ferret)

- Cooperate with adjacent land managers to maintain, expand, and protect prairie dog colonies in configurations capable of supporting a viable black-footed ferret population. Continue to provide monitoring, management and research expertise by refuge staff.
- Provide technical and scientific expertise to State, counties, and other landowners interested in black-footed ferret recovery efforts on their lands.

TES and SPECIES of CONCERN OBJECTIVE 4 (least tern). Over 15 years, work with USACE to maximize suitable nesting habitats that are attractive to least terns with the goal of maximizing annual productivity to promote recovery.

TES and SPECIES of CONCERN OBJECTIVE 5 (piping plover). Over 15 years, work with USACE to maximize suitable nesting habitats that are attractive to piping plovers with the goal of maximizing annual productivity to promote recovery.

Rationale for TES and Species of Concern Objectives 4–5 (least tern and piping plover). Certain areas of the reservoir, some islands and shorelines, tend to be more attractive to nesting least terns and piping plovers. Once identified, it may be practical to manage those habitats to ensure their continued suitability. Recognizing that reservoir levels vary greatly, it may only be feasible to identify sites that, in most successive years, are attractive and available to these species.

Strategies for TES and Species of Concern Objectives 4–5 (least tern and piping plover). Refer to strategies for TES and Species of Concern Objectives 1–15 below.

TES and SPECIES of CONCERN OBJECTIVE 6 (pallid sturgeon). Over 15 years, work cooperatively with MFWP and other partners along the Missouri River to develop management actions, in compliance with the recovery plan, to benefit pallid sturgeon populations.

TES and SPECIES of CONCERN OBJECTIVE 7 (pallid sturgeon). Over 15 years, work cooperatively with partners to monitor populations of pallid sturgeons.

Rationale and strategies for TES and Species of Concern Objectives 6–7 (least tern and piping plover). Refer to rationale and strategies for TES and Species of Concern Objectives 1–15 below.

TES and SPECIES of CONCERN OBJECTIVE 8 (grizzly bear). Over 15 years, develop a grizzly bear management plan, in cooperation with MFWP, for managing grizzly bears that could naturally colonize the refuge.

Rationale for TES and Species of Concern Objective 8 (grizzly bear). This refuge-specific plan is being developed in case grizzly bear naturally recolonize the refuge. The philosophy will be to promote grizzly bear abundance, within ecological constraints, and to provide for recreational viewing opportunities. Grizzly bears will provide natural predation pressure on large ungulates and influence their movement around the refuge.

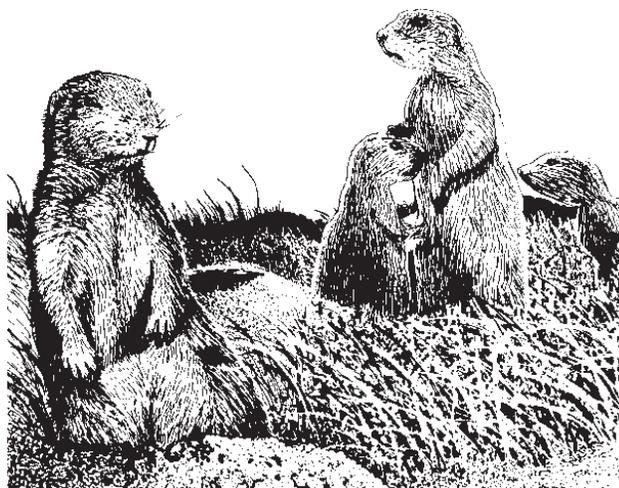
Strategies for TES and Species of Concern Objective 8 (grizzly bear)

- Work with MFWP and others to document grizzly bear presence on the refuge and to monitor abundance, distribution, and population trends if grizzly bears become established, and educate user groups about the ecological role grizzly bears play in the environment.
- If grizzly bears are documented on the refuge, take steps to minimize potential conflicts with livestock. However, on a case-by-case basis, permit approved agents to remove grizzly bears that are documented to be depredating livestock.
- Promote, help sponsor, and conduct research on grizzly bear ecology in the Missouri River Breaks.
- Refrain from establishing a hunting season for grizzly bears on the refuge if grizzly bears are delisted.

TES and SPECIES of CONCERN OBJECTIVE 9 (black-tailed prairie dog). Over 15 years, continue protection, restoration and expansion of black-tailed prairie dog populations refuge-wide to maximize occupancy of potential habitat.

TES and SPECIES of CONCERN OBJECTIVE 10 (black-tailed prairie dog). Work with MFWP, conservation organizations, and neighbors to implement MFWP's "Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana" (MFWP 2002b). Work to establish at least two 5,000-acre complexes that could support black-footed ferrets in which the refuge could contribute to the larger complex.

TES and SPECIES of CONCERN OBJECTIVE 11 (black-tailed prairie dog). GPS map all black-tailed prairie dog colonies on the refuge every 3 years, if funding and personnel allow. Continue research, monitoring, and treatment.



Prairie Dog Town
Bob Savannah / USFWS

Rationale for TES and Species of Concern Objectives 9–11 (black-tailed prairie dog). Refer to rationale for TES and Species of Concern Objectives 1–15 below.

Strategies for TES and Species of Concern Objectives 9–11 (black-tailed prairie dog)

- Within 3 years, map and rank the quality of all potential and existing prairie dog habitats.
- Promote expansion by mechanically removing vegetation, targeted prescriptive grazing, and fire.
- Coordinate with MFWP and others on how the refuge could best contribute to conservation of prairie dogs and associated species.
- Use current disease (plague) management tools and translocation procedures (Truett et al. 2001, Dullum et al. 2005) to promote prairie dog population growth and persistence in desired areas.
- Continue research and field trials on existing and developing plague management tools.

TES and SPECIES of CONCERN OBJECTIVE 12 (greater sage-grouse). Over 15 years, assist MFWP in carrying out the State's conservation strategies for greater sage-grouse and work with other partner agencies and organizations in sage-grouse conservation and research. Within 2 years, using MFWP's sage-grouse core area map (MFWP 2005b) and existing research projects, delineate areas of the refuge that are of high importance to sage-grouse. Adjust proposed actions and responses to wildfires to minimize short-term negative effects and maximize long-term benefits for sage-grouse and other sage-steppe-associated species.

Rationale for TES and Species of Concern Objective 12 (greater sage-grouse). In 2010, the Service decided that the greater sage-grouse was warranted, but precluded, for listing under the Endangered Species Act. On the refuge, populations are generally stable. Greater sage-grouse has been identified as a focal species for the upland habitat, refer to "Bird Objectives" in section 4.2 above. The sagebrush flats in UL Bend National Wildlife Refuge provide critical breeding and wintering habitat for sage-grouse.

Greater sage-grouse is adapted to a mosaic of plant communities on the refuge, with its natural variation in plant species composition, topography, substrate, weather, and frequency of fire. Leks are normally found on sites with less herbaceous and shrub cover, surrounded by potential nesting habitat. Hens have been recorded nesting 2.5–4.8 miles from leks where they are first observed. Nests are placed in relatively thick cover dominated by big sagebrush, silver sagebrush, grasses, rabbitbrush, greasewood, and other shrubs. Broods also use a variety of habitats; however, brood habitat must be rich in forbs and insects. During the winter, greater



Dr. Thomas G. Barnes / USFWS

Greater Sage-Grouse

sage-grouse will use the same areas as during breeding time but can move to areas dominated by a 6- to 43-percent cover of sagebrush, depending on snow conditions. Sagebrush is essential for winter habitat, and it dominates the late autumn, winter, and early spring diet. However, plants must be tall enough in deep snow conditions to supply needed leaves or buds for food. At all times of the year, greater sage-grouse forages on the ground in open habitats (Schroeder et al. 1999).

The Service will continue to protect essential habitat, particularly important breeding areas during prescribed fire and wildfire operations. For more details, refer to habitat objectives in section 4.2 above and to fire management objectives and strategies in section 4.5 below. The use of prescribed fire can result in a net loss of sagebrush and should be avoided in breeding areas, but it can be an effective tool for dense sagebrush cover and suppressed herbaceous cover. Wildfires are less predictable and unplanned, and they have had significant effects in upland areas on the refuge (refer to section 3.2 in chapter 3). A primary objective in the CCP is to reduce severe wildfires, increase plant diversity, and provide a mosaic of habitats. The habitat objec-

tives and strategies described above will benefit sage-grouse. This includes transitioning away from annual grazing and toward habitat-based prescriptive grazing strategies, reducing fencing, reducing invasive species, minimizing the severity of wildfire in sage-grouse habitat, continuing ongoing research, and improving overall habitat quality (Connelly et al. 2000, MFWP 2005b).

The Service will continue to help MFWP in achieving the conservation strategies for sage-grouse (MFWP 2005b). Their 2005 plan identifies core areas and outlines strategies for wildfire suppression, prescribed fire, livestock grazing, hunting, noxious weeds, and development of energy resources. Hunting will continue to be allowed. Additionally, the Service will work with other partners across the region to protect and enhance sage-grouse habitat.

Strategies for TES and Species of Concern Objective 12 (greater sage-grouse)

- Using existing lek locations and existing research telemetry data, combined with the many available GIS data layers, map and model sage-grouse habitat and rank its quality.
- Identify existing and potential threats to sage-grouse habitat and develop remedies.

- Protect brooding habitat on the refuge.
- Collaborate with private landowners and other land managers in protecting the region's sage-grouse habitat.

TES and SPECIES of CONCERN OBJECTIVE 13 (mountain plover). Over 15 years, continue to promote prairie dog towns to provide habitat for mountain plovers and other prairie dog-dependent species.

Rationale for TES and Species of Concern Objective 13 (mountain plover). Refer to rationale for TES and Species of Concern Objectives 1–15 below.

Strategies for TES and Species of Concern Objective 13 (mountain plover)

- Promote the persistence and expansion of prairie dog colonies, especially those on ridges and with gravelly substrates, as such sites appear more attractive as nesting habitat for mountain plovers.
- At least every 3 years, design and conduct population surveys for mountain plovers.

TES and SPECIES of CONCERN OBJECTIVE 14 (sicklefin chub and sturgeon chub). Over 15 years, work with MFWP and other partners to improve monitoring of rare fish, such as the sicklefin chub and the sturgeon chub, and develop management actions to benefit pallid sturgeon populations.

Rationale for TES and Species of Concern Objective 14 (sicklefin chub and sturgeon chub). In 2001, the Service found that the sicklefin and sturgeon chub do not warrant listing as threatened or endangered. The sicklefin chub has been documented in the Missouri River above Fort Peck Reservoir, but little is known about its abundance or distribution. The Montana Chapter of the American Fisheries Society reports that the sturgeon chub is relatively common and widespread in eastern Montana, and populations appear relatively secure. The refuge has spent little effort on rare fish, but it is willing to work with others on their conservation. Neither of these species was encountered during a 1999 fishery of several streams on the refuge conducted by Robert Bramblett and Alexander Zale (1999).

Strategy for TES and Species of Concern Objective 14 (sicklefin chub and sturgeon chub)

- Meet with MFWP fishery staff to discuss the status of these fish species and what actions the refuge might consider for better management of them.

TES and SPECIES of CONCERN OBJECTIVE 15 (general). Over 15 years, protect, conserve, and enhance populations of special status species where the refuge and partners can make significant contributions to recovery efforts on the refuge. Give priority to species that are listed federally or by the State of Montana.



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A Service employee prepares to release an endangered black-footed ferret on the refuge.

Rationale for TES and Species of Concern Objectives 1–15. The Service manages threatened and endangered species as trust species and is responsible for helping with the recovery of these species that occur within the Refuge System. To implement effective management for the protection and recovery of threatened and endangered species, a major goal of the Refuge System is to develop priorities for refuge management among species. Prioritization is important because limitations in money and staff time prevent targeting all special status species for management. Limited resources are allocated, in part, based on inventories of special status species and prioritization of management needs.

Maintenance, restoration, and enhancement of special status species will be used to restore natural ecological processes. Resources will be directed toward maintaining, and enhancing where appropriate, population levels to the maximum extent possible and practicable for these special status species.

On October 4, 2011, the Service concluded that listing under the Endangered Species Act was not warranted for the northern leopard frog.

Strategies for TES and Species of Concern Objectives 1–15

- By 2014, evaluate and prioritize the special status species that occur on the refuge to figure out which species require active management and the level and type of management needed. Use criteria for prioritization that includes listing status, implementation of actions identified in recovery plans, status within Montana, population size on the refuge, threats to survival, sensitivity to disturbance, and the ability of the refuge to contribute to recovery or conservation of the species.

- By 2015, compile all field surveys, literature, and historical records pertaining to the special status species that occur on the refuge. Incorporate MFWP's Comprehensive Fish and Wildlife Conservation Strategy whenever possible.
- By 2016, develop habitat management strategies to preserve and enhance populations of high-priority special status species on the refuge (including federally listed species such as black-footed ferret, piping plover, least tern, and pallid sturgeon). These strategies include detailed prescriptions for habitat management, protocols to monitor the status of these species, and methods to evaluate the effectiveness of management actions. Monitor the effects of public use on special status species.
- Over 15 years, encourage research by refuge staff, graduate students or other organizations on priority special status species to better understand and promote their conservation. Continue to help USACE with historical plover and tern surveys so that the survey data remains consistent.
- Within 5 years, work with the Ecological Services branch of the Service to identify areas of critical habitat for endangered species and species of concern. Consider using prescribed fire in these areas to achieve specific resource objectives, as long as there were not significant negative effects. Identify these areas in the fire management plan as areas of special concern to be protected from wildfire.
- Collaborate with other interested parties and secure money to hire more seasonal employees to conduct amphibian monitoring and turtle monitoring.
- Refer to "Riparian Area and Wetland Objectives" in section 4.2 above for strategies to improve riparian habitats to benefit amphibians.

TES and SPECIES of CONCERN OBJECTIVE 16 (Sprague's pipit). Over 15 years, map locations of Sprague's pipit found on the refuge.

Rationale for TES and Species of Concern Objective 16 (Sprague's pipit). In September 2010, the Service reviewed the conservation status of the Sprague's

pipit to decide whether the species warranted protection under the Endangered Species Act. The status review found that listing Sprague's pipit as threatened or endangered is warranted, but is precluded by the need to complete listing actions of a higher priority (FWS 2010e). Although Sprague's pipit has been documented on the refuge, areas where pipits are found are not mapped. This species will be monitored as part of the Service's overall bird objectives and upland habitat objectives.

Sprague's pipit is an open-grassland bird and avoids poorly drained areas as well as areas with even low densities of shrubs. Pipits avoid roads and trails, requiring large patches of grassland (greater than, or equal to, 358 acres) with smaller edge-to-area ratios. These birds are most commonly found in native grasses of intermediate height and thickness with moderate litter depths. Due to the poor soils and low precipitation of the Missouri Breaks, intermediate heights are difficult to achieve when compared to their full potential in wetter areas in North Dakota and can only be accomplished by limited herbivory. Areas dominated by nonnative grasses and crested wheatgrass are not used. Sprague's pipits forage for a wide array of arthropods on the ground in grass that is several inches tall. They usually nest in native grass of intermediate height and density with little bare ground.

Sprague's pipit is susceptible to habitat degradation due to high-intensity grazing and is affected by lack of fire and the subsequent increase in woody vegetation and increase in the accumulation of litter. Soon after a burn, numbers may decline but will increase in the years following a burn. For arid parts of the pipit's range including the refuge, the literature states a fire interval of 8–20 years is recommended. Mowing has negative effects on Sprague's pipits (Robbins 1999).

Strategies for TES and Species of Concern Objective 16 (Sprague's pipit)

- Identify locations where Sprague's pipits occur on the refuge.
- Follow the Service's recommendations in the conservation plan for Sprague's pipit (FWS 2010e) on fire, grazing, and other tools to enhance habitat.

4.4 GOAL for RESEARCH and SCIENCE

Advance the understanding of natural resources, ecological processes, and the effectiveness of management actions in a changing climate in the northern Great Plains through compatible scientific investigations, monitoring, and applied research.

Research and monitoring will be designed to understand the interaction between fire, grazing, plant response, wildlife populations, and other ecological

factors. The Service will adopt an active approach to using livestock grazing as a management tool by shifting from traditional annually permitted grazing to a prescriptive grazing regime for enhancement of wildlife habitats. If monitoring reveals that adequate populations of sentinel plant species were not viable, changes in livestock permitting such as reduced AUMs or retired permits will be initiated.

The below objectives are for research activities through partnership efforts. In addition, research needs are described in the habitat, wildlife, and public use objectives.

OBJECTIVES for RESEARCH and SCIENCE



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Refuge staff monitor plants on the refuge.

RESEARCH and SCIENCE OBJECTIVE 1. Over 15 years, encourage universities and other organizations to conduct annual surveys on the effects of public use, wildfire, prescribed fire, and other management strategies throughout the calendar year.

RESEARCH and SCIENCE OBJECTIVE 2. Over 15 years, support research of habitat, wildlife, and public use.

RESEARCH and SCIENCE OBJECTIVE 3. Over 15 years, work with MFWP to annually study the movement of big game relative to habitat changes (for example, fire and grazing).

RESEARCH and SCIENCE OBJECTIVE 4. Within 5 years, begin monitoring wintering pronghorn on the refuge to meet the Executive order.

RESEARCH and SCIENCE OBJECTIVE 5. Over 15 years, work with MFWP to conduct research on habitat suitability for bighorn sheep.

RESEARCH and SCIENCE OBJECTIVE 6. Within 1 year, monitor visitor counts to determine the number and types of visitors on the refuge, and by 2017 complete a visitor use study.

Rationale for Research and Science Objectives 1–6. Research will support the emphasis of managing for biological diversity. The Service will continue working with many universities and researchers.

Before a mountain lion hunt can be conducted on the refuge, more research will be needed to determine population numbers, food requirements, and the role these

predators have on other wildlife on the refuge. This will be necessary before the full package can be submitted to Washington for approval.

Strategies for Research and Science Objectives 1–6

- Evaluate refuge assets that can be affected by climate change.
- Include questions on a visitor use study aimed at quantifying the type and amount of public use occurring in the wilderness.
- Within 5 years, work with MFWP to conduct research on the age structure of mule deer herds within the Missouri River Breaks.

4.5 GOAL for FIRE MANAGEMENT

Manage wildland fire using a management response that promotes fire's natural role in shaping the landscape while protecting values at risk.

Fire management and habitat management are inseparable, thus objectives for prescribed fire and wildfire were developed to support the achievement of habitat objectives for the four vegetation categories—upland, river bottom, riparian area and wetland, and shoreline.

The terms and concepts for wildland fire, prescribed fire and wildfire, are based on Federal inter-agency policy (National Wildfire Coordinating Group 2011, USDA and DOI 2009). Wildland fire is any non-structure fire that occurs in the wildland including prescribed fire and wildfire. Response to wildland fire is based on consideration of a full range of fire management actions. These include allowing a fire

to be managed to achieve benefits where possible and taking suppression action when those benefits are not attainable or when there is a likely negative effect on important resources or adjacent lands. Fire management actions may include controlling the fire's perimeter, protecting a specific area with highly valued resources, and monitoring fire conditions and activity.

All wildfire suppression and prescribed fire activities will be carried out under an approved fire management plan. Any prescribed burns will be carried out in conformance with an approved smoke management plan that addresses critical smoke concerns, measures to reduce negative effects, downwind receptors, and smoke-vector maps in individual burn plans. The Service will acquire an outdoor burning permit issued by the Montana Department of Environmental Quality. The use of prescribed fire will follow protocol and guidelines established in the Montana/Idaho Airshed Operating guide (MIAG 2010). The Service will obtain clearance from the Montana/Idaho Airshed Group before any use of prescribed fire.

OBJECTIVES for FIRE MANAGEMENT

PRESCRIBED FIRE OBJECTIVES

A prescribed fire is any fire ignited by management actions to meet specific objectives. A prescribed fire is conducted under a project-specific prescription of needed conditions such as weather, fuel moisture, and soil moisture. The prescription is designed to confine the fire to a predetermined area and produce the intensity of heat and rate of spread required for the fuel consumption needed to accomplish the objectives.

The Service is a member of the Montana/Idaho Airshed Group. The group comprises State, Federal, tribal, and private member organizations who are dedicated to the preservation of air quality in Montana and Idaho. Members work cooperatively to prevent smoke impacts while using fire to accomplish land management objectives. Each member that conducts prescribed burns in Montana is required to have an annual air-quality, major, outdoor-burning permit issued by the Montana Department of Environmental Quality.

The Service will restore the natural fire regime through an increased use of prescribed fire to increase the viability of fire-dependent plant species. The Service will burn patches of varying size and within the historical fire-return intervals on a rotational basis. This technique will create a mosaic of habitats that (1) restores heterogeneity (more natural diversity in species) within landscapes, (2) preserves fire refugia and associated plant species, (3) enhances food

resources for wildlife, (4) ensures biological diversity and integrity and environmental health, and (5) promotes ecological resilience. Furthermore, some areas could need intensive manipulation with mechanical and hand restoration tools. The Service will minimize the use of fire in other areas to protect species of concern like the greater sage-grouse.

PRESCRIBED FIRE OBJECTIVE 1. Within 2–4 years, revise the fire management plan.

PRESCRIBED FIRE OBJECTIVE 2. Within 5 years, identify priority habitat units where sentinel plant species have declined due to lack of fire, and develop burn plans to apply prescribed fire in those areas.

PRESCRIBED FIRE OBJECTIVE 3. Develop a patch-burning system using wildland fire to annually improve at least 2,500 acres of habitat suitable for target species and focal bird species. Additionally, reestablish the natural fire regimes (fire occurs on average every 8–70 years) for fire refugia on about 30,000 acres using prescribed fire and wildfire managed for resource benefit.

PRESCRIBED FIRE OBJECTIVE 4. Within 2 years, identify critical habitat for threatened and endangered species and species of concern that could be adversely affected by fire. In addition, use prescribed fire in conjunction with research to determine if there will be any negative effects on species or critical habitat.

PRESCRIBED FIRE OBJECTIVE 5. Within 1–2 years, work with the Ecological Services branch of the Service to identify what, and how, critical habitat for threatened and endangered species and species of concern could be adversely affected by prescribed fire and incorporate into the fire management plan.

PRESCRIBED FIRE OBJECTIVE 6. Over 15 years, use prescribed fire and wildfire managed for resource benefit to restore the natural ecological process of fire and to reduce the encroachment of ponderosa pine and Douglas-fir into the dry needlegrass–wheatgrass prairie by 5–10 percent.

PRESCRIBED FIRE OBJECTIVE 7. Over 15 years, reduce 5 percent of hazardous fuel on forested slopes, with an emphasis on protecting old-growth forests that have a fire-return interval of 75–100 years from catastrophic fire.

PRESCRIBED FIRE OBJECTIVE 8. Over 15 years, establish partnerships with nongovernmental organizations, local governments, and private cooperators to identify and reduce 200–400 acres of hazardous fuel in the wildland–urban interface.

Rationale for Prescribed Fire Objectives 1–8. Refer to the rationale for upland objectives in section 4.2 above for a description of landscape changes since the demise of wild bison in 1881.

The Service has long recognized fire as a unique process that shapes wildlife habitat structure and function, and the agency has managed and used fire extensively for the past 70 years. Guiding principles of fire management in the Service include responsible stewardship, habitat management strategies based on conserving ecological integrity, reducing hazardous fuel, and establishing effective partnerships.

The emphasis of the refuge’s fire management program has switched from a strict suppression orientation to a program that uses prescribed fire and wildfire as management tools to achieve habitat objectives and large, landscape-level change.

The sagebrush flats in the UL Bend Refuge are critical nesting and wintering habitat for sage-grouse. Wildland fire in an area such as this could dramatically alter the habitat and result in severe negative effects on associated wildlife (Connelly et al. 2000, MFWP 2005b). While the literature generally urges caution when applying prescribed fire to sage-grouse habitats, the literature also stresses the importance of providing a mosaic of habitats for different seasons including winter, summer, and brooding seasons (Connelly et al. 2000). Breeding habitats will be protected from fire when possible. Within 1–2 years, refuge biologists will evaluate such areas and provide fire managers with a detailed map of the essential habitat to be protected, which will be taken



A small, low-intensity prescribed fire in 2008.

into account in prescribed fire and wildfire plans. For example, prescribed fire will be used to create a mosaic only when the lack of the mosaic is known to be limiting local sage-grouse populations.

Sprague's pipit has evolved with fires on the landscape and may be limited by reduced fire frequencies (FWS 2010e). Reduced fire frequency has led to encroachment by woody vegetation and invasive grasses and forbs, excessive growth of vegetation, and excessive accumulation of litter (FWS 2010e). Timing is important because fire can have short-term negative effects but, in the long term, can also be beneficial to Sprague's pipit.

There are large tracts of old-growth forest on the western half of the refuge that have not burned in the last 75–100 years (Douglas-fir and ponderosa pine). If a late-season, wind-driven wildfire were to occur in these areas, as has occurred throughout the central section of the refuge during the past decade, these old-growth forests would be practically eliminated, possibly forever. The refuge fire staff will evaluate these areas for possible reduction of hazardous fuel and treat identified areas with prescribed fire or mechanical thinning, or both.

Strategies for Prescribed Fire Objectives 1–8

- In cooperation with universities, partner scientists, and staff biologists, evaluate suitable areas for using prescribed fire as a habitat management tool to promote the abundance and viability of focal species.
- Enhance the fire organization with an increase of fire staff and prescribed fire competency: two prescribed fire burn bosses (type 1 and type 2), 15 prescribed fire seasonal employees, and one prescribed fire specialist (the seasonal employees and prescribed fire specialist will be additions to the current staff). These individuals will write burn plans and carry out an aggressive prescribed fire program. If increased money through the fire program is not available, work to secure funding through the refuge program to hire the above fire staff.
- Using research, fire-history data, and fire-scar evidence, conduct an inventory of sites that have exceeded average fire intervals. Set priorities for a burn rotation of hazardous fuel in these areas, taking into account habitat and wildlife objectives.
- Evaluate critical habitat across the refuge and provide the fire management officer with a detailed map of the critical habitat to be protected within 1 year of plan approval.
- Evaluate old-growth forest areas that have a fire frequency of 75–100 years for possible fuel reduction and treat identified areas with fire or mechanical thinning.
- Contract a fire planner to develop plans for the use of wildland fire that covers all burnable acres on the refuge.
- With the use of historical photos, aerial photos, Geographic Information System (GIS), and onsite evaluation, identify areas where conifer encroachment into grasslands has been the greatest. Manage these areas with fire or mechanical treatment.
- Using the refuge's 2005 Hazardous Fuels Assessment and, in cooperation with USACE and local cooperators and private landowners, carry out fuel reduction projects in wildland–urban interface areas including the Pines, Hell Creek, Rock Creek, and Nelson Creek Recreation Areas. Support the acquisition of community assistance grants for mechanical treatment of wildland–urban interface areas.
- Manage the landscape with a coordinated program of prescribed fire (patch burns) and livestock grazing to restore historical fire-return intervals and the fire–grazing interaction. This includes concentrated herbivory (grazing and fire) coupled with long periods of abandonment and reduced selectivity for important sentinel species.
- In cooperation with universities, partner scientists, and staff biologists, evaluate areas with declining sentinel plant species due to lack of fire for the feasibility of using prescribed fire as a habitat management tool to promote the abundance and viability of sentinel plant species.
- Use prescribed fire to establish a seminatural mosaic of burned patches that (1) reestablish a more natural fire–browsing–grazing interaction, (2) promote long-distance animal movement, (3) cause long periods of abandonment from grazing and browsing ungulates, (4) reduce the selectivity for sentinel species by all ungulates, (5) increase landscape species and structural heterogeneity, and (6) improve habitat for focal bird species (refer to “Bird Objectives” in section 4.2 above).

WILDFIRE OBJECTIVES

Wildfire ignitions are unplanned, such as fire started by lightning or an unauthorized or accidental fire started by humans. The response to a natural ignition fire is based on an evaluation of risks to firefighter and public safety and the circumstances under which a fire occurs including weather and fuel conditions, natural and cultural resource management objectives, values to be protected, and protection priorities.

The Service will work with partners to address wildland–urban interface areas at the Pines Recreation Area and other USACE recreation areas. In

adherence with an approved fire management plan and using historical fire frequency data and current fire conditions, the Service will evaluate each wildfire to determine the management response and whether the wildfire could be used in the patch-burning program.

Through a reciprocal agreement between the Service and DNRC, the Service will aggressively suppress all wildfires that occur on State school-section lands within the boundary of the refuge.

WILDFIRE OBJECTIVE 1. Within 2 years, revise the fire management plan using the most current information. Incorporate a full spectrum of fire management actions for response to wildfire, knowing that managing fire is a dynamic process, including management of wildfire for resource benefit.

WILDFIRE OBJECTIVE 2. After revision of the fire management plan, evaluate a full range of fire management options and carry out appropriate actions on natural ignition fires on the north side of the Missouri River. Within 5–7 years, evaluate the suitability of various fire management options to consider for all ignitions within the refuge boundary.

WILDFIRE OBJECTIVE 3. Within 5 years, identify the locations with the highest valued resources, such as houses or wellheads, and ensure those values are not lost. Additionally, develop databases with maps that are readily available for managers to use in making sound decisions.

WILDFIRE OBJECTIVE 4. Within 5 years, identify areas where perimeter control is needed to preserve public safety and to protect both natural and human-made values at risk. Categorize these as hazardous fuel reduction areas, which will protect them as high-value resources (often called “point protection”).

WILDFIRE OBJECTIVE 5. After revision of the fire management plan, use a full spectrum of management responses on natural ignitions and, in general, control the southern perimeter of fires south of the Missouri River that have the potential of escaping refuge lands. Initiate a full suppression response in the wildland–urban interface areas, which are the highest priority for hazardous fuel reduction.

WILDFIRE OBJECTIVE 6. Within 2 years, update and execute cooperative agreements with neighboring agencies—BLM, DNRC, the six counties, nongovernmental organizations, and neighboring landowners—for consideration of all fire management options when determining the management response to wildfires.

WILDFIRE OBJECTIVE 7. Within 1 year, identify areas of critical habitat for endangered species and species of concern that will be adversely impacted by fire. Fully suppress fires in these areas.

Rationale for Wildfire Objectives 1–7. Consideration of the full spectrum of management response to wildfire does not replace, supersede, or give emphasis to any one particular strategy or tactic. Instead, the Service will consider all available strategies and tactics to form a calculated response based on the circumstances of a particular fire at a particular time with particular characteristics. There is often more than one way to respond to a set of circumstances. (Northern Rockies Coordinating Group [NRCG] 2008).

Practices included here give the refuge the tools needed to manage wildfire for achieving multiple objectives. Fire has a role in maintaining the characteristics of an ecosystem (The WILD Foundation 2006) and in sustaining species. Sentinel plants and fire-return intervals have been studied on the refuge, showing that both have been interrupted by human activity (Frost 1998). Using the proper fire management actions to manage wildfire will help return natural processes to the Missouri River Breaks ecosystem. Wildfire management, in concert with a monitoring program and aggressive use of prescribed fire, will ensure the protection of areas with higher fire-return intervals.

The Service will use intensive suppression strategies where perimeter areas are threatening to burn off the refuge. While not all of the refuge’s neighbors and cooperators share the Service’s vision for wildfire, the refuge staff will continue to explore opportunities to incorporate the full range of fire management strategies on lands next to the refuge where there is no mutual agreement between the Service and landowner.

Strategies for Wildfire Objectives 1–7

- Take necessary actions, according to an approved fire management plan, to maintain public and firefighter safety above all else.
- Using historical fire frequency data, evaluate the full range of fire management options and apply appropriate actions to use wildfire as a naturally occurring component of the patch-burn program, in adherence with an approved fire management plan.
- Monitor the effects of fire on habitat and wildlife populations.
- Use natural wildfire occurrence within the scope of a full range of fire management options and an approved fire management plan to improve, enhance, and restore native wildlife habitat.
- Over 15 years, increase public awareness in surrounding communities and refuge users about the full range of fire management options and how the Service evaluates and identifies strategies to manage wildfire and prescribed fire to increase sentinel plants and reduce catastrophic wildfire risk.



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Large wildfires like the King Island fire in 2006 affect air quality, visual resources, soils, and habitat.

- Over 15 years, monitor the response of sentinel plants to both wildfire and prescribed fire; adjust fire management as needed to meet habitat objectives. Use monitoring data to update map databases and fire information for future planning.
- Within 5 years, increase staff qualifications to include a strategic operational planner, field observer, and incident commander. Increase fire staff to include 5–7 new permanent employees and 50- to 60-percent more seasonals, based on 2009 personnel.
- Within 5–7 years, contract the development of a GIS overlay of the refuge for use in producing fire management strategies for each habitat unit.
- Within 3–5 years, work with cooperators to fully coordinate the determination of management responses to wildfires using historical fire occurrence data to delineate areas that may be right for each of the various fire management options.

4.6 GOAL for PUBLIC USE and EDUCATION

Provide all visitors quality education, recreation, and outreach opportunities that are appropriate and compatible with the purpose and goals of the refuge and the mission of the National Wildlife Refuge System while maintaining the remote and primitive experience unique to the refuge.

The Service will emphasize quality (versus quantity) wildlife-dependent uses and experiences and secure access to the refuge, as described below. Quality experiences are based on criteria defined in the Service's policy for wildlife-dependent recreation (FWS 2006c):

- promotion of safety
- compliance with laws
- minimizing conflicts with other policies or adjacent landowners
- promotion of accessibility and availability to a broad spectrum of visitors

- promotion of resources stewardship and conservation
- provision of reliable and reasonable opportunities to experience wildlife
- provision of facilities that are accessible and blend into the natural setting

The Service will continue to prohibit collection of shed antlers.



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OBJECTIVES for PUBLIC USE and EDUCATION

HUNTING OBJECTIVES

Hunting is permitted on the refuge for elk, mule deer, white-tailed deer, pronghorn, bighorn sheep, coyotes, waterfowl, and upland gamebirds. It is used both as a management tool for improving habitat conditions and as an appropriate and compatible wildlife-dependent recreational activity (refer to the hunting compatibility determination in appendix D).

Pursuant to Service policies and Federal laws and regulations, the Service will cooperate with MFWP to provide hunting experiences that maintain big game species and other game species at levels that sustain ecological health and improve habitat but that also provide opportunities for quality experiences including diverse male-age structures provided by appropriate population objectives. When formulating population management objectives, the Service will consider natural densities, social structures, and population dynamics at the refuge level as well as guidance found in national policies, such as the biological integrity policy. In some areas of the refuge, big game hunting seasons and harvest quotas on the refuge could be more restrictive than State regulations. All other wildlife is protected.

The Service will consider allowing additional opportunities for limited, compatible, and appropriate hunting. Currently, trapping is not allowed, and

recreational shooting of prairie dogs is prohibited. If monitoring and population data indicated a potential for trapping specific furbearers or small predators, a proposal (hunt plan) could be prepared that includes a justification with population status, determination of harvest levels, and monitoring results. Proposals are subject to additional public input and National Environmental Policy Act compliance.

HUNTING OBJECTIVE 1. Within 2–5 years, develop a visitor services plan that includes a hunting plan.

Rationale for Hunting Objective 1. Hunting has long been an important cultural and social component to the lands that make up the refuge. It is also an important tool for managing wildlife populations.

Interest in experiencing the natural and wild wonders of the area has been focused in large part on participating in a variety of hunting opportunities. The refuge will continue to provide for many quality and diverse hunting experiences.

Strategies for Hunting Objective 1

- Continue to respond to inquiries and provide information about current refuge hunting opportunities.
- Continue yearly review of refuge hunting regulations to ensure clarity and to address any emerging issues or concerns, and give the pub-

lic an opportunity to review and comment on any changes.

- Continue to publish and update the refuge hunting regulations brochure to inform the public of hunting opportunities, including accessible opportunities, and refuge-specific regulations.
- Distribute the refuge brochure more widely.
- Through visitor contact and hunting information, encourage hunters to walk in to hunt.
- Increase outreach about the refuge’s accessible hunting opportunities by developing a one-page tearsheet that explains the accessible hunting opportunities and facilities. Post information on the Web site.

HUNTING OBJECTIVE 2. Over 15 years, continue to facilitate the hunting program by allowing access on open refuge roads, camping as designated under refuge rules, and boat access.

Rationale for Hunting Objective 2. The refuge is isolated and many hunters feel that camping is necessary to ensure a quality hunt. Camping is allowed; however, efforts will be made to minimize any habitat and wildlife disturbances that result from camping.

Strategies for Hunting Objective 2

- Continue to permit minimally disturbing, pack-in and pack-out, backcountry camping throughout the entire refuge.
- Within 5 years, designate the most popular public use areas for camping and harden those sites to minimize erosion and negative effects on habitat.
- Allow vehicle access to camping areas, by the shortest route, within 100 yards of numbered roads except where closed. Do not allow off-road vehicle access to campsites in proposed wilderness areas, designated wilderness, where habitat effects warrant closing a site with a “No Vehicle” sign, and administrative areas that are posted as closed.
- If an area is overly affected by camping, make temporary closures or create hardened access points.
- Define current camp areas along the river to prevent campground “creep” into the riparian habitat.
- Continue working with USACE to restrict boat camping on islands in the river.
- Continue to permit camping within 100 yards of roads to facilitate harvest opportunities.
- Continue to monitor boat use for accessing hunting areas along the river to ensure that wildlife species using the habitat along the river are not negatively affected over the long term.
- Working with USACE and others, begin monitoring the amount of boat access occurring in popular hunting areas. If monitoring shows that



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Hunting is one of the most popular activities on the refuge.

increased access is negatively affecting wildlife populations using river bottoms, make recommendations and work with users to reduce the negative effects (for example, limit motor size or number of boats allowed on river).

- Allow boat camping along the beaches of the lake-shore.

HUNTING OBJECTIVE 3. Within 5 years, work with MFWP and other partners to create diverse, quality, hunting opportunities on the refuge including harvesting big game animals of all age classes. Within 10 years, 65–75 percent of hunters report a reasonable harvest opportunity and satisfaction with the overall experience.

Rationale for Hunting Objective 3. Under the Service's wildlife-dependent recreation policy (FWS 2006c), providing for quality experiences is highlighted as an important component of a hunting program (605 FW1, 605FW2). Safety, reasonable opportunities for success, and working collaboratively with the State wildlife agencies are important elements that should be considered. A quality experience could mean participants could expect reasonable harvest opportunities, uncrowded conditions, fewer conflicts between hunters, relatively undisturbed wildlife, and limited interference from, or dependence on, mechanized aspects of the sport.

Big game hunting is popular on the refuge and, as a result, at times crowding is becoming an issue that potentially affects the quality of the hunting experience. Too many hunters in some areas could lead to unsafe hunting conditions and compromised harvest opportunities. With a growing number of private property acres off-limits to hunting, pressure is intensifying on Service lands. To ensure a quality hunting experience, it is essential to maintain healthy populations of resident wildlife and migratory birds (FWS 2006b), in part by achieving the habitat objectives identified previously. There is interest in new opportunities such as the expansion of bighorn sheep populations for more hunting opportunities.

Strategies for Hunting Objective 3

- Adopt MFWP hunting seasons and regulations for those species for which harvest is currently allowed (except for mule deer) on the refuge (elk, white-tailed deer, and pronghorn). Continue with the 3-week mule deer season, or consider other options until the buck-to-doe ratio as identified in wildlife objectives is achieved.
- Work with MFWP to figure out the appropriate level of hunting permits for elk for achieving habitat objectives related to herd populations and herd composition. Take into account both biological integrity and landowner tolerance when setting permit levels for elk.



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The Service will work with MFWP to set the number of elk permits that will meet habitat objectives related to herd populations and composition.

- Evaluate hunting district 652 (special-draw area for mule deer bucks) for mule deer home ranges, hunting district size, harvest strategy, permit numbers, habitat quality, and access and assess effects on management objectives.
- Initiate an annual tooth survey to evaluate age structure for all hunted species.
- Evaluate motorized access for hunting and decide where seasonal road closures may be needed to promote walk-in opportunities for quality hunting or where roads could remain open for retrieval to promote harvest in remote areas.
- If necessary due to increasing hunting pressure and overharvest of certain species, use a refuge permit system to control the number of hunters.
- Work with the State to establish and coordinate hunter days or events for hunters with special needs.
- Work cooperatively with MFWP to conduct law enforcement patrols at the refuge to ensure compliance.
- Develop a policy for addressing the use of tree stands. Address the number of stands permitted and the timeframe they can be up (how many days before, during, and after a hunt).
- Require nontoxic shot for all bird hunting to reduce the incidental poisoning of nontarget wildlife.

- Continue to prohibit most predator hunting, except permit limited coyote hunting mid-October through March 1.
- Within 2–5 years, complete a survey on user preferences, and include questions needed to evaluate big game harvest on the refuge.
- Use annual wildlife surveys, car count data, and trail-cams to monitor and evaluate hunting use.

HUNTING OBJECTIVE 4. Within 5 years, evaluate the demand for more access for hunters with mobility impairments. If warranted, within 10 years, provide one additional hunting access for hunters with mobility impairments.

Rationale for Hunting Objective 4. There is demand for hunting opportunities that are accessible to hunters with special needs, such as hunters with mobility impairments. Currently, there is one accessible blind on the west end of the refuge and USACE has an accessible campground downstream of the dam.

Strategies for Hunting Objective 4

- Work with partners (such as Wheeling Sportsmen and Wilderness on Wheels) to improve the current accessible blind in the Sand Creek Unit.
- Identify where potential accessible sites are needed and where they could be developed if the demand arises.

HUNTING OBJECTIVE 5. Within 4 years, working with MFWP and within the State’s hunting-season framework, expand opportunities for young people to hunt with at least one new hunt that is available to only young hunters.

Rationale for Hunting Objective 5. It is important to engage young people in wildlife-dependent recreation and engender enthusiasm and support for hunting, wildlife conservation, and the Refuge System to build a conservation ethic. Early season or preseason hunts are best suited for youth because these seasons provide the best harvest opportunities. These programs will spark interest in hunting and hopefully lead to recruitment of more young refuge supporters.

Strategy for Hunting Objective 5

- Work with the State of Montana to establish a special, permitted, weekend hunt for elk and deer in all hunting districts covering the refuge that is available to only young hunters.

HUNTING OBJECTIVE 6. Over 15 years, work with MFWP to consider the opportunity for limited hunting of furbearers and mountain lion, provided monitoring of wildlife and habitat indicates stable and growing populations.

Rationale for Hunting Objective 6. There is interest of implementing new opportunities such as a hunt for

mountain lions. The Service will consider allowing for limited, quality-oriented hunting opportunities of furbearers or mountain lion provided the populations are stable.

For mountain lion, there will likely be a special drawing and only a few licenses will be issued. To open the refuge for a mountain lion hunt, a proposal (hunt plan) needs to be prepared that includes a justification including the population status, determination of harvest levels, and monitoring results. A proposal needs to comply with the National Environmental Protection Act (refer to “Big Game Objectives” in section 4.2 above and to section 3.2 in chapter 3).

Strategy for Hunting Objective 6. Refer to strategies for Hunting Objective 3.

FISHING OBJECTIVES

Fishing is allowed on the refuge. The Service will cooperate with other agencies to enhance fishing opportunities while maintaining game species and other species. Anglers often catch catfish, walleye, northern pike, sauger, perch, small mouth bass, bullhead, paddlefish, and lake trout.

USACE is responsible for providing recreation on their primary lands and waters. The Service works cooperatively with USACE to manage the lands, waters and public recreation opportunities within the Fort Peck Lake Project and the refuge boundary. The Service will continue to cooperate with USACE and the State to ensure that a quality fishing program exists within the refuge.

FISHING OBJECTIVE 1. Over 15 years, continue to follow State fishing regulations.

Rationale for Fishing Objective 1. Fishing within the refuge has centered on several types of opportunity: the fishery within the Fort Peck Reservoir and some opportunities associated with game fish–stocked reservoirs scattered throughout the upland part of the refuge. Fisheries resources have been primarily managed by MFWP (refer to “Fishing” under section 3.4 in chapter 3), and the refuge has participated in a partnership capacity when opportunities have occurred. There is a combination of interest in both introduced species of game fish as well as a native fish component that provides for a well rounded set of opportunities for the angler. In particular, native fisheries management associated with the free-flowing Missouri River has seen increasing emphasis in management in recent years, by both MFWP and the Service. This management focus will continue into the future and will provide for an increased diversity of opportunities for anglers to gain understanding of the importance of native fisheries while taking part in angling activities.

Strategies for Fishing Objective 1

- Work with USACE on maintaining and extending boat ramps that are critical as the lake recedes due to prolonged periods of drought.
- Follow State regulations for establishment of permanent and portable ice-fishing houses.
- Continue to enforce no driving on the shoreline.

FISHING OBJECTIVE 2. Within 5 years, monitor the effects of fishing on the surrounding resources. Cooperate and collaborate with MFWP to ensure that paddlefish fishing remains a compatible use.

Rationale for Fishing Objective 2. Paddlefish fishing is very popular with anglers across Montana. In Montana, the Slippery Ann area is one of a few important paddlefish fishing areas along the Missouri River. Historically paddlefish fishing was open to all, and hundreds of anglers packed into accessible areas from Kipp Recreation Area to Rock Creek boat ramp along the Missouri River. Law enforcement officers remained busy keeping order and preventing resource damage from camping and bank fishing. In recent times, MFWP has placed limits on paddlefish fishing (MFWP 2009c). The Service will work closer with MFWP to develop more strategies to ensure that paddlefish fishing, in particular, remains a sustainable and compatible use. The popularity of paddlefishing has resulted in some shoreline areas becoming heavily impacted from users who come to camp and fish.

Strategies for Fishing Objective 2

- Work with MFWP to figure out an acceptable number of paddlefish permits, dates, and harvest strategies to limit conflicts among anglers, wildlife habitat, and other refuge visitors.
- Work with MFWP and build on the research and data collection (creel surveys) already being conducted.
- Work with MFWP to identify important spawning areas.

FISHING OBJECTIVE 3. Over 15 years, work with MFWP, USACE, and other partners to maintain current access for sport fishing in the Missouri River and Fort Peck Reservoir.

Rationale for Fishing Objective 3. In 2006, about 60,100 fishing visits were recorded out of 233,000 visits to the refuge. Anglers spent more than 2 million dollars in expenditures, making it third highest ranking wildlife-dependent recreational use of the refuge (Carver and Caudill 2007). A popular activity, ice fishing is currently allowed on the Missouri River and Fort Peck Lake. Fishing contributes to the local economies through the rental of hotel rooms, eating at restaurants, buying of supplies and fuel.

Strategies for Fishing Objective 3

- If needed, improve access to the lake and river.
- Within 5 years, establish clear access points for ice fishing to minimize effects on upland habitat from vehicles.
- Explore opportunities for creating more motorized access for ice fishing during winter (Elk Hole or the Big Swirl) by providing access from the south side of the river or Timber Creek. Prohibit access from the river or shoreline.
- Work with USACE on maintaining and extending boat ramps that are critical as the lake recedes due to prolonged periods of drought.
- Follow State regulations for establishment of permanent and portable ice-fishing houses.
- Seek partnerships to develop accessible facilities such as piers or platforms that accommodate anglers with disabilities.
- Work with the State to maintain healthy fish populations.
- Work with counties to maintain existing gravel roads to the lake for fishing.
- Identify roads that provide direct access to the lake including ATV access.
- Continue to enforce no driving on the shoreline.

FISHING OBJECTIVE 4. Within 5 years, evaluate and establish for young people an additional fishing opportunity or event at one additional area as part of Montana's free fishing weekend.

Rationale for Fishing Objective 4. The opportunity to expand and develop a closer partnership with MFWP and others will benefit the refuges' goal to introduce youth to the Refuge System.

Strategy for Fishing Objective 4

- Work with MFWP and USACE to sponsor a fishing event for young anglers in the Fort Peck area that is associated with the fishing education program at the Fort Peck interpretive center.

FISHING OBJECTIVE 5. Within 2–4 years, have a mechanism or agreement in place to ensure that Refuge System permit requirements are added to or incorporated with USACE- or State-issued permits.

Rationale for Fishing Objective 5. The refuge has provided little to no oversight of the commercial harvest of fish in the past because most fish management falls under the primary jurisdiction of USACE and MFWP. However, Federal regulations governing the Refuge System state that "fishery resources of commercial importance on wildlife refuge areas may be taken under permit in accordance with Federal and State law and regulations" (50 CFR Part 31.13). Other regulations govern all commercial uses on refuges. USACE and State currently manage commer-

cial fishing within the refuge boundary. The Service recognizes these agencies has having primary jurisdiction for management of these activities and will work cooperatively when requested.



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Paddlefish

Fishing tournaments are popular on the Fort Peck Lake and on thus within the refuge. Care must also be taken to safeguard sensitive habitats or fish and wildlife areas within the refuge. Because fishing tournaments are a use of the refuge, they are subject to regulations governing uses on national wildlife refuges. The refuge has not provided any oversight to tournaments in the past, deferring to the State, and at USACE's regulatory and permitting processes. The Service recognizes these agencies has having primary jurisdiction for management of these activities and will work in a cooperative nature to ensure that public fishing opportunities are not negatively affected by these activities.

Strategies for Fishing Objective 5 (commercial fishing)

- Recognize the State and USACE as having primary responsibility for managing commercial fishing within Fort Peck Lake and work with these agencies to ensure the fisheries resources of the lake are not negatively affected.
- Work with MFWP to establish a method of sharing permittee and catch information for the refuge.

WILDLIFE OBSERVATION, PHOTOGRAPHY, and INTERPRETATION OBJECTIVES

Environmental education and interpretation programs will incorporate the Service's conservation goals in the themes, messages, and activities. The Service will provide opportunities for wildlife observation and photography across diverse habitats that show the full spectrum of plant and animal species found in the area.

The refuge provides several facilities for participating in wildlife viewing, photography, and learning about and appreciating the refuge's resources. These include the auto tour route, signs, kiosks, nearly 670 miles of road, the Fort Peck Interpretive Center that the Service cooperates with USACE for operation, and contact stations at Sand Creek and Jordan Field Stations.

Interpretation consists of self-guided trails, interpretive panels, and brochures as well as staff-dependent exhibits, tours and special events. Interpretation plays a key role in a visitor's experience and environmental awareness and helps foster an appreciation, support, and understanding of the refuge-specific topics and the Refuge System as a whole.

Freeman Tilden (1957) stated, "Any interpretation that does not somehow relate what is being displayed or described to something within the personality or experience of the visitor will be sterile." Similarly, the Service's Visitor Services Handbook (FWS 2011g) suggests, "Interpretation on refuges connects the hearts and minds of visitors with the places, objects, and resources we protect." The ref-

uge offers excellent opportunities to interpret the wildlife resource, paleontological discoveries, the Refuge System, western settlement history and the large intact landscape of the Missouri River Breaks in meaningful ways for visitors. To achieve this end, more interpretive programs and facilities are needed to orient and educate visitors and elicit “revelation upon information” (Tilden 1957).

Self-guided interpretive opportunities allow visitors to learn independently. Interpretive tools for these self-guided opportunities will include exhibits, programs, trails, brochures, Web site, and signage.

Each of these wildlife-dependent recreational activities requires different programming elements. Because these are nonconsumptive activities (not hunting or fishing), and they are often closely interrelated (for example, a visitor may observe and photograph wildlife while participating in an interpretive program), the objectives have been combined for all.

WILDLIFE OBSERVATION, PHOTOGRAPHY, and INTERPRETATION OBJECTIVE 1. Within 5 years, develop and complete a visitor service plan that identifies specific programming elements in addition to interpretive themes, messages, and audiences for wildlife observation, photography, and interpretation to support objectives 4 and 5 (see table 23 in section 4.10 below about stepdown plans).

WILDLIFE OBSERVATION, PHOTOGRAPHY, and INTERPRETATION OBJECTIVE 2. Within 5 years and as part of objective 1 above, conduct a visitor experience survey to obtain an accurate estimate of visitors and their desired needs and experiences for wildlife observation.

WILDLIFE OBSERVATION, PHOTOGRAPHY, and INTERPRETATION OBJECTIVE 3. Within 5 years, hire an outdoor recreation planner for the refuge. (Refer to “Refuge Operations Objectives” in section 4.9 below.)

WILDLIFE OBSERVATION, PHOTOGRAPHY, and INTERPRETATION OBJECTIVE 4. Over 15 years, increase participation in wildlife observation, photography, and interpretive activities by about 15–25 percent (approximately 6,000–10,000 more visits annually).

WILDLIFE OBSERVATION, PHOTOGRAPHY, and INTERPRETATION OBJECTIVE 5. Over 15 years, improve the quality and increase the number of wildlife observation, photography, and self-guided and staff-dependent interpretive programs or facilities by approximately 15–25 percent. Base this on the visitor services plan and possibly include observation blinds or facilities, trails, signs, a science and interpretive center at Sand Creek Field Station, or other programs and facilities.

Rationale for Wildlife Observation, Photography, and Interpretation Objectives 1–5. The refuge provides a beautiful and remote setting for wildlife observation and photography. While the extensive road system

provides access to areas that are rich with wildlife and are picturesque, many observation areas are not promoted nor signed. With the exception of the elk-viewing areas, visitors may have difficulty locating overlooks and other areas that lend themselves to photography and observation. The large number of vehicles using the elk-viewing area in the fall raises concerns about overcrowding.

Habitat improvements to uplands, river bottoms, riparian areas, and shorelines could increase opportunities for viewing and photographing wildlife. The Service will seek to increase by a moderate amount the number of visitors participating in these activities, subsequently adding programs or facilities (for example, observation blinds and a science and interpretive center at Sand Creek Field Station) as needed, but will provide for quality-based experiences. Although quality is difficult to define precisely, and it means something different for every visitor, developing an experienced-based approach that provides for the diverse interests of visitors, while operating within the capabilities of the resources (Manfredo 2002), will achieve this goal. Experience-based management proposes that recreation opportunities be described in terms of the experience, setting, and the activity. Some visitors have a great experience if they observe a lot of wildlife, regardless of how many other people are around. For others, a quality experience could mean seeing less wildlife but being around fewer people (Manfredo 2002).

Increasing visitation by 15–25 percent will require a moderate investment in facilities and programs. A critical component for implementation is the development of the visitor services plan, completing a visitor experience survey, and the addition of two outdoor recreation planners to carry out and oversee the program. Constructing more facilities for wildlife watching such as blinds, trails, or designating another road on the refuge will draw in visitors who are seeking that opportunity. It will be important that new and expanded wildlife observation and photography facilities complement the natural settings within the refuge.

Strategies for Wildlife Observation, Photography, and Interpretation Objectives 1–5

- Maintain the existing wildlife-viewing area.
- Recruit volunteers for the Christmas bird count and other birding events.
- Identify observation areas to the public through signage and maps.
- Develop Web site-based observation materials such as bird lists and information, maps, and Webcams.
- At Fort Peck Interpretive Center, provide a computer kiosk where visitors can access birding information such as bird songs (for example, using Thayer birding software).

- Incorporate the refuge as a stop on the Montana birding trail and regional birdwatching trails or routes. Provide support materials at the refuge, headquarters, and online to guide visitors through the State and direct them to key birding spots.
- Explore new areas to promote for wildlife observation and photography opportunities, such as expansion of elk-viewing opportunities.
- Where possible, establish universally accessible observation blinds.
- Start grouse-viewing programs and provide accessible blinds that allow visitors to view grouse on leks after peak hen attendance (peak attendance of male grouse occurs toward the end of the breeding season, providing visitors quality viewing experiences while minimizing disturbances to actual breeding activity).
- Develop at least one additional (three total), accessible, nonmotorized trail system for families and people with disabilities.
- Develop 2–5 miles of primitive hiking trails including one on the east side at Sand Arroyo (see figure 41).
- Consider the State section north of Slippery Ann for facilities.
- Maintain exhibits at the Fort Peck Interpretive Center.
- Identify gaps in interpretative materials or programs and additional themes to expand through improved programming.
- Develop more interpretive exhibits and materials.
- Update the wildlife and bird lists.
- Continue to print and distribute the refuge’s general brochure.
- Develop a bird guide map to target birder audiences and provide more sophisticated, quality interpretive opportunities.
- Update the refuge history brochure.
- Improve visitor contact areas at the Sand Creek, Fort Peck, and Jordan Field Stations by providing more interesting and informative information.
- Routinely update the Web site and incorporate changing interpretive content into the design.
- Increase the elk-viewing bus tours to include other communities.
- Work with Phillips County to use their buses for interpretive activities and tours.
- Incorporate a stewardship message into interpretive facilities and programs to instill in visitors greater support for the refuge and its resources.
- Continue to place interpretive signs at public access and overlook points (for example, Crooked



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Refuge staff help visitors identify wildlife species.

Creek) in cooperation with various agencies and units of government.

- Inventory, maintain, and replace signs, as needed.
- Maintain the auto tour route.
- Inventory all facilities, identify audiences for outreach efforts, and update the inventory annually.
- Design two, short, accessible, hiking trails with interpretive signage and brochures for visitors of all needs at the Fort Peck and Sand Creek Field Stations.
- Continue to cosponsor special events related to wildlife and habitat conservation.
- Actively publicize and take part in one national event such as National Wildlife Refuge Week and Migratory Bird Day.

ENVIRONMENTAL EDUCATION OBJECTIVE

The purpose of environmental education is to advance public awareness, understanding, appreciation, and knowledge of key fish, wildlife, plant, and resource issues through formal, curriculum-based programs tied to national and State education standards. Environmental education may be geared toward children or adults, and it is key for changing attitudes and behavior, which affect the refuge through off-refuge land use decisions and on-refuge conduct and use. Only through understanding and appreciation will people be moved to personal and collective action to ensure a healthy refuge for the future.

ENVIRONMENTAL EDUCATION OBJECTIVE. Within 5–10 years, expand the quantity of the environmental education programs (on- and off-refuge) offered by the refuge by about 10 percent (identify program elements in the visitor services plan). (See table 23 in section 4.10 below about stepdown plans.)

Rationale for the Environmental Education Objective. The Service is committed to connecting people with nature through initiatives such as “Children in Nature” (FWS 2009c). Books like *Last Child in the Woods* (Louv 2005) have highlighted the importance of connecting children with nature. Louv contends that the lack of nature in the lives of today’s wired generation (Louv refers to it as “nature-deficit”) contributes to disturbing childhood trends, such as rises in obesity, attention disorders, and depression.

There will be a moderate increase in the environmental education program, with an emphasis on quality. The programs will primarily focus on the Service’s conservation goals as well as biological diversity, biological integrity and the ecological processes that shape the refuge, but other topics including climate change and ranching history will be included.

Similar to the objectives for wildlife observation, the first action is to develop the visitor services plan that identify the elements of an environmental education program at the refuge and hire an outdoor recreation planner. Existing curricula will be modified to highlight these issues and at least one new curriculum will be developed in compliance with State standards. Because environmental education is curriculum-based and labor intensive, initial efforts will be limited to Fort Peck and Lewistown Field Stations when an outdoor recreation planner is hired.

Strategies for the Environmental Education Objective

- Develop an environmental education program as part of the visitor services stepdown plan.
- Identify gaps in environmental education materials and programs, conduct a visitor experience survey, and identify additional themes to expand through improved programming.
- Promote teacher-taught and refuge-taught programming that incorporates the “Children in Nature” initiative in both structured and unstructured ways. Encourage family visits and family awareness of the refuge and the Refuge System. Promote programs to get all ages of children outdoors (for example, the “Lets go Outside” initiative).
- Respond to requests for technical assistance for curriculum-based environmental education (for example, Range Days, Bio-Blitz, Envirothon, and Field Days).
- Use the refuge Web site to promote environmental education; include a downloadable podcast.
- Within 5–7 years, provide refuge-taught environmental education programming at no less than two school visits per year.
- Over 15 years, work with partners to modify existing environmental education curricula tailored to the refuge (for example, BLM, USACE,



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Refuge staff member conducting an outreach field trip.

State, Project Wild, Project Wet, Nature Learning, and Project Learning Tree.) Include potential topics such as prairie streams, prairie plants and wildlife, climate change, and invasive plants.

- Align teacher- and refuge-taught school programs with State and local educational standards.
- Annually offer two to four teacher workshops to all interested school districts in central and eastern Montana promoting refuge-based (local community) and regional-based information.
- Over 15 years, work with partners to create up to two environmental education curricula unique to the refuge, with potential topics including prairie streams, use of fire, prairie plants and wildlife, invasive plants, climate change, and ecology of the Missouri River Breaks with emphasis on sentinel plants.
- Hire two outdoor recreation planners (as part of public use program).

OUTREACH OBJECTIVES

Outreach efforts help educate people about the refuge and its needs. It involves communication between the refuge and interested groups and the public such as local communities and city, county, State, and Federal officials. Outreach may include formal meetings or informal discussions with visitors or landowners, as well as news releases, organized programs, tours, and presentations.

OUTREACH OBJECTIVE 1. Within 2 years, build greater awareness and appreciation for the Service and refuge resources, with a resulting 5- to 10-percent increase in requests for information, visitation, and Web site hits.

OUTREACH OBJECTIVE 2. Within 5 years, engage outside audiences such as interested groups, the public, and potential visitors in at least three meetings, presentations, or open houses per year. Provide information to audiences about the importance of the refuge goal of restoring ecological processes and increasing the resiliency of refuge habitat to nonclimate stressors and climate change stressors.

Rationale for Outreach Objectives 1–2. Outreach will focus on the refuge’s goal of restoring ecological processes and increasing the resiliency of refuge habitat to nonclimate stressors as well as climate change stressors. Outreach will communicate wildlife and habitat goals and the increasing visitation to the refuge.

The refuge will increase its outreach efforts through participation in local events and meetings or by developing a Friends group (a nongovernmental organization that specifically works on behalf of furthering the refuge or Refuge System’s goals).

Improving the quality and content of the refuge’s Web site is one way for the refuge to reach out to a larger audience. Recent data suggests that “hits” (visits to the Web site <<http://fws.gov/cmr>>) are seasonal and likely due to a visitor’s particular interest, for example, hunting or development of the refuge’s CCP. Before hunting season, hits to the Web site increase from all over the United States as well as residents in Montana.

Strategies for Outreach Objectives 1–2

- Occasionally take part in State and local events such as State, county, and school career fairs.
- Conduct three information-sharing events (such as interviews, public service announcements, and writing articles) with the media (newspaper, television, and radio), chambers of commerce, congressional contacts, and tourism outlets per year.
- Make presentations as requested.
- Recruit volunteers to support staff.
- Seek grants in partnership with others to fund special events or programs.
- Use the Internet to keep the public informed about refuge programs and activities.
- Actively take part in one State and local events such as State, county, and school career fairs.
- Investigate developing a Friends group for the refuge within 2 years of CCP approval.
- Improve the refuge’s Web site by adding at least two of the following:
 - Photographs of the refuge.
 - Videos of elk in rut, prairie dog towns, and sage-grouse and sharp-tailed grouse leks.
 - Increased Webcam feeds.
 - Blogs with refuge-specific information on a prairie dog town or the elk-viewing area. Include a downloadable podcast.
 - Information on travel conditions for roads.
 - Downloadable versions of all refuge brochures.
- Develop an outreach plan as part of the visitor services plan (see table 23 in section 4.10 below about stepdown plans).
- Work with the Montana tourism department to promote the refuge and its resources.

ACCESS OBJECTIVES

There are nearly 670 miles of road found on the refuge. Hard-surfaced, all-weather roads are limited to U.S. Highway 191 on the western end of the refuge and several highways around Fort Peck. Several graveled roads provide direct access to the refuge. All other roads are passable only in dry weather.

Refuge access will be primarily managed to benefit natural processes, but some improvements will



The 670 miles of roads that crisscross the refuge affect the physical, biological, and public environment.

be made to provide quality visitor experiences. Initially, the Service will close about 21 miles of roads, implement a seasonal closure along 2.4 miles of road 315, and designate 13 miles of roads on the northeast side of the refuge as game retrieval roads where seasonal closures will be applied. Other closures or modifications could be necessary after further review of the refuge's road program. This will encourage free movement of wildlife, permit prescribed fire or wild-fire suppression activities, and increase effective harvest of wild ungulates.

The Service will upgrade about 5 miles of roads to all-weather access (gravel), allow more winter fishing access, and expand opportunities for quality wildlife observation, interpretation, and environmental education through added facilities (trails, viewing blinds, and a science interpretive center).

Bicycles will be restricted to numbered roads only including seasonally closed roads. The Service will provide facilities and services that enable people of all abilities to enjoy the educational and recreational opportunities available on the refuge.

Properly licensed snowmobiles are allowed only on the frozen surface of Fort Peck Reservoir. Bicycles may be used only on numbered roads including seasonally closed roads.

Boating is allowed on the refuge although special regulations apply on the western edge, which is part of the National Wild and Scenic River System (refer to hunting objectives for more discussion about monitoring boat access). Working with USACE and other agencies, the Service will monitor boat use along the Missouri River to determine use levels and whether wildlife disturbance, particularly during hunting season, was an issue. The Service will then work with cooperators and users to manage access where needed to limit disturbance to wildlife along the river corridor. Motorized vehicle use will be monitored on numbered trails and man-

aged if there is documented disturbance to wildlife or visitors.

Aircraft may not land on the uplands of the refuge. Landing sites for seaplanes will continue to be allowed under the provisions of the Seaplane Landing Plan (USACE 1995). Landing and taxiing of fixed-wing aircraft on the surface of Fort Peck Reservoir is allowed in designated landing locations.

Several special regulations for public access on the refuge will continue to apply. This includes, among others, the requirement for ATVs and motorcycles to be street-legal. In addition, all vehicles must stay on established routes. The Service will continue to allow for access to private inholdings or State lands. The Service will develop a stepdown management plan for transportation.

ACCESS OBJECTIVE 1. Within 3 years, evaluate access points and determine improvements that can be made to enhance ecological processes on the refuge.

ACCESS OBJECTIVE 2. Within 3–5 years, work with partners to develop a comprehensive travel management plan.

ACCESS OBJECTIVE 3. Over 15 years, work with counties to reconfigure the refuge road system. Initially close 21 miles of roads and seasonally close 15 miles of roads (designate 13 miles on the northeast part of the refuge as game retrieval roads, and seasonally close road 315 from its junction with road 838) as needed to encourage free movement of animals, permit prescribed fire activities, harvest wild ungulates, provide for quality wildlife-dependent recreation, or allow other activities that contribute to overall improved ecological health (see figure 41). Once the transportation plan is completed, close or modify more roads as necessary.

ACCESS OBJECTIVE 4. Within 5 years, identify safety hazards and partners to routinely maintain the refuge road system.

Rationale for Access Objectives 1–4. With more than 670 miles of road crisscrossing the refuge, there are few places that cannot be accessed within a mile of a road (refer to “Access” under section 3.4 in chapter 3). Most of the roads are primitive and not heavily traveled except during hunting season; nonetheless, the number and extent of the road system is cause for concern from a wildlife management, law enforcement, and road maintenance perspective.

Some refuge roads have become severely rutted and braided, particularly during wet seasons, and there is little money to maintain or patrol all the roads. Roads and invasive plants go hand in hand on most public lands in the United States (USFS 2003), as roads are a known vector for carrying weed seeds. The full extent of the problem is unknown at the ref-

uge because invasive species mapping has not been done for all upland areas, but invasive weeds are of considerable concern in many areas (for example, north fork of Rock Creek and Big Dry Arm (see figure 20 in chapter 3). The Service has worked with refuge users, particularly during hunting season, to reduce the transport of invasive species by vehicles by running the weed wash station.

Roads also can result in wildlife disturbance and habitat fragmentation. Habitat fragmentation has been shown to exacerbate the problem of habitat loss for grassland birds. While understanding the effects of habitat fragmentation is complex and not easy to assess, it is critically important to do so in making decisions about grassland management (Johnson 2001).

The objectives will provide the improved access that some refuge users desire—along with managing big game populations to improve habitat and meeting MFWP harvest objectives—while ensuring the access plan enables the Service to restore ecological processes. To achieve the overall habitat and public use objectives, other road closures could be needed, but this will be assessed in consideration of harvest strategies and other public uses and will be identified during development of the transportation plan. There will be moderate increases in providing for nonconsumptive uses, and improved access and facilities could be important in facilitating these activities. The Service will consider allowing motorized access on some closed roads (outside of wilderness areas) for game retrieval only. If conditions warrant, other improvements or closures will be considered.

The following roads (by road number) will be closed based on the criteria listed (some roads meet multiple criteria and appear more than once below):

- for protection of wilderness values—306 and 311
- to increase blocks of undisturbed habitat or reduce negative wildlife effects—320
- to address safety or maintenance issues—374 (part of) and 825
- where there is no defined legal public access—353, 355, 365, 476, 479, 488, 489, 609, 616, 617, and 618
- where the area is easily accessible from off the refuge or from another road—320, 616, and 618

Seasonal closures will be carried out on roads 315, 440, 331, 332, 333 to improve wildlife security, reduce displacement of wildlife due to motor vehicle use, and provide optimum winter habitat for wildlife.

Strategies for Access Objectives 1–4

- Direct money and staff to the evaluation of all forms of access (including motor boat) and its effects on various wildlife populations. Use this information to make final recommendations for closing access (roads) seasonally or permanently

or restricting boat motors to reduce the disturbance to wildlife.

- Within 2–5 years, assess the use of mountain bikes on all numbered routes, seasonally closed roads, and closed roads.
- Study the effects of recreation in proposed wilderness and wilderness along with closed, seasonally closed, and numbered roads to evaluate current restrictions and the effects of recreation on wildlife and habitat.
- Work with private landowners, counties, USACE, BLM, and MFWP to identify roads that provide legal public access on or off the refuge. Acquire legal access where needed and feasible.
- Remove all roads that provide exclusive access to the refuge because of inaccessible private lands within or outside the refuge.
- By 2014, produce a GIS road layer and public use “Guide Map” that shows legal public access on the refuge; designates all-weather roads, dirt “two tracks,” and roads that end at waters edge; and shows fences and gates to accommodate horse users.
- Consider opening or closing numbered routes seasonally or permanently.
- Consider restricting all access during some times of the year and allowing it at other times such as with seasonal closures.
- Work with partners to improve the elk-viewing area and reduce congestion by enlarging the area.
- Evaluate the demand for multimodal accessibility.
- Determine the extent of road use and the types of use.
- Reduce undesignated vehicle trails off system roads, i.e., road stems.
- Maintain directional signage and improve the wayfinding system as needed.
- Develop road management systems to compete for national funds.
- Perform “hot spot” road safety audits (for example, such problem areas as Knox Ridge and Sandy Creek Road).
- Perform an audit of the 100–200 series of roads within 3 years.
- Consider money and staff needed for opening and closing roads (including seasonally closed roads), developing more access points, or making changes in access.
- Designate parts of roads 440, 331, 332, and 333 as game retrieval roads (opened for set hours during hunting season for game retrieval only). Designate road 315 as seasonally closed from the

junction with road 838 to its end (from the end of August to March 1).

- Consider ways to improve opportunities for visitors to take part in nonconsumptive uses such as by providing viewing areas.
- Consider improving Knox Ridge Road for all-weather access (gravel).
- Work with other agencies and partners to restrict access or expand roadless areas if needed to facilitate ecological processes.
- Institute seasonal closures at beaches to protect nesting endangered species.
- Decrease access to roads to minimize invasive species (for example, the north fork of Rock Creek and Big Dry Arm).
- Replace structures that are barriers to aquatic organisms (for example, use fish-friendly culverts).
- Restrict access to proposed wilderness units to meet biological objectives.

RECREATION SITE OBJECTIVE

Facilities will be upgraded and designed to meet accessibility standards. Camping needs will be evaluated as use changes on the refuge, and adaptive management (see figure 42 in section 4.11) will be used to address camping demand, for example, harden the frequently used sites to minimize erosion and effects on habitat. Camping will be limited to within 100 yards of numbered routes.

There are two primary types of recreation areas found on the refuge: (1) developed areas that have amenities such as campsites, running water, and boat ramps and are managed by USACE or outgranted to MFWP or BLM; and (2) primitive areas that only have vault toilets and are managed by the Service. Additionally, there are a few more primitive areas with no facilities that were outgranted to the Service in the Enhancement Act (refer to section 1.9 in chapter 1). The following objectives address areas that the Service manages.

RECREATION SITE OBJECTIVE. Within 5 years, work with USACE to further define or improve existing Service recreation areas.

Rationale for the Recreation Site Objective. Current Service-managed recreation areas are primitive (vault toilet) compared to USACE or other agency managed recreation areas around the refuge. More visitors are using these areas for hunting, fishing, and elk viewing. These areas provide a site for visitors to gather and enjoy the Breaks while participating in wildlife-dependent recreational activities. Without these designated areas, the natural resources will be affected largely due to visitors being dispersed across a wider area.

Strategies for the Recreation Site Objective

- Harden all sites to define the current recreation area boundary to prevent future expansion into habitat.
- Work with USACE to evaluate the site potential for improving camping within the designated USACE recreation areas.
- Coordinate accessible and usable campsites that will meet the needs of those requiring special accommodations.
- Evaluate current recreational facilities and restrictions for user friendliness and ecological effects.
- Consider improving existing facilities to improve the overall refuge experience.

COMMERCIAL RECREATION OBJECTIVE

A commercial use is any economic use of a national wildlife refuge such as cooperative farming, haying, timber harvest, and grazing. Commercial fishing and outfitting are examples of commercial recreation.

The Service will only permit commercial recreation when it benefits natural ecological processes or habitats. For example, commercial activities could be allowed in roadless areas to facilitate big game harvest for meeting wildlife and habitat objectives.

All commercial uses must be appropriate and compatible with the mission of the Service and the Refuge System and the purpose for the refuge was established. Commercial uses that are not appropriate and compatible are not allowed and if they are occurring, they must be stopped or modified to be compatible.

COMMERCIAL RECREATION OBJECTIVE. Within 5 years and in collaboration with MFWP and USACE, implement a consistent process for issuing permits for persons conducting for-hire outfitter hunting and wildlife observation activities.

Rationale for the Commercial Recreation Objective.

Commercial guiding and outfitting services have been and will continue on the refuge under a special use permit. These activities primarily are associated with hunting. All commercial activities on the refuge require a permit as identified by Title 50 CFR.

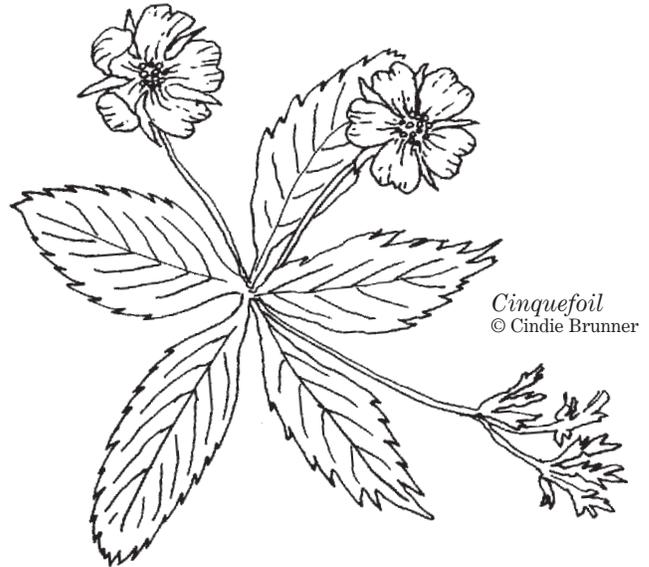
Currently, fishing outfitting, fishing tournaments, and commercial fishing are not covered by special use permit. Commercial fishing including tournaments are a popular activity on Fort Peck Lake where USACE has primary jurisdiction. The refuge has little to no oversight of commercial fishing harvest, deferring to the State's expertise and experience as well as USACE's primary jurisdiction.

The Service will look to work with MFWP and USACE to better understand the fishery resources and the levels of harvest. The refuge participated in

the development of the Fort Peck Reservoir Fisheries Management Plan (MFWP 2002a) that addressed fishing tournaments and commercial fishing. MFWP is in the process of rewriting the 10-year plan and the refuge will request to be a cooperating agency.

Strategies for the Commercial Recreation Objective

- Evaluate all commercial uses on the refuge for possible effects on wildlife populations.
- Continue to prohibit commercial outfitting for coyote hunting.
- Evaluate the current intensity of outfitting to find out if public use is being affected as a result.
- With the above information, make adjustments as necessary to ensure commercial uses are compatible with refuge missions and purposes.
- Evaluate the numbers of animals harvested by commercial outfitters. Require outfitters to project expected harvest levels in permit application each year.
- Determine the net-client hunter-use days and harvest success rates for each outfitter and outfitter-sponsored client numbers.
- Work with the State, BLM and USACE to develop capacity parameters within the refuge for various types of guiding operations (parameters aim to minimize competition or conflict with the public engaged in hunting, fishing, and wildlife observation; minimize conflicts between guides; and ensure a viable economic opportunity for existing guiding businesses).
- Conduct a public information effort through news releases and media contacts.
- Provide proactive enforcement with the refuge's and other agencies' law enforcement officers.
- Consider implementing outfitter permits for guiding and retrieval in the proposed wilderness if cow elk continue to increase or are causing negative effects on vegetation in the area.



4.7 GOAL for WILDERNESS

Conserve, improve, and promote the wilderness character and associated natural processes of designated and proposed wilderness areas and wilderness study areas within the refuge for all generations.

The 20,819-acre UL Bend Wilderness in the UL Bend Refuge and all proposed wilderness units (see figure 41) will be protected in accordance with the 1964 Wilderness Act and the Service's Wilderness Stewardship Policy (FWS 2008c).

About 155,288 acres of proposed wilderness within 15 units of the Charles M. Russell Refuge (see figure 41) will be managed in accordance with Service policy. Roads in proposed wilderness units will

remain closed except for roads that provide access to private lands within the refuge.

The Service will expand or adjust the existing proposed wilderness units by 19,942 acres in Alkali Creek, Antelope Creek, Crooked Creek, East Seven Blackfoot, Mickey Butte, Wagon Coulee, Sheep Creek, and West Hell Creek to promote and conserve wilderness qualities and characteristics and minimize negative effects on existing access. These expansions or adjustments are called wilderness study areas (see figure 41 and appendix F).

Within 2 years, the Service will complete the study of all units that meet the wilderness criteria (refer to appendix F) and submit final recommendations to the Service directorate and Secretary of the Department of the Interior.

OBJECTIVES for WILDERNESS

WILDERNESS OBJECTIVE 1. Over 15 years, continue to manage the 20,819-acre UL Bend Wilderness as a class I air shed.

WILDERNESS OBJECTIVE 2. Within 2 years, complete the wilderness study and submit recommendations to the Service Directorate and Secretary for the Department of the Interior.

WILDERNESS OBJECTIVE 3. Over 15 years, expand or adjust the existing proposed wilderness units by 19,942 acres in Antelope Creek, Crooked Creek, Alkali Creek, East Seven Blackfoot, West Hell Creek, Sheep Creek, Wagon Coulee, and Mickey Butte to promote and conserve wilderness qualities and characteristics while minimizing impacts to access outside of the units. Refer to any expansion or adjustment as a wilderness study area until formally transmitted to Congress (see figure 41 and appendix F).

Rationale for Wilderness Objectives 1–3. The UL Bend Wilderness (Public Law 94–557) and the proposed wilderness units are managed according to the Wilderness Act of 1964. The Service's wilderness policy (FWS 2008c) describes how the refuge manager preserves the character and qualities of designated wilderness while managing for the establishing purposes of the refuge. This policy, like the Wilderness Act, states that wilderness is maintained with outstanding opportunities for solitude and a primitive and unconfined type of recreation. Visitors to the UL Bend Wilderness and the proposed wilderness units are primarily hunters and hikers seeking big game hunting and wildlife observation opportunities.

The management emphasis is to restore the biological diversity, integrity, and environmental health of the refuge while providing for quality wildlife-dependent uses. By keeping the wilderness designation and closing some roads, there will be more security for wildlife, less habitat fragmentation, fewer invasive species infestations, and other positive wildlife benefits, which are important considerations in restoring ecological processes.

The refuge manager conducts a "minimum requirements analysis" before taking any action that may affect wilderness character. In general, the manager will not modify habitat, species population levels, or natural ecological processes in refuge wilderness unless doing so will maintain or restore ecological integrity that has been degraded by human influence or is necessary to protect or recover threatened and endangered species.

Eight units totaling 19,942 acres will be expanded because they possess the outstanding wilderness tangible and intangible aspects as described in the Service's wilderness policy.

Strategies for Wilderness Objectives 1–3

- Continue to allow game retrieval carts in proposed wilderness units.
- Inform and educate the public about wilderness on the refuge by adopting some or all of the interpretive themes identified for wilderness education in the wilderness stewardship policy.
- Implement wilderness character monitoring protocols (developed in 2011).

4.8 GOAL for CULTURAL and PALEONTOLOGICAL RESOURCES

Identify, value, and preserve the significant paleontological and cultural resources of the refuge to connect refuge staff, visitors, and the community to the area's prehistoric and historic past.

OBJECTIVES for CULTURAL and PALEONTOLOGICAL RESOURCES

CULTURAL RESOURCE OBJECTIVES

The refuge contains hundreds of prehistoric and historic resources (more than 50 years old). There are numerous old homestead cabins, cemeteries, and Native American sites. Remnants of old river towns such as Carroll and Rocky Point, which sprung up in the 1820s and 1860s to serve the fur trade and steamboat traffic have been washed away by the mighty Missouri River. Other homestead sites were lost when Fort Peck Dam was completed and the lush river bottoms were flooded by the reservoir.

Cultural resources will be identified, and significant resources will be protected in accordance with the National Historic Preservation Act and other relevant laws. Some old homesteads will continue to be maintained but others will not. Known gravesites will be protected and the cultural resource inventory will be maintained. A refuge history brochure will be provided.

The Service will create a sensitivity model for cultural resource locations and conduct surveys in areas with a moderate or high potential for resources. A comprehensive cultural resource overview and step-down plan will be completed. Oral histories will be collected to help understand and interpret the history of some of the structures on the refuge. Opportunities to work with partners to fund and carry out preservation projects will be explored, and any artifact collections will be located and properly curated.

CULTURAL RESOURCE OBJECTIVE 1. Over 15 years, continue to identify and protect cultural resources in accordance with Federal laws and policies.

CULTURAL RESOURCE OBJECTIVE 2. Within 5 years, develop a stepdown plan for the preservation and protection of cultural resources on the refuge.

CULTURAL RESOURCE OBJECTIVE 3. Within 5 years, identify areas with a high or moderate likelihood of having historic properties.

Significant cultural and paleontological resources will be protected and managed. Individual projects may require more consultation with the State of Montana's Historic Preservation Office, Tribal Historic Preservation Offices, and other interested parties. The Service will maintain closures of roads through sensitive areas. In addition, there will be increased protection of cultural and paleontological sites through law enforcement and public education.

CULTURAL RESOURCE OBJECTIVE 4. Within 10 years, survey the moderate and high areas for cultural resources to identify most of the historic properties.

CULTURAL RESOURCE OBJECTIVE 5. Over 15 years, compile a comprehensive cultural resource overview that describes the nature and extent of past cultural resource investigations, the types of resources known at the refuge, and the interpretive context for these resources.

CULTURAL RESOURCE OBJECTIVE 6. Over 15 years, develop interpretive materials that explain the refuge's cultural resources.

CULTURAL RESOURCE OBJECTIVE 7. Over 15 years, develop a system for archiving historic items (including documents, photographs, maps and artifacts) in accordance with Department of the Interior policies.

CULTURAL RESOURCE OBJECTIVE 8. Beginning in year 2, locate individuals with knowledge about the general history of the refuge, the location of sites, or alterations to various buildings and structures.

Rationale for Cultural Resource Objectives 1–8. Federal laws and policies mandate the identification and protections of cultural resources on Federal lands. Specifically, section 106 of the National Historic Preservation Act requires all Federal agencies to consider effects on cultural resources before any Federal action.

The refuge contains many historical structures, many of which have not yet been properly surveyed. Additionally, the Missouri River Breaks has a rich history of Native American and Euro-American presence. Identifying sensitive cultural areas and resources will allow staff to better consider cultural resources in planning and will establish the priorities for cultural resource surveys. A cultural resource survey is the best tool available for finding cultural resources at the refuge. Using surveys, both his-

toric and prehistoric resources are identified and key information is gathered that helps for evaluation, planning, research, and educational outreach. There is limited knowledge about cultural resources at the refuge because less than 1,000 acres have been professionally surveyed. Although there are 363 known cultural resource sites, many have very limited documentation.

The overview will outline specific threats to the resources and the ability of future studies to address regional research questions. It will also serve as a planning tool to help encourage consideration of cultural resources during project planning.

To increase the public's appreciation and encourage support for the cultural and paleontological resources, staff needs to interpret the resources. Cultural artifacts and historic structures can provide valuable insight into the settlement of the Missouri River Breaks and the development of the refuge through time and provide the public with a link to the past.

Long-term and past employees, in addition to local residents and members of regional historic societies, can be a wealth of information about the history of the refuge and the location of specific resources.

Strategies for Cultural Resource Objectives 1–8

- Within 10 years, establish photo documentation and GPS mapping for known significant sites.
- Continue cultural resource reviews of undertakings.
- Improve the Service's ability to conduct thorough and timely reviews including more comprehensive consultation.
- Develop a programmatic agreement with Montana State Historic Preservation Office.
- Create a comprehensive list and map of known historic sites.
- Identify historic homesteads to maintain.
- Protect all known gravesites, and maintain the cultural resource inventory.
- Monitor the condition of the resources on a regular basis using a cultural resource professional and, when possible, mitigate adverse effects that are compromising the integrity of the resource.
- Provide staff with access to information on historic properties and request updated information on resource condition when they are in the area.
- Create a sensitivity model for cultural resource locations based on previous surveys on the refuge and the surrounding areas, in consultation with the State Historic Preservation Officer, the Tribal Historic Preservation Office, and other professionals.
- Make the cultural resources sensitivity model available to appropriate staff.
- Ground-truth the cultural resources sensitivity model when possible.
- Update and refine the cultural resources sensitivity model on a regular basis.
- Conduct cultural resource surveys of areas with a moderate to high potential for cultural resources.
- Work with partners such as other agencies, colleges, and universities to conduct surveys and share resources.
- Notify the region 6 archaeologists when unrecorded cultural resources are located.
- Identify cooperative opportunities with colleges and universities.
- Secure grants to complete the resources overview.
- Develop a cultural and paleontological resource fact sheet for distribution to refuge visitors.
- Create more cultural resource educational and interpretive materials.
- Develop brochures and kiosks that interpret cultural resources.
- Conduct a comprehensive inventory of historic items and an assessment of their condition. Determine the informational and artifact value of the items. Determine the best strategy to make the information and artifacts useful and available.
- Protect and store historic items of value in archiving-stable materials under environmentally appropriate conditions.
- Work with current staff and area residents to develop a list of individuals who may have information about the refuge's history.
- Conduct field trips or interviews with people identified as having knowledge of the history at the refuge.

PALEONTOLOGICAL RESOURCE OBJECTIVES

Many paleontological resources have been excavated from the refuge. Among the most recognizable dinosaur fossil finds to come from the refuge are *Tyrannosaurus rex*, *Triceratops*, *Albertosaurus*, *Mosasaurus*, and hadrosaurs (refer to section 3.6 in chapter 3). Several collections are on display at the Fort Peck Interpretive Center. Collection of any fossils is not allowed without a special use permit.

The Service will continue to issue permits to institutions that investigate paleontological resources from a scientific perspective. Permits will not be issued for recreational paleontology requests that do not follow a scientific study design. All permits will continue to meet compatibility requirements and the regulations for the Paleontology Resource Protection Act.

The refuge will develop a stepdown plan with Montana State University and USACE for these resources. The number of education permits for universities for excavation of paleontological resources could be decreased if necessary to increase protection.

PALEONTOLOGICAL RESOURCE OBJECTIVE 1. Over 15 years, continue to issue permits to the Museum of the Rockies or others for collecting paleontological resources and prohibit recreational digging.

Rationale for Paleontological Resource Objective 1. Currently, the Museum of the Rockies in Bozeman, Montana, has a permit to dig for fossils on the refuge, and providing they met the terms of the permit, this will continue.

Strategy for Paleontological Resource Objective 1

- Monitor an operator to ensure compliance with terms of the permit, and monitor and investigate any reports of illegal digging.

PALEONTOLOGICAL RESOURCE OBJECTIVE 2.

Within 5 years, in cooperation with the Museum of the Rockies and the USACE,

develop a stepdown plan for paleontological resources. Ensure the plan specifies guidelines for uniform permitting of paleontological research to credible research facilities across the refuge.

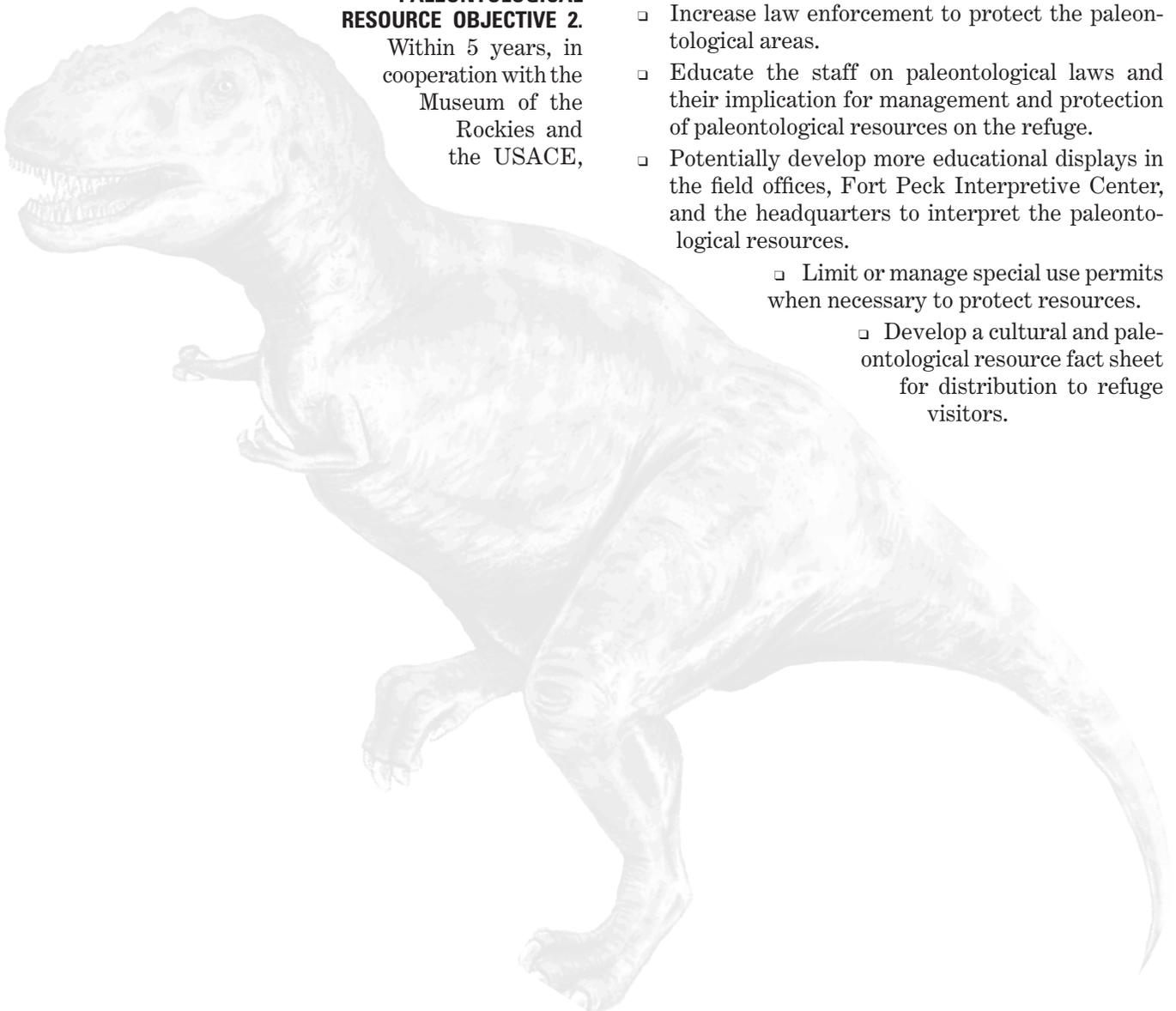
PALEONTOLOGICAL RESOURCE OBJECTIVE 3. Within 5 years, interpret and promote the national natural landmarks on the refuge. At a minimum, post the plaque and announce the designation.

Rationale for Paleontological Resource Objectives 2–3. Montana State University is evaluating paleontological resources and working on the stepdown plan. The plan will include guidelines to decide when and how to issue permits for science and education. Montana State University is the official repository for paleontological resource collected from the refuge.

Two areas on the refuge have been designated as national natural landmarks, the Bug Creek Fossil Area and the Hell Creek Fossil Area.

Strategies for Paleontological Resource Objectives 2–3

- Increase law enforcement to protect the paleontological areas.
- Educate the staff on paleontological laws and their implication for management and protection of paleontological resources on the refuge.
- Potentially develop more educational displays in the field offices, Fort Peck Interpretive Center, and the headquarters to interpret the paleontological resources.
 - Limit or manage special use permits when necessary to protect resources.
 - Develop a cultural and paleontological resource fact sheet for distribution to refuge visitors.



4.9 GOAL for REFUGE OPERATIONS and PARTNERSHIPS

Through effective communication and innovative use of technology and resources, the refuge uses funding, personnel, partnerships, and volunteer programs for the benefit of natural resources while recognizing the social and economic connection of the refuge to adjacent communities.

OBJECTIVES for REFUGE OPERATIONS and PARTNERSHIPS

REFUGE OPERATIONS OBJECTIVES

Refuge operations include management of facilities, structures, and other land or water use. The refuge relies on personnel, equipment, and facilities to carry out both day-to-day operations and long-term programs such as land acquisition.

The Service will increase personnel to include an outdoor recreation planner at each of the Fort Peck and Lewistown Field Stations, a full-time law enforcement officer at Fort Peck Field Station, a manager at the UL Bend Refuge, two maintenance employees, and a fire specialist on the east end of the refuge.

The Service will maintain existing facilities at the refuge. Facilities will be expanded at Jordan Field Station and more office space will be provided at the Jordan and Sand Creek Field Stations. A bunkhouse will be built at Fort Peck Field Station. The Service will collaborate with others to develop a science and interpretive center at Sand Creek Field Station.

The mineral withdrawals for locatable minerals (diatreme gems) on the UL Bend Refuge (permanent) and the Charles M. Russell Refuge (20-year withdrawal) will remain in effect. The Service will seek permanent withdrawal of all minerals including oil and gas and other leasable and saleable minerals on all refuge lands and future acquisitions.

The below objectives describe how the Service will use money and staff to meet the refuge goals.

REFUGE OPERATIONS OBJECTIVE 1. Continue mineral withdrawal on all refuge lands until 2013, and work to renew mineral withdrawal or acquire minerals. Seek permanent withdrawal from Congress of all minerals, including oil and gas and other leasable and locatable minerals on all refuge lands and future acquisitions.

Rationale for Refuge Operations Objective 1. Public Land Order 6997 (1993) withdrew minerals for all the

The vision and goals will be met through proportionate refuge operations and the refuge's collaboration with many partners.

The Service will look to facilitate the exchange of State lands within the refuge boundary where feasible. Working with willing sellers, the Service will buy priority lands within the authorized boundary as money is available. The Service will cooperate with USACE to transfer jurisdiction of lands not needed by USACE to meet its legal mandates.

refuge until 2013. The Service will continue to renew and seek to purchase minerals on future acquisitions. This will not include private or State lands where this is exempted.

The Service will seek a permanent withdrawal for minerals from Congress (only Congress can order this designation) to permanently protect refuge resources. Current techniques for extraction of leasable and locatable minerals including oil and gas are not compatible with the primary purposes of the refuge.

Strategies for Refuge Operations Objective 1

- Seek to purchase minerals on fee acquisitions.
- Adhere to legal rights-of-way obligations for access to private and State lands including those for oil and gas extractions.

REFUGE OPERATIONS OBJECTIVE 2. Over 15 years, work within the Service to adjudicate and define water rights.

Rationale for Refuge Operations Objective 2. The United States holds Federal reserved water rights on the refuge (refer to section 3.1 in chapter 3), and the United States is in the process of quantifying these reserved rights with the Montana Reserved Water Rights Compact Commission.

Strategy for Refuge Operations Objective 2

- Maintain select stock ponds.

REFUGE OPERATIONS OBJECTIVE 3. Over 15 years, maintain existing public use facilities (refer to section 3.4 in chapter 3).

REFUGE OPERATIONS OBJECTIVE 4. Improve facilities as identified under the strategies and as part of implementing the public use objectives identified above.

Rationale for Refuge Operations Objectives 3–4. Specific improvements and additions will be made to public

use facilities as part of implementing the objectives for public use and development of the visitor services stepdown plan. The exact number of facilities, length of trail, and location will need to be determined based on projected visitor numbers and after more detailed programming occurred with the visitor services plan.

Strategies for Refuge Operations Objectives 3–4

- Maintain the auto tour route, elk-viewing area, accessible hunting blind, and interpretive kiosks.
- Continue to work with USACE to manage the boat ramps.
- Ensure refuges are signed and that directional signage is in place. Collaborate with the highway department to develop and position signage.
- Remodel restrooms associated with campgrounds (Slippery Ann) to be made accessible.
- Construct more facilities (blinds, trails, or tour routes) including a lek blind for sage-grouse and sharp-tailed grouse as identified in the visitor services plan.
- Design and map birdwatching trails for public use.
- Evaluate the possibility of constructing a science and interpretive center at the Sand Creek Field Station in cooperation with various nongovernmental organizations.
- Develop interpretive signage at certain historic properties such as Rocky Point.
- Design and map birdwatching trails for public use.
- Develop displays in the field offices and the headquarters to interpret the paleontological resources.
- Develop displays in the field offices and the headquarters to interpret the paleontological resources.

REFUGE OPERATIONS OBJECTIVE 5. Within 5–10 years, add the needed staff for full-time and seasonal positions and volunteers to fully carry out the CCP as identified in table 25 (section 4.13 below).

Rationale for Refuge Operations Objective 5. There will be a need to increase personnel by seven to eight positions to meet habitat and public use objectives and one trainee position will be eliminated.

Strategies for Refuge Operations Objective 5

- With an increase in fire money and through the Refuge Operations Needs System database, continue to work toward increasing permanent and seasonal firefighting personnel by 50 percent.
- Hire a career-conditional position that is knowledgeable in planting crops to start work on the first river bottom on the list.

- Hire staff to conduct new monitoring across the refuge.
- Hire seasonal employees for fence removal, and hire professional fence builders for boundary fence construction of remaining fences.
- Hire two visitor services personnel (outdoor recreation planners) at Lewistown Field Station and Fort Peck Field Station (top priority).
- Hire staff and graduate students to complete habitat inventories.
- Hire two maintenance employees for UL Bend Refuge.
- Staff the interpretive center at Fort Peck Field Station with refuge personnel.
- Add more law enforcement personnel for Fort Peck Field Station.

PARTNERSHIP OBJECTIVES

The refuge and its resources are within a larger landscape that is important to the conservation of the natural and cultural resources at the refuge. Partnerships, including agreements with landowners next to the refuge and other interested agencies and groups, are essential to meeting refuge goals.

The Service will carry out actions in the CCP through cooperation and collaboration with existing partnerships with Federal and State agencies, counties, conservation districts, adjacent private landowners, local communities, and others. The Service will review the refuge's partnerships and adapt them as needed based on new management direction.

The Service will collaborate with USACE in accordance with established agreements. As an example, operation of the Fort Peck Interpretive Center and Museum is a cooperative effort between USACE, the Service, and Fort Peck Paleontology Incorporated. Staff will coordinate with USACE on lands that could be transferred to the Service for primary jurisdiction.

The Service will continue to explore opportunities to collaborate with partners on wildfire suppression, use of prescribed fire, and habitat manipulation. Staff will seek more partnerships and money to support endeavors such as increased control of invasive species or for initiation of a Friends group. The Service will cooperate with partners to provide comparable accessible opportunities for all.

Many opportunities exist near the refuge to continue existing partnerships or establish new ones, including the following:

- Federal agencies including BLM, USDA, USGS, USACE, National Oceanic Atmospheric Administration, Federal Highways Administration, and many others

- MFWP and DNRC on wildlife and habitat management and other State agencies
- conservation districts, county commissioners, fire wardens, fire districts, weed districts, and sheriffs departments
- nongovernmental organizations including Rocky Mountain Elk Foundation, World Wildlife Fund, American Prairie Reserve, The Conservation Fund, The Nature Conservancy, Montana Wildlife Federation, Wildlife Conservation Society, Yellowstone Valley Audubon Society, Ranchers Stewardship Alliance, Defenders of Wildlife, National Wildlife Federation, grazing associations, the Wilderness Society, Prairie Wildlife Research, and Stockgrowers Association
- adjacent private landowners and local communities

PARTNERSHIP OBJECTIVE 1 (land management). Over 15 years, work cooperatively with USACE to acquire jurisdiction around the lake to enforce regulations.

PARTNERSHIP OBJECTIVE 2 (land management). Over 15 years, maintain existing partnerships and agreements with Federal, State, county, conservation districts, adjacent private landowners, and local communities.

PARTNERSHIP OBJECTIVE 3 (land management). Over 15 years, continue working with agencies (USACE; BLM; MFWP; DNRC; counties of Fergus, Petroleum, Garfield, McCone, Phillips, and Valley; and tribal governments), conservation organizations (World Wildlife Fund, American Prairie Reserve, Ranchers Stewardship Alliance, and The Nature Conservancy), and private landowners to manage large free-ranging wildlife (elk, mule deer, and pronghorn), sage-grouse, species of concern (prairie dogs and black-footed ferrets), and sentinel plants.

PARTNERSHIP OBJECTIVE 4 (land management). Within 2 years, sign a memorandum of understanding with the above groups that outlines habitat conservation strategies across the landscape for the species mentioned in Partnership Objective 3.

PARTNERSHIP OBJECTIVE 5 (land management). Over 15 years, promote healthy populations of all plants and associated prairie-wildlife lands adjoining the refuge partners' focus areas.

Rationale for Partnership Objectives 1–5 (land management). The Service will continue to work cooperatively with many agencies and jurisdictions. The agreements in place will continue.



USFWS

Sharp-tailed grouse is a focal species for upland habitat.

Many prairie wildlife species require large tracts of undisturbed prairie. Often these species have large home ranges that cover hundreds of square miles and cross multiple landownership. Several species (for example, prairie dogs and sage-grouse) are in peril due to a combination of factors including loss of habitat, disease, and landowner tolerance. Cooperation among adjoining landowners and managers to provide all the seasonal habitat needs is necessary for these species to survive.

Loss of grassland-nesting cover, winter habitat foods, and economic pressures (converting grassland to crops) are a few of the habitat limitations that negatively affect these sentinel species. Monitoring sentinel plants and the heterogeneity of habitats with associated wildlife will help the Service manage for these species.

Conservation incentives from government agencies or conservation groups will help to foster cooperative conservation practices such as supporting level 1 prairie dog town of 5,000 acres, preserving sage-grouse nesting and winter habitat, and promoting heterogeneity of habitats to support the needs of grassland-obligate birds and other species.

The habitats of the northern glaciated plains evolved with pyric herbivory influences. Hundred years of fire suppression and constant grazing pressure has affected the health and relative presence of numerous plants (sentinel plants) including skunk-bush, winterfat, golden currant, and buffaloberry. By improving the health and distribution of these sentinel plants the overall health of various wildlife species will be improved as well. By restoring pyric-herbivory processes and managing for total ungulate populations, the overall health of these plants and habitats will improve and contribute to the overall biological health and ecological integrity. Land management by private landowners and conservation organizations around the refuge affect plant and wildlife distribution on the refuge.

Strategies for Partnership Objectives 1–5 (land management).

- Conduct a pyric herbivory study and management program on the refuge as a demonstration site for other interested land managers and landowners.
- Enter into a memorandum of understanding with interested partners to manage lands for sentinel plants and natural ecological processes such as historical fire occurrence.
- Manage sentinel wildlife such as prairie dogs to support the full suite of wildlife that rely on prairie dogs or prairie dog towns.
- Secure outside funding (Cooperative Conservation Partnership Initiative and Conservation Innovation Grants) for long-term monitoring

projects to measure progress of increasing the health and relative abundance of sentinel plants.

PARTNERSHIP OBJECTIVE 6 (volunteers and friends). Within 5 years, develop a volunteer program and Friends group aimed at meeting the refuge’s biological and public use objectives.

PARTNERSHIP OBJECTIVE 7 (volunteers and friends). Over 15 years, maintain and build partnerships with agencies, communities, and organizations to support and grow public use programs on and off the refuge.

Rationale for Partnership Objectives 6–7 (volunteers and friends). In 2008, about 39,765 volunteers gave 1.5 million hours in support of Service activities including 3,338 volunteers in region 6 who contributed 131,169 hours (FWS 2008d). People volunteer for a variety of reasons, but they play an important role in helping the Service meet its mission. Friends groups are important allies for the Service, often advocating for a field stations by giving information to local community and elected officials. There are more than 200 Friends groups across the Service (FWS 2008d). To carry out the refuge’s habitat and public use objectives, the Service will establish an active volunteer program and Friends group to advance the refuge’s programs and establish partnerships with the local communities.

Strategies for Partnership Objectives 6–7 (volunteers and friends)

- Begin to recruit volunteers.
- Advertise the Friends group and volunteer opportunities on the Web site, in surrounding communities, and within refuge visitor facilities.
- Develop partnerships with wildlife groups and organizations such as Yellowstone Valley Audubon Society and others to market available birding and wildlife opportunities at the refuge.
- Create new partnerships and maintain and expand existing partnerships with hunters to increase awareness of the importance of bird and habitat conservation.
- Create new partnerships and maintain and expand existing partnerships with conservation groups and the public to increase public awareness of nonconsumptive bird recreation and bird conservation.
- Seek out partners to establish and promote bird-watching trails or routes.
- Work with partners and volunteers to establish mountain bluebird trails.
- Work with partners to develop an outreach plan as part of the visitor services plan.
- Work with the Montana tourism department to promote the refuge and resources.

- Over 15 years, develop partnerships with photography clubs to provide two nature photography workshops on the refuge.
- Over 15 years, collaborate with other groups to provide one additional Web-based camera or video camera to local schools.
- Work with partners to continue to seek grants to fund events and programs.

4.10 STEPDOWN MANAGEMENT PLANS

Where the CCP provides overall direction in the form of goals and objectives for the refuge, each stepdown management plan describes the details of carrying out the strategies to meet the objectives. Table 23 identifies the stepdown plans needed to fully implement the CCP.

Table 23. Stepdown management plans for the Charles M. Russell and UL Bend Refuges, Montana.

<i>Plan</i>	<i>Year to be completed</i>
Cultural resources	2017
Fire management	2014
Habitat management	2015–19
Invasive plant management	2015
Paleontological resources	2017
Public use	2017
hunting and fishing	
fishing and mussels	
wildlife observation, photography, and interpretation	
environmental education	
Transportation	2017
Wilderness stewardship	2015

4.11 MONITORING and EVALUATION

Adaptive management is a flexible approach to long-term management of biotic resources. Adaptive management is directed, over time, by the results of ongoing monitoring activities and other information. More specifically, adaptive management is a process by which projects are carried out within a framework of scientifically driven experiments to test the predictions and assumptions outlined within the CCP (see figure 42).

To apply adaptive management, specific survey, inventory, and monitoring protocols will be adopted for the refuge. The habitat management strategies will be systematically evaluated to determine management effects on wildlife populations. This information will be used to refine approaches and find out how effectively the objectives are being accomplished. Evaluations will include participation by Service personnel and other partners. If monitoring and evaluation indicate undesirable effects for target and nontarget species or communities, alteration to the management projects will be made. Subsequently, the CCP will be revised.

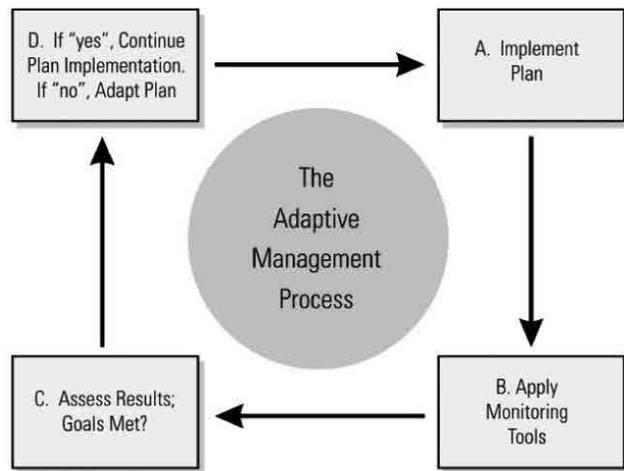


Figure 42. Adaptive management process.

4.12 PLAN AMENDMENT and REVISION

The CCP will be reviewed annually to determine the need for revision. A revision will occur if and when significant information becomes available, such as a change in ecological conditions. Revisions to the CCP and subsequent stepdown management plans will be subject to public review and compliance with the National Environmental Policy Act. At a minimum, this plan will be evaluated every 5 years and revised after 15 years.

4.13 FUNDING and PERSONNEL

Refuge budgets generally include ongoing operations funds for personnel, maintenance, and utility needs. It is estimated that it will cost about \$76.7 million over 15 years to carry out this plan. There will be a one-time cost of about \$20.4 million and a salary cost of about \$56.3 million. Table 24 displays the details used to develop the costs.

Table 24. Cost analysis for implementing the comprehensive conservation plan for the Charles M. Russell and UL Bend Refuges, Montana.

<i>Management cost item</i>		<i>Cost (\$1,000s)</i>
HABITAT	uplands	598
	river bottoms	490
	riparian areas and wetlands	258
	shorelines	51
CLIMATE CHANGE		95
INVASIVE SPECIES		120
FIRE	prescribed fire	2,100
	wildfire	1,190
WILDLIFE MANAGEMENT	big game	475
	furbearers	400
	threatened and endangered species	215
	American bison	80
	other wildlife	97
	birds	121
PUBLIC USE	hunting	330
	fishing	163
	observation, interpretation, and photography	346
	environmental education	47
	outreach	20
	commercial uses and outfitting	32
	recreation sites	90
access	210	
WILDERNESS		15
CULTURAL RESOURCES		110
REFUGE OPERATIONS	stock ponds and maintenance	172
VOLUNTEERS and FRIENDS		32
PRIORITY LAND ACQUISITIONS		4,000
INTERPRETIVE CENTER	building	8,000
	exhibits	500
Subtotal of one-time costs over 15 years		20,356
Salaries over 15 years		56,351
Total cost		76,707

Table 25 shows the personnel needed to implement the plan. Projects required to carry out the CCP will be funded through two separate systems, as follows: (1) the refuge operations needs system is used to document requests to Congress for money and personnel needed to carry out projects above the existing base budget; and (2) the Service asset maintenance management system is used to document the equipment, buildings, and other existing properties that require repair or replacement.

Table 25. Personnel needed to implement the comprehensive conservation plan for the Charles M. Russell and UL Bend Refuges, Montana.

Headquarters (Lewistown, Montana)

- Project leader GS¹-14
- Deputy project leader GS-13
- Pilot and wildlife biologist GS-12
- Outdoor recreation planner GS-9
- Maintenance worker WG¹-8
- Maintenance worker WG-7
- Supervisory wildlife biologist² GS-13
- Wildlife biologist GS-12
- Wildlife biologist GS-9
- Wildlife biologist GS-9
- Refuge complex fire management officer GS-13
- Administrative officer GS-11
- Administrative assistant GS-6
- Administrative assistant (term) GS-4
- Outdoor recreation planner GS-11

Fort Peck Field Station

- Station manager GS-12
- Assistant station manager GS-9
- Biological technician GS-6
- Outdoor recreation planner GS-7/9
- Law enforcement officer GS-7/9
- Range technician GS-5/6

Jordan Field Station

- Station manager GS-12
- Assistant station manager GS-7/9
- Range technician GS-6/7

Sand Creek Field Station

- Station manager GS-12
- Assistant station manager GS-9
- Assistant fire management officer GS-11
- Biological technician GS-6
- Law enforcement officer GS-9
- Range technician GS-7
- Maintenance worker WG-8
- Outdoor recreation planner GS-7/9

UL Bend National Wildlife Refuge

- Station manager GS-9/11
- Technician GS 5/6
- Maintenance worker WG-7/8

Seasonal Employees

(Fill to meet needs)

¹GS=General Schedule employee by pay grade; WG=Wage Grade employee by pay grade.

² Many of the existing staff have expertise and education in range management. They would qualify as range conservation specialists and could be put into that position series. Monitoring for range health generally involves looking at the dominant community plants, mostly grasses, and determining if they are viable, versus the refuge's wildlife habitat monitoring program, which includes looking at all the plants that comprise the community and ensuring that they are healthy, vibrant, and able to reach maturity.

Glossary

accessible: Pertaining to physical access to areas and activities for people of different abilities, especially those with physical impairments.

active management: The direct manipulation of habitats or wildlife populations to achieve specific objectives. Actions could include planting food plots, managing water levels, prescribed grazing or fire, or wildlife relocations.

adaptive resource management: The rigorous application of management, research, and monitoring to gain information and experience necessary to assess and change management activities; a process that uses feedback from research, monitoring, and evaluation of management actions to support or change objectives and strategies at all planning levels; a process in which policy decisions are carried out within a framework of scientifically driven experiments to test predictions and assumptions inherent in management plan. Analysis of results helps managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.

Administration Act: National Wildlife Refuge System Administration Act of 1966.

alternative: A reasonable way to solve an identified problem or satisfy the stated need (40 CFR 1500.2); one of several different means of accomplishing refuge purposes and goals and contributing to the Refuge System mission (The Fish and Wildlife Service Manual, 602 FW 1.5).

amphibian: A class of cold-blooded vertebrates including frogs, toads, or salamanders.

annual: A plant that flowers and dies within 1 year of germination.

appropriate use: A proposed or existing uses on national wildlife refuges that meet at least one of the following: (1) is a wildlife-dependent recreational use; (2) contributes to fulfilling refuge purposes, the Refuge System mission, or goals and objectives outline in a CCP; or (3) the refuge manager has evaluated the use and found it to be appropriate.

ATV: All-terrain vehicle.

AUM: Animal-unit month.

baseline: A set of critical observations, data, or information used for comparison or a control.

BCR: Bird conservation region.

biological control: The use of organisms or viruses to control invasive plants or other pests.

biological diversity, also biodiversity: The variety of life and its processes including the variety of living organisms, the genetic differences among

them, and the communities and ecosystems in which they occur (The Fish and Wildlife Service Manual, 052 FW 1.12B). The National Wildlife Refuge System's focus is on indigenous species, biotic communities, and ecological processes.

biological integrity: Biotic composition, structure, and function at genetic, organism, and community levels.

biotic: Pertaining to life or living organisms; caused, produced by, or comprising living organisms.

BLM: *See Bureau of Land Management.*

Bureau of Land Management (BLM): A Federal agency that was established in 1946 through consolidation of the General Land Office and U.S. Grazing Service. The agency has a multiple-use mandate is responsible for a variety of programs for managing and conserving surface and subsurface mineral estates, mostly in the western United States.

canopy: A layer of foliage, generally the uppermost layer, in a vegetative stand; midlevel or understory vegetation in multilayered stands. Canopy closure (also canopy cover) is an estimate of the amount of overhead vegetative cover.

CCP: *See comprehensive conservation plan.*

CFR: *See Code of Federal Regulations.*

cervid: All members of the family Cervidae and hybrids including deer, elk, moose, caribous, reindeer, and related species.

CFR: *See Code of Federal Regulations.*

cfs: Cubic feet per second.

CO₂: Carbon dioxide.

Code of Federal Regulations (CFR): The codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the Federal Government. Each volume of the CFR is updated once each calendar year.

compatibility determination: *See compatible use.*

compatible use: A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director of the U.S. Fish and Wildlife Service, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge (The Fish and Wildlife Service Manual, 603 FW 3.6). A compatibility determination supports the selection of compatible uses and identified stipulations or limits necessary to ensure compatibility.

comprehensive conservation plan (CCP): A document that describes the desired future conditions of the refuge and provides long-range guidance and management direction for the refuge manager to

accomplish the purposes of the refuge, contribute to the mission of the Refuge System, and to meet other relevant mandates (The Fish and Wildlife Service Manual, 602 FW 1.5).

concern: *See issue.*

conservation district: Organized in the 1930s as a response to the severe erosion problems, a district is often a political subdivision of a State. Money comes from assessments levied on real property within the boundaries of the district. It helps citizens in conserving renewable natural resources.

conspicuous: An individual belonging to the same species as another.

corridor: *See travel corridor.*

county road: In general, means any public highway opened, established, constructed, maintained, abandoned in accordance with State law.

cover, cover type, canopy cover: Present vegetation.

cultural resources: The remains of sites, structures, or objects used by people in the past.

depredation: Destruction or consumption of eggs, broods, or individual wildlife due to a predatory animal; damage inflicted on agricultural crops or ornamental plants by wildlife.

DNRC: Montana Department of Natural Resources and Conservation.

DOI: Department of the Interior.

EA: *See environmental assessment.*

ecological resilience: The ability to absorb disturbances, to be changed, and then to reorganize and still have the same identity, that is, keep the same basic structure and ways of functioning. A resilient system is forgiving of external shocks; a disturbance is unlikely to affect the whole. A resilient habitat (1) sustains many species of plants and animals and a highly variable structural composition; (2) is asymmetric; (3) exemplifies biological integrity, biological diversity, and environmental health; and (4) adapts to climate change.

ecosystem: A dynamic and interrelating complex of plant and animal communities and their associated nonliving environment; a biological community, together with its environment, functioning as a unit. For administrative purposes, the Service has designated 53 ecosystems covering the United States and its possessions. These ecosystems generally correspond with watershed boundaries and their sizes and ecological complexity vary.

ecosystem resilience: *See ecological resilience.*

EIS: Environmental impact statement.

endangered species, Federal: A plant or animal species listed under the Endangered Species Act of 1973, as amended, that is in danger of extinction throughout all or a significant part of its range.

endangered species, State: A plant or animal species in danger of becoming extinct or extirpated in a

particular State within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.

Enhancement Act: Title VIII of the Water Resources Development Act of 2000.

environmental assessment: A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action and alternatives to such action, and provides sufficient evidence and analysis of effects to determine whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).

environmental health: Composition, structure, and functioning of soil, water, air, and other abiotic features.

extinction: The complete disappearance of a species from the earth; no longer existing.

fauna: All the vertebrate and invertebrate animals of an area.

Federal trust resource: A trust is something managed by one entity for another who holds the ownership. The Service holds in trust many natural resources for the people of the United States as a result of Federal acts and treaties. Examples are species listed under the Endangered Species Act, migratory birds protected by international treaties, and native plant or wildlife species found on a national wildlife refuge.

Federal trust species: All species where the Federal Government has primary jurisdiction including federally endangered or threatened species, migratory birds, anadromous fish, and certain marine mammals.

fire refugia: Those places within the landscape that due to size, soils, or topography do not burn as often, as intensely, or at all with frequent light ground fire. In landscapes with frequent fire return intervals, respect for fire refugia is essential for protection of fire intolerant plant species.

flora: All the plant species of an area.

fire management plan (FMP): A plan that identifies and integrates all wildland fire management and related activities within the context of approved land and resource management plans. The plan defines a program to manage wildland fires (wildfire and prescribed fire).

focal species: A multispecies approach where the ecological needs of a suite of species are used to define an ideal landscape to maintain the range of habitat conditions and ecological processes required by landbirds or other species. Focal species are considered most sensitive to or limited by certain ecological processes (such as fire or nest predation) or habitat attributes (such as patch size or snags).

The needs of a suite of focal species are then used to help guide management activities.

forb: A broad-leaved, herbaceous plant; a seed-producing annual, biennial, or perennial plant that does not develop persistent woody tissue but dies down at the end of the growing season.

fragmentation: The alteration of a large block of habitat that creates isolated patches of the original habitat that are interspersed with a variety of other habitat types; the process of reducing the size and connectivity of habitat patches, making movement of individuals or genetic information between parcels difficult or impossible.

Friends group: Any formal organization whose mission is to support the goals and purposes of its associated refuge and the National Wildlife Refuge Association overall; Friends organizations and cooperative and interpretive associations.

FWS: See *U.S. Fish and Wildlife Service*.

geocaching: A high-technology scavenger hunt in which objects are hidden at secret outdoor locations for participants to find using Global Positioning System positions posted on the Internet.

Geographic Information System (GIS): A computer system capable of storing and manipulating spatial data; a set of computer hardware and software for analyzing and displaying spatially referenced features (such as points, lines and polygons) with nongeographic attributes such as species and age.

GIS: See *geographic information system*.

Global Positioning System (GPS): A navigational system involving satellites that allows a user with a receiver to determine precise coordinates for their location on the earth's surface.

goal: Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (The Fish and Wildlife Service Manual, 620 FW 1.5).

GPS: See *Global Positioning System*.

GS: General Schedule (pay rate schedule for certain Federal positions).

habitat: Suite of existing environmental conditions required by an organism for survival and reproduction; the place where an organism typically lives and grows.

habitat disturbance: Significant alteration of habitat structure or composition; may be natural (for example, wildfire) or human-caused events (for example, timber harvest and disking).

habitat management plan (HMP): A stepdown plan to a comprehensive conservation plan that identifies in detail how the objectives and strategies for uplands, riparian areas, river bottoms, and shorelines will be carried out.

habitat type, also vegetation type, cover type: A land classification system based on the concept of distinct plant associations.

HDP: See *height–density plot*.

height–density plot (HDP): Methods used to record the height of visual obstruction of plant cover. A measuring pole is observed at points along a line transect from a set distance and angle. It provides information on the adequacy of nesting cover for sharp-tailed grouse.

herbivory: Grazing of grass and other plants by any animal.

heterogeneity: diversity or dissimilar species within a landscape

HMP: See *habitat management plan*.

hunting: A species that can be hunted on the refuge in accordance with Federal and State regulations.

IMPLAN: Impact Analysis for Planning.

impoundment: A body of water created by collection and confinement within a series of levees or dikes, creating separate management units although not always independent of one another.

Improvement Act: National Wildlife Refuge System Improvement Act of 1997.

indigenous: Originating or occurring naturally in a particular place.

inholding: Non-Service land owned by private, other agency, or other group landowners that is within the boundary of a national wildlife refuge.

integrated pest management: Methods of managing undesirable species such as invasive plants; education, prevention, physical or mechanical methods of control, biological control, responsible chemical use, and cultural methods.

introduced species: A species present in an area due to intentional or unintentional escape, release, dissemination, or placement into an ecosystem as a result of human activity.

invasive plant, also noxious weed: A species that is nonnative to the ecosystem and whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health.

invertebrates: An animal that lacks an internal skeleton or backbone such as insects, butterflies, and aquatic species like snails.

inviolate sanctuary: A place of refuge or protection where animals and birds may not be hunted.

issue: Any unsettled matter that requires a management decision; for example, a Service initiative, opportunity, resource management problem, a threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition (The Fish and Wildlife Service Manual, 602 FW 1.5).

long-distance animal movement: The ability of a wildlife species to move greater distances in search of forage without fences.

lotic: Flowing water wetlands are associated with rivers, streams and drainage ways. These riparian wetlands contain a defined channel and floodplain.

management alternative: See *alternative*.

MFWP: Montana Department of Fish, Wildlife and Parks.

MIAG: Montana/Idaho Airshed Group.

migration: Regular extensive, seasonal movements of birds between their breeding regions and their wintering regions; to pass usually periodically from one region or climate to another for feeding or breeding.

migratory birds: Birds that follow a seasonal movement from their breeding grounds to their wintering grounds. Waterfowl, shorebirds, raptors, and songbirds are all migratory birds.

mission: Succinct statement of purpose or reason for being.

mitigation: Measure designed to counteract an environmental impact or to make an impact less severe.

mixed-grass prairie: A transition zone between the tallgrass prairie and the shortgrass prairie dominated by grasses of medium height that are approximately 2–4 feet tall. Soils are not as rich as the tallgrass prairie and moisture levels are less.

monitoring: The process of collecting information to track changes of selected parameters over time.

national wildlife refuge: A designated area of land, water, or an interest in land or water within the National Wildlife Refuge System, but does not include coordination areas; a complete listing of all units of the Refuge System is in the current “Annual Report of Lands Under Control of the U.S. Fish and Wildlife Service.”

National Wildlife Refuge System (Refuge System): Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife including species threatened with extinction, all lands, waters, and interests therein administered by the Secretary as wildlife refuges, areas for the protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, and waterfowl production areas.

National Wildlife Refuge System Improvement Act of 1997 (Improvement Act): Sets the mission and the administrative policy for all refuges in the National Wildlife Refuge System; defines a unifying mission for the Refuge System; establishes the legitimacy and appropriateness of the six priority public uses (hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation); establishes a formal process for determining appropriateness and compatibility; establishes the responsibilities of the Secretary of the Interior for managing and protecting the Refuge System; requires a comprehensive conservation plan for each refuge by the year 2012. This act amended parts of the Refuge Rec-

reation Act and National Wildlife Refuge System Administration Act of 1966.

native species: A species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

neotropical migrant: A bird species that breeds north of the United States and Mexican border and winters primarily south of this border.

nest success: The percentage of nests that successfully hatch one or more eggs of the total number of nests initiated in an area.

nongovernmental organization: Any group that is not a Federal, State, tribal, county, city, town, local, or other governmental entity.

noxious weed, also invasive plant: Any living stage (including seeds and reproductive parts) of a parasitic or other plant of a kind that is of foreign origin (new to or not widely prevalent in the United States) and can directly or indirectly injure crops, other useful plants, livestock, poultry, other interests of agriculture including irrigation, navigation, fish and wildlife resources, or public health. According to the Federal Noxious Weed Act (Public Law 93–639), a noxious weed (such as invasive plant) is one that causes disease or has adverse effects on humans or the human environment and, therefore, is detrimental to the agriculture and commerce of the United States and to public health.

NRCS: Natural Resources Conservation Service of the U.S. Department of Agriculture.

NWR: National wildlife refuge.

objective: An objective is a concise target statement of what will be achieved, how much will be achieved, when and where it will be achieved, and who is responsible for the work; derived from goals and provide the basis for determining management strategies. Objectives should be attainable and time-specific and should be stated quantitatively to the extent possible. If objectives cannot be stated quantitatively, they may be stated qualitatively (The Fish and Wildlife Service Manual, 602 FW 1.5).

patch: An area distinct from that around it; an area distinguished from its surroundings by environmental conditions.

patch burning: The use of prescribed fire each year in a different location or patch within a larger unfenced landscape. With an ecology-driven purpose, patch burning has high potential to increase biodiversity and wildlife habitat. This management practice creates a mosaic of heavily grazed and lightly grazed areas that provide a diverse vegetative structure and increase diversity in the same grazing unit.

perennial: Lasting or active through the year or through many years; a plant species that has a lifespan of more than 2 years.

plant community: An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site such as soil, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community, such as ponderosa pine or bunchgrass.

preferred alternative: The Service's final selection (after analysis of alternatives in a draft National Environmental Policy Act document) of a management alternative to carry out, which is documented in a "record of decision" for an EIS or a "finding of no significant impact" for an environmental assessment and published in the Federal Register. The decision is based on the legal responsibility of the Service including the missions of the Service and the Refuge System, other legal and policy mandates, the purpose of the refuge, and the vision and goals in the final CCP. In addition, the Service considers public, tribal, and agency input along with land uses in the ecosystem, environmental effects, and budget projections.

prescribed fire: A wildland fire originating from a planned ignition to meet specific objectives identified in a written, approved, prescribed fire plan for which National Environmental Policy Act requirements (where applicable) have been met before ignition. These objectives could be hazardous fuel reduction, habitat- or wildlife-oriented, or other objectives in the prescribed fire burn plan.

prescriptive grazing: The planned application of livestock grazing at a specified season, duration and intensity to accomplish specific vegetation management objectives. The objectives are designed to achieve the broader habitat and wildlife goals.

priority public use: One of six uses authorized by the National Wildlife Refuge System Improvement Act of 1997 to have priority if found to be compatible with a refuge's purposes. This includes hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation.

proposed action: The alternative proposed to best achieve the purpose, vision, and goals of a refuge (contributes to the Refuge System mission, addresses the significant issues, and is consistent with principles of sound fish and wildlife management).

public: Individuals, organizations, and groups; officials of Federal, State, and local government agencies; Native American tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have shown an interest in Service issues and those who do or do not realize that Service decisions may affect them.

public domain: Lands that were not under private or State ownership during the 18th and 19th centuries in the United States, as the country was expanding. These lands were obtained from the 13 colonies, Native American tribes, or purchases from other counties. The domain was controlled by the Federal Government and sold to States or private interests through the General Land Office, which would eventually become the Bureau of Land Management.

public involvement: A process that offers affected and interested individuals and organizations an opportunity to become informed about, and to express their opinions on, Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management.

purpose of the refuge: The purpose of a refuge is specified in or derived from the law, proclamation, Executive order, agreement, public land order, donation document, or administrative memorandum establishing authorization or expanding a refuge, a refuge unit, or a refuge subunit (The Fish and Wildlife Service Manual, 602 FW 1.5).

pyric herbivory: Grazing promoted through fire. The fire-grazing interaction is critical in maintaining heterogeneity (dissimilar species resulting in variety) of grassland ecosystems.

quality wildlife-dependent recreation: Programs are based on 11 criteria that defined under 605 FW1, "General Guidelines for Wildlife-Dependent Recreation." Quality programs include the following: safety of participants and compliance with laws and regulations; minimized conflicts with other goals or users; accessibility, stewardship, and availability to a broad spectrum of the American people; public understanding and appreciation of the natural resources; reliable and reasonable opportunities to experience wildlife; accessible facilities that blend in with the natural setting; and visitor satisfaction to help define and evaluate programs.

raptor: A carnivorous bird such as a hawk, a falcon, or a vulture that feeds wholly or chiefly on meat taken by hunting or on carrion (dead carcasses).

R.S. 2477: Revised Statute 2477. Section 2477 of the Revised Statutes emerged from section 8 of the Mining Act of 1866, which provided rights-of-way for the construction of highways over public lands, not reserved for public uses. It was repealed on October 21, 1976, under the Federal Land Policy and Management Act.

refuge purpose: *See purpose of the refuge.*

Refuge System: *See National Wildlife Refuge System.*

refuge use: Any activity on a refuge, except administrative or law enforcement activity, carried out

by or under the direction of an authorized Service employee.

resident species: A species inhabiting a given locality throughout the year; nonmigratory species.

resilience: The ability to absorb disturbances, to be changed and then to reorganize and still have the same identity (keep the same basic structure and ways of functioning).

rest: Free from biological, mechanical, or chemical manipulation, in reference to refuge lands.

restoration: Management emphasis designed to move ecosystems to desired conditions and processes, such as healthy upland habitats and aquatic systems.

Riparian and Wetland Research Program: A program through the University of Montana's Department of Forestry that the Service contracted with in 1999–2000 to look at water quality on the refuge.

riparian area or riparian zone: An area or habitat that is transitional from terrestrial to aquatic ecosystems including streams, lakes, wet areas, and adjacent plant communities and their associated soils that have free water at or near the surface; an area whose components are directly or indirectly attributed to the influence of water; of or relating to a river; specifically applied to ecology, "riparian" describes the land immediately adjoining and directly influenced by streams. For example, riparian vegetation includes all plant life growing on the land adjoining a stream and directly influenced by the stream.

RLGIS: Refuge land geographic information system.

scoping: The process of obtaining information from the public for input into the planning process.

seasonally flooded: Surface water is present for extended periods in the growing season, but is absent by the end of the season in most years.

sediment: Material deposited by water, wind, and glaciers.

sentinel plant species: Plant species that vanish first when the ecological processes that occur within an ecosystem are out of balance (refer to appendix G).

Service: See *U.S. Fish and Wildlife Service*.

shorebird: Any of a suborder (Charadrii) of birds such as a plover or a snipe that frequent the seashore or mudflats.

spatial: Relating to or having the character of space.

special status species: Plants or animals that have been identified through Federal law, State law, or agency policy as requiring special protection of monitoring. Examples include federally listed endangered, threatened, proposed, or candidate species; State-listed endangered, threatened, candidate, or monitor species; Service's species of management concern; or species identified by the Partners in Flight Program as being of extreme or moderately high conservation concern.

special use permit: A permit for special authorization from the refuge manager required for any refuge service, facility, privilege, or product of the soil provided at refuge expense and not usually available to the public through authorizations in Title 50 CFR or other public regulations (Refuge Manual, 5 RM 17.6).

species of concern: Those plant and animal species, while not falling under the definition of special status species, that are of management interest by virtue of being Federal trust species such as migratory birds, important game species, or significant keystone species; species that have documented or apparent populations declines, small or restricted populations, or dependence on restricted or vulnerable habitats.

stepdown management plan: A plan that provides the details necessary to carry out management strategies identified in the comprehensive conservation plan (Fish and Wildlife Service Manual, 602 FW 1.5).

strategy: A specific action, tool, or technique or combination of actions, tools, and techniques used to meet unit objectives (The Fish and Wildlife Service Manual, 602 FW 1.5).

suppression: All the work of extinguishing a fire or confining fire spread.

target species: A species selected, because of specific biological or social reasons, for management and monitoring. A target species could be a focal, endangered, big game, or other species.

TEA-21: 1998 Transportation Equity Act for the 21st Century.

TES: Threatened and endangered species.

threatened species, Federal: Species listed under the Endangered Species Act of 1973, as amended, that are likely to become endangered within the foreseeable future throughout all or a significant part of their range.

threatened species, State: A plant or animal species likely to become endangered in a particular State within the near future if factors contributing to population decline or habitat degradation or loss continue.

travel corridor: A landscape feature that facilitates the biologically effective transport of animals between larger patches of habitat dedicated to conservation functions. Such corridors may facilitate several kinds of traffic including frequent foraging movement, seasonal migration, or the once in a lifetime dispersal of juvenile animals. These are transition habitats and need not contain all the habitat elements required for long-term survival or reproduction of its migrants.

trust resource: See *Federal trust resource*.

trust species: See *Federal trust species*.

ungulate: A hoofed mammal such as horses, cattle, deer, pronghorn, and bighorn sheep.

USACE: See *U.S. Army Corps of Engineers*.

U.S. Army Corps of Engineers (USACE): The Federal agency whose mission is to provide vital public engineering services in peace and war to strengthen the Nation's security, energize the economy, and reduce risks from disasters.

U.S.C.: United States Code.

USDA: U.S. Department of Agriculture.

U.S. Fish and Wildlife Service (Service, USFWS, FWS):

The principal Federal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people. The Service manages the 93-million-acre National Wildlife Refuge System comprised of more than 530 national wildlife refuges and thousands of waterfowl production areas. It also runs 65 national fish hatcheries and 78 ecological service field stations, the agency enforces Federal wildlife laws, manages migratory bird populations, restores national significant fisheries, conserves and restores wildlife habitat such as wetlands, administers the Endangered Species Act, and helps foreign Governments with their conservation efforts. It also oversees the Federal aid program that distributes millions of dollars in excise taxes on fishing and hunting equipment to State wildlife agencies.

USFS: USDA Forest Service.

USFWS: See *U.S. Fish and Wildlife Service*.

U.S. Geological Survey (USGS): A Federal agency whose mission is to provide reliable scientific information to describe and understand the earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

USGS: See *U.S. Geological Survey*.

viability: Ability to survive and developing adequately. For a plant, the ability to survive and bear fruits or seeds without being fenced.

vision statement: A concise statement of the desired future condition of the planning unit, based primarily on the Refuge System mission, specific refuge purposes, and other relevant mandates (The Fish and Wildlife Service Manual, 602 FW 1.5).

visual obstruction: Pertaining to the density of a plant community; the height of vegetation that blocks the view of predators and conspecifics to a nest.

waterfowl: A category of birds that includes ducks, geese, and swans.

watershed: The region draining into a river, a river system, or a body of water.

wetland management district: Land that the Refuge System acquires with Federal Duck Stamp money for restoration and management primarily as prairie wetland habitat critical to waterfowl and other wetland birds.

WG: Wage grade schedule (pay rate schedule for certain Federal positions).

wild bison: In Montana, wild buffalo are defined as buffalo or bison that have not been reduced to captivity per Montana Code Ann. §87-2-101(16). Bison that are free roaming and held in public trust are classified as a game species in Montana. The State of Montana's legal classification of bison changes based on whether they are found on commercial farms or in private conservation herds or whether they are found in the wild.

wildfire: An unplanned ignition of a wildland fire (such as a fire caused by lightning, volcanoes, and unauthorized and accidental human causes) and any escaped prescribed fire.

wildland fire: Any nonstructure fire that occurs in the wildland including wildfire and prescribed fire.

wildland-urban interface: The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland and vegetative fuel.

wilderness review: The process used to identify and recommend for congressional designation Refuge System lands and waters that merit inclusion in the National Wilderness Preservation System. It is a required element of a CCP and includes three phases: inventory, study, and recommendation.

wilderness, also designated wilderness: An area designated in legislation and administered as part of the National Wilderness Preservation System.

wilderness, proposed: An area of the Refuge System that the Secretary of the Interior has recommended to the President for inclusion in the National Wilderness Preservation System.

wilderness, recommended: An area of the Refuge System that the Director of the Service has recommended to the Secretary of the Interior, through the Assistant Secretary for Fish and Wildlife and Parks, for inclusion in the National Wilderness Preservation System.

wilderness study area (WSA): An area the Service is considering for wilderness designation, which has been identified and established through the inventory component of a wilderness review.

wildlife-dependent recreational use: Use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, environmental education, or interpretation. The National Wildlife Refuge System Improvement Act of 1997 specifies that these are the six priority public uses of the Refuge System.

woodland: Open stands of trees with crowns not usually touching, generally forming 25-60 percent cover.

WSA: Wilderness study area.

Appendix A

Record of Decision

Record of Decision for the Final Comprehensive Conservation Plan and Environmental Impact Statement

*Charles M. Russell National Wildlife Refuge
UL Bend National Wildlife Refuge*

July 2012

INTRODUCTION

This record of decision provides the basis for management decisions for the final comprehensive conservation plan and environmental impact statement for Charles M. Russell National Wildlife Refuge and UL Bend National Wildlife Refuge (together, “the refuge”), Montana. We, the Fish and Wildlife Service (Service) manage these two national wildlife refuges as part of the National Wildlife Refuge System. UL Bend National Wildlife Refuge lies within Charles M. Russell National Wildlife Refuge; these two units are managed cohesively as one refuge. Unless otherwise specified in this record of decision, they are referred to as Charles M. Russell National Wildlife Refuge. As part of the National Wildlife Refuge System, the Charles M. Russell National Wildlife Refuge is managed for wildlife conservation above all else.

The comprehensive conservation plan (CCP) was prepared along with an environmental impact statement (EIS) in compliance with the National Environmental Policy Act and relevant planning policies. We published a notice of availability for the final CCP and EIS in the Federal Register on May 7, 2012 (FR 77 (88):26781–84).

In preparing the final CCP and EIS, we worked closely with several cooperating agencies and partners including: the U.S. Army Corps of Engineers; Bureau of Land Management; Montana Department of Fish, Wildlife, and Parks; Montana Department of Natural Resources; counties of Fergus, Petroleum, Garfield, McCone, Valley, and Phillips; and Missouri River Conservation Districts council (for the six districts that surround the refuge). Other tribal governments, Federal, State and local agencies, non-governmental organizations, and individuals contributed input to the plan.

REFUGE BACKGROUND

The planning area is located in Fergus, Petroleum, Garfield, McCone, Valley, and Phillips Counties in Montana. The refuge headquarters is in Lewistown, Montana. Encompassing nearly 1.1 million acres, Charles M. Russell National Wildlife Refuge is one of the largest refuges in the lower 48 States. It extends west about 125 air miles along the Missouri River from Fort Peck Dam to the refuge’s western edge at the boundary of the Upper Missouri River Breaks National Monument.

Refuge habitat includes native prairie, forested coulees, river bottoms, and badlands. Wildlife is as diverse as the topography and includes Rocky Mountain elk, mule deer, white-tailed deer, pronghorn, Rocky Mountain bighorn sheep, sharp-tailed grouse, prairie dogs, endangered black-footed ferrets, and over 236 species of birds.

More than 250,000 visitors take part in a variety of wildlife-dependent recreational activities every year. In particular, the refuge is renowned for its outstanding hunting opportunities. Other visitors enjoy viewing and photographing wildlife along the refuge’s extensive network of roads. The Fort Peck Interpretive Center showcases many exhibits. Still others enjoy fishing along the Missouri River.

PURPOSE AND NEED FOR THE PLAN

The purpose of this final CCP and EIS is to identify actions necessary to accomplish the purposes of both refuges, identify the role the refuges will play in support of the mission of the National Wildlife Refuge System, and to provide long-term guidance for management of refuge programs and activities.

The CCP is needed:

- to communicate with the public and other partners in efforts to carry out the mission of the National Wildlife Refuge System;
- to provide a clear statement of direction for management of the refuge;
- to provide neighbors, visitors, and government officials with an understanding of the Service's management actions on and around the refuge;
- to ensure the Service's management actions are consistent with the National Wildlife Refuge Improvement Act of 1997;
- to ensure that management of the refuge considers other Federal, State, and county plans;
- to provide a basis for development of budget requests for the operation, maintenance, and capital improvement needs of the refuge.

We are committed to sustaining the Nation's fish and wildlife resources through the combined efforts of governments, businesses, and private citizens.

NATIONAL WILDLIFE REFUGE SYSTEM

Like all national wildlife refuges, Charles M. Russell and UL Bend National Wildlife Refuges are administered under the National Wildlife Refuge System.

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

REFUGE PURPOSES

Each national wildlife refuge is managed to fulfill the mission of the National Wildlife Refuge System, as well as the specific purposes for which that refuge was established.

In 1936, Charles M. Russell National Wildlife Refuge was established by Executive Order 7509 for the following purpose:

"That the natural forage resources therein shall be first utilized for the purpose of sustaining in a healthy condition a maximum of four hundred thousand (400,000) sharp-tailed grouse, and one thousand five hundred (1,500) antelope, the primary species, and such nonpredatory secondary species in such numbers as may be necessary to maintain a balanced wildlife population, but in no case shall the consumption of the forage by the combined population of the wildlife species be allowed to increase the burden of the range dedicated to the primary species: Provided further, That all the forage resources within

this range or preserve shall be available, except as herein otherwise provided with respect to wildlife, for domestic livestock...And provided further, That land within the exterior limits of the area herein described...may be utilized for public grazing purposes only to the extent as may be determined by the said Secretary (Agriculture) to be compatible with the utilization of said lands for the purposes for which they were acquired."

UL Bend National Wildlife Refuge was established in 1969 "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (16 U.S.C. 715d, Migratory Bird Conservation Act).

Other lands within both refuges subsequently have been acquired under a variety of transfer and acquisition authorities or have different designations including designated and proposed wilderness, giving both refuges more than one purpose.

VISION

At the beginning of the planning process, we developed a vision for the refuge that describes the focus of refuge management and portrays a picture of the refuge in 15 years:

Charles M. Russell National Wildlife Refuge's expansive badlands, cottonwood river bottoms, old-growth forested coulees, sagebrush steppes, and mixed-grass prairies appear out of the sea that is the northern Great Plains.

Encompassing more than a million acres, the refuge affords visitors solitude, serenity, and unique opportunities to experience natural settings and wildlife similar to what Native Americans and, later, Lewis and Clark observed. The diversity of plant and animal communities found on the refuge stretch from the high prairie through the rugged breaks, along the Missouri River, and across Fort Peck Reservoir. The refuge is an outstanding example of a functioning, resilient, and intact landscape in an ever-changing West.

Working together with our neighbors and partners, the Service employs adaptive management rooted in science to protect and improve the biological integrity, biological diversity, and environmental health of the refuge's wildlife and habitat resources.

MANAGEMENT GOALS

We developed eight goals for the refuge based on the National Wildlife Refuge Improvement Act of 1997

and the refuge purposes, and we refined these goals as the planning process progressed. The goals direct work toward achieving the vision and purposes of the refuge and outline approaches for managing refuge resources.

HABITAT CONSERVATION

Conserve, restore, and improve the biological integrity, environmental health, and ecological diversity of the refuge's plant and animal communities of the Missouri river Breaks and surrounding prairies to support healthy populations of native populations of native plants and wildlife in a changing climate. Working with others, reduce and control the spread of nondesirable, nonnative, invasive plant and aquatic species for the benefit of native communities on and off the refuge.

THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN

Contribute to the identification, preservation, and recovery of threatened and endangered species and species of concern that occur or have historically occurred in the northern Great Plains.

RESEARCH AND SCIENCE

Advance the understanding of natural resources, ecological processes, and the effectiveness of management actions in a changing climate in the northern Great Plains through compatible scientific investigations, monitoring, and applied research.

FIRE MANAGEMENT

Manage wildland fire using a management response that promotes fire's natural role in shaping the landscape while protecting values at risk.

PUBLIC USE AND EDUCATION

Provide all visitors quality education, recreation, and outreach opportunities that are appropriate and compatible with the purpose and goals of the refuge and the mission of the National Wildlife Refuge System while maintaining the remote and primitive experience unique to the refuge.

WILDERNESS

Conserve, improve, and promote the wilderness character and associated natural processes of designated and proposed wilderness areas and wilderness study areas within the refuge for all generations.

CULTURAL AND PALEONTOLOGICAL RESOURCES

Identify, value, and preserve the significant paleontological and cultural resources of the refuge to connect refuge staff, visitors, and the community to the area's prehistoric and historic past.

REFUGE OPERATIONS AND PARTNERSHIPS

Through effective communication and innovative use of technology and resources, the refuge uses funding, personnel, partnerships, and volunteer programs for the benefit of natural resources while recognizing the social and economic connection of the refuge to adjacent communities.

SIGNIFICANT ISSUES

In the EIS, we disclosed the effects of four management alternatives that were developed to address significant issues, which were derived from the scoping process. The significant issues in the final CCP and EIS include:

- habitat and wildlife
- water resources
- public use and access
- wilderness
- socioeconomics
- partnerships and collaboration
- cultural values, traditions, and resources

DECISION (Alternative D)

We select to implement Alternative D—Ecological Processes Emphasis. This alternative is selected for management because it will enable the Service to use natural, dynamic, ecological processes and management activities in a balanced responsible manner to restore and maintain the biological diversity, biological integrity, and environmental health of the Charles M. Russell National Wildlife Refuge and the UL Bend National Wildlife Refuge. Once natural processes are restored, a more passive approach (less human assistance) will be favored. There will be quality wildlife-dependent public uses and experiences. Economic uses will be limited when they are injurious to ecological processes.

Alternative D addresses the significant management issues raised during the planning process. This alternative best meets the purposes of the refuges,

the mission of the National Wildlife Refuge System, and the vision and management goals set for the refuge while adhering to the management policies of the Service. Additionally, this alternative balances the interests and perspectives of many agencies, organizations, tribes, and the public.

Alternative D was revised from the proposed action in the draft CCP and EIS after our consideration of many comments received from agencies, tribes, other stakeholder organizations, and the public, many of whom supported this approach, during the comment period.

The key actions of alternative D follow:

- We will apply management practices that mimic and restore natural processes on the refuge to manage for a diversity of plant species and wildlife species in uplands, riparian areas, and river bottoms. This will involve a concerted manipulation of habitats or wildlife populations (using prescribed fire, grazing, hunting, and other tools) through coordinated objectives. Management will evolve toward more passive approaches that allow natural processes such as fire, grazing, and flooding to occur with less human aid or money.
- We will maintain plant diversity and health using fire in combination with wild ungulate herbivory or prescriptive livestock grazing, or both, to ensure the viability of populations of sentinel plants (those plant species that decline first when management practices are injurious). Prescriptive livestock grazing will be implemented across 50–75 percent of the refuge within 6–9 years. We will communicate with permittees as new habitat management plans are developed.
- In collaboration with the Montana Department of Fish, Wildlife and Parks and others, we will maintain the health and diversity of all species' populations—including focal birds, migratory birds, threatened and endangered species, species of concern, game species, and nongame species—by restoring and maintaining balanced, self-sustaining populations. This could include manipulating livestock grazing and wildlife numbers, or both, if habitat monitoring determined conditions were declining or plant species were being affected by overuse. Predators will be managed to benefit the ecological integrity of the refuge. Limited hunting for mountain lion or other furbearers or predators will be considered only after monitoring verified that population levels could be sustained with a hunt.
- If the State of Montana moves forward with a plan to restore wild bison in Montana, we will cooperate with Montana Department of Fish, Wildlife and Parks; Montana Department of Natural Resources and Conservation; conservation organizations; and others to conduct the necessary biological, social, and economic research to determine the feasibility of restoration for wild bison on the surrounding landscape. Before any wild bison reintroduction could proceed, we would work with others to complete a cooperative wild bison management plan developed and agreed-on by all involved parties. A wild bison plan would address population objectives and management, movement of animals outside restoration areas, genetic conservation and management, disease management, and conflict-resolution procedures.
- We will cooperate with Montana Department of Fish, Wildlife and Parks to provide hunting experiences that keep game levels that meet or exceed State objectives, sustain ecological health, and provide opportunities not found on other public lands. We will develop cooperative programs with Montana Department of Fish, Wildlife and Parks for monitoring big game populations and habitat. During development of habitat management plans, we will establish population levels, sex and age composition targets, and harvest strategies that are jointly agreed to and tailored to the varied habitat potential on the refuge. To provide a variety of quality recreational opportunities, hunting regulations will include population objectives with diverse male age structures not generally managed for on other public lands.
- Refuge access will be managed primarily to benefit natural processes, but some improvements will be made to provide quality visitor experiences. Initially, we will close about 21 miles of roads, implement a seasonal closure along 2.4 miles of road 315 (Petroleum County), and designate 13 miles of roads on the northeast side of the refuge as game retrieval roads where seasonal closures will be applied. Other closures or modifications could be necessary after further review of the road program. This will encourage free movement of wildlife, permit prescribed fire or wild-fire suppression, and increase effective harvest of wild ungulates. Additionally, we will consider (1) upgrading about 5 miles of roads to all-weather access (gravel) to allow for additional winter fishing access, and (2) adding trails, viewing blinds, and a science interpretive center to expand opportunities for quality wildlife observation, interpretation, and environmental education.
- We will expand or adjust existing proposed wilderness units by 19,942 acres in Alkali Creek, Antelope Creek, Crooked Creek, East Seven Blackfoot, Mickey Butte, Sheep Creek, Wagon Coulee, and West Hell Creek. UL Bend Wilderness Area will remain protected.

OTHER ALTERNATIVES CONSIDERED

The final CCP and EIS evaluated two other action alternatives and the no-action alternative.

ALTERNATIVE A: NO ACTION

Few changes would occur in the management of existing wildlife populations and habitat. Wildlife-dependent public uses and economic uses would continue at current levels. Key actions of alternative A follow:

- There would be a continued emphasis on big game management, annual livestock grazing, use of fencing for pastures, invasive species control, and water development. Habitat would continue to be managed in the 65 habitat units that the Bureau of Land Management established for livestock grazing purposes. Prescriptive grazing would be implemented gradually as units became available and habitat evaluations were completed (anticipated to be 50-percent implemented by year 15).
- Big game would be managed to achieve target levels as described in a 1986 record of decision on an earlier environmental impact statement for resource management.
- Select stock ponds would be maintained and rehabilitated. Riparian habitat would be restored where possible, and standard watershed management practices would be enforced.
- Access would be allowed on 670 miles of refuge roads.
- About 155,288 acres of proposed wilderness within 15 units of the Charles M. Russell Refuge would be managed in accordance with Service policy. UL Bend Wilderness Area would be protected.

Alternative A was not selected for implementation, because it would not meet the goals of the CCP for habitat and wildlife management. The continuation of existing management objectives and strategies would not restore biological integrity, environmental health, or ecological diversity (a primary element in the vision for the refuge) nor would it enable the refuge to manage wildlife and habitat in a comprehensive manner as was intended by the National Wildlife Refuge Improvement Act of 1997. There would be continued emphasis on managing wildlife habitats within the confines of the 65 habitat units that were originally established for domestic grazing purposes and not for wildlife. This alternative would only partially satisfy the goals for threatened and endangered species and species of concern, research and science, fire management, public use

and education, wilderness, and refuge operations and partnerships.

Although alternative A would continue the transition toward implementing prescriptive fire and grazing strategies, it would largely maintain the current management emphasis of fire suppression and annual livestock grazing. The Great Plains evolved through a complex interaction of fire and grazing, and the continued emphasis on constant grazing and fire suppression across the uplands would greatly limit the composition, structure, and function of vegetation, resulting in the continued loss of plant diversity and habitat function. Although the gradual transition toward implementing prescriptive grazing over annual grazing has resulted in some minor benefits in localized areas across the refuge, these benefits have not resulted in a recovery of sentinel plants and may be offset by increases in native ungulates.

There would be few specific strategies undertaken to restore riparian areas and wetlands outside of what is currently done (keeping livestock away from riparian areas where possible and limited invasive species control). The continued transition toward implementing prescriptive grazing would result in minor incremental benefits to the overall health of riparian areas; however, localized sites would continue to experience a negative trend. Similarly, the continued use of water impoundments under this alternative would result in minor long-term impacts to riparian areas.

Alternative A would meet basic elements of the threatened, endangered, and species of concern goal. However, it would only maintain or continue existing efforts toward recovery or monitoring of special status species with limited efforts made at increasing protection efforts for special status species. Similarly, existing research programs would continue but would not increase.

There would not be a designated staff member to support public use and education. There would continue to be limited environmental education opportunities and few improvements for nonconsumptive, wildlife-dependent users.

Alternative A would maintain the status quo for wilderness protection but would not improve or promote these qualities on the refuge. This alternative would satisfy the goal for cultural and paleontological resource protection. We would continue to work with many partnership organizations; however, there would not be a volunteer program or the ability to increase conservation strategies across the landscape.

Some stakeholder agencies, organizations, and the public expressed support for all or elements of alternative A, primarily because it would maintain the emphasis on annual livestock grazing, wildland fire suppression, stock pond management, and inte-

rior fencing. Many oppose road closures, increases in wilderness protection, potential bison restoration, species reintroductions, and an increase in predators on the refuge. However, many stakeholders and the public did not support a continuation of existing management on the refuge and were emphatic about the need to manage the refuge for wildlife purposes.

ALTERNATIVE B: WILDLIFE POPULATION EMPHASIS

We would manage the landscape, in cooperation with our partners, to emphasize the abundance of wildlife populations using balanced natural ecological processes such as fire and herbivory by wild ungulates and responsible farming practices and tree planting. Wildlife-dependent public use would be encouraged, and economic uses would be limited when they compete for habitat resources.

We would actively manipulate habitat, thus creating a diverse plant community of highly productive wildlife food and cover. The management emphasis would be on habitat for target wildlife species, including focal bird species, in separate parts of the refuge. We would consolidate the 65 habitat units and write new habitat management plans based on field station boundaries and habitat evaluation for target species. We would work with others to develop methods to monitor and evaluate target or focal species and habitat needs. Prescriptive grazing would be implemented across 50–75 percent of the refuge within 4–7 years.

We would close about 106 miles of roads and would work with partners to develop a travel management plan and to secure access to the refuge through other lands.

We would expand or adjust by 25,869 acres the existing proposed wilderness units: Alkali Creek, Antelope Creek, Crooked Creek, East Seven Blackfoot, Mickey Butte, Sheep Creek, Wagon Coulee, West Beauchamp Creek, and West Hell Creek.

Alternative B was not selected for implementation. The overall effects on habitat quality, biological integrity, and ecological resilience (health) would vary geographically based on the target and focal species and the management tools that were used. This management approach would improve habitat conditions and habitat function, although maximizing wildlife populations would not necessarily improve biological diversity, biological integrity, or environmental health across the refuge. For example, potential increases in elk populations or invasive species could offset benefits in riparian areas, depending on livestock management and the interactions between wild and domestic ungulates and riparian habitat. Maximizing big game populations would likely necessitate further reductions in live-

stock grazing to reduce competition and to provide adequate forage and space for native ungulates without adversely affecting habitat quality and conditions for other wildlife species.

The closing of 106 miles of roads would have many benefits for wildlife security as well as for those hunters who desire more roadless hunting opportunities, but it could also limit harvest effectiveness in some locations or have other unintended consequences on access.

Alternative B would add one outdoor recreation planner, which would enable the refuge to improve visitor services over current conditions, but it would still be limited and would not increase wildlife-dependent public uses or environmental education programs to any degree. Visitation would likely remain stagnant over 15 years.

A large number of stakeholder organizations and the public expressed support for alternative B, primarily because of its emphasis on maximizing wildlife populations, increasing wilderness protection, and closing of 106 miles of roads. However, many local citizens and agencies oppose any road closures and many of the objectives and strategies in alternative B.

ALTERNATIVE C: PUBLIC USE AND ECONOMIC USE EMPHASIS

We would manage the landscape in cooperation with our partners to emphasize and promote the maximum, compatible, wildlife-dependent public use and economic uses while protecting wildlife populations and habitats to the extent possible. Damaging effects on wildlife habitats would be minimized by using a variety of management tools to enhance and diversify public and economic opportunities.

Alternative C was not selected for implementation; while it would enable us to take some steps toward improving existing conditions, it would only minimize damaging effects in other localized areas. It would not restore biological integrity, environmental health, or ecological diversity. Furthermore, this alternative would not advance the understanding of ecological processes or promote fire's natural role. With increased staff levels for outdoor recreation planners, the refuge could provide more visitors educational, interpretive, and recreational opportunities, although the emphasis would be on moderate increases in visitor numbers and not necessarily an emphasis on providing quality experiences.

As with alternative A, alternative C would maintain the status quo for wilderness protection, but it would not promote additional wilderness protection. Therefore, this alternative would not fully satisfy the goal for wilderness.

Alternative C would fully satisfy the goals for cultural and paleontological resources and an increase in partnerships across the landscape.

Some stakeholder agency or organizations and the public expressed support for some elements of alternative C but, overall, it was not widely supported by agencies, organizations, or the public. Many organizations and stakeholders felt it went too far in providing for economic uses, in spite of the fact that all public and economic uses are subject to compatibility requirements.

TRIBAL INVOLVEMENT AND CONSULTATION

At the start of the planning process in 2007, we sent notification letters including an invitation to participate on the CCP planning team to the following tribes: Arapahoe Business Council, Chippewa Cree Tribe, Crow Tribal Council, Fort Belknap Tribal Council, Fort Peck Tribal Council, and Northern Cheyenne Tribe. In early July 2009, we reached out to several of the closest tribes to the refuge—Fort Peck Tribes and Fort Belknap Tribes—and made arrangements to initiate government-to-government consultation (July 8–9, 2009). Subsequently, we advised the Fort Peck Tribes and the Fort Belknap Tribes on the important aspects of the plan. During the comment period for the draft CCP and EIS, a representative from the Fort Peck Tribes attended a public hearing held in Glasgow, Montana (October 2010), and we also received comments from the Fort Peck Tribes on the draft CCP and EIS.

On June 5–6, 2012, we continued our government-to-government consultation process with the Fort Peck Tribes and the Fort Belknap Tribes for briefing the tribes about important aspects of the final CCP and EIS.

PUBLIC INVOLVEMENT AND OUTREACH

The formal scoping period began on December 4, 2007, with the publication of a notice of intent in the Federal Register (FR72 (232):68174–76). Before this and early in the preplanning phase, we outlined a process that would be inclusive of diverse stakeholder interests and would involve a range of activities for keeping the public informed and ensuring meaningful public input. This process was summarized in a planning update titled Public Involvement Summary (October 2007). Soon after, we created a project Web site,

and six additional planning updates and other project information have been added to the Web site. We have mailed all planning updates to the project mailing list.

During the initial scoping period, we received nearly 24,000 written responses. Hundreds of people attended seven public meetings across Montana and provided many verbal comments.

In the fall of 2008, we again reached out to the public and the cooperating agencies and sought additional input on four potential draft alternatives before fully developing and analyzing these alternatives. We held seven additional public meetings during this time and received hundreds of additional written and oral responses.

COMMENTS ON THE DRAFT PLAN AND EIS

A notice of availability for the draft CCP and EIS was published in the Federal Register on September 7, 2010 (FR75 (172): 54381–84) announcing the availability of the draft CCP and draft EIS, our intention to hold public meetings, and a request for comments. We published another notice in the Federal Register on November 1, 2010 (FR75 (210):67095), extending the comment period by 24 days to December 10, 2010. We held seven public meetings on the draft CCP and EIS. During the subsequent comment period, we received 20,600 letters, emails, or verbal comments. All substantive issues raised in the comments were addressed in volume 2 of the final CCP and EIS.

COMMENTS ON THE FINAL PLAN AND EIS

The notice of availability for the final CCP and EIS was published in the Federal Register on May 7, 2012 (FR77 (88): 26781–84). Subsequently, the Environmental Protection Agency published on May 18, 2012, its list of the environmental impact statements filed the previous week, and the 30-day waiting period ended on June 18, 2012.

We received one letter from the Environmental Protection Agency and one individual comment about the changes made to the final CCP and EIS and about the responses to comments.

SUMMARY OF COMMENTS

In general, we received support for the changes that were made in the final CCP and EIS. The only new concern raised was whether alternative B was the environmentally preferred alternative, which we discuss below.

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

The environmentally preferable alternative is defined as the “alternative that will promote the national environmental policy as expressed in section 101 of the National Environmental Policy Act. Typically, this means the alternative that causes the least damage to the biological and physical environment. It also means the alternative that best protects, preserves and enhances historic, cultural and natural resources” (Forty Most Asked Questions Concerning Council of Environmental Quality’s National Environmental Policy Act Regulations, 1981). We believe Alternative D—Ecological Processes Emphasis is the environmentally preferable alternative.

The primary focus of alternative D is to restore and maintain the biological diversity, biological integrity, and environmental health of the refuge. This alternative will promote ecological resilience, restore pyric herbivory, promote animal movement with long periods of abandonment, increase landscape species and structure heterogeneity, and improve wildlife diversity. This will be accomplished by (1) writing new habitat management plans including inventory and monitoring plans based on soil characteristics, historical fire occurrence, and hunting district boundaries; and (2) monitoring the focal bird species found on the uplands, river bottoms, riparian areas, and wetlands of the refuge. There will be increased efforts to reduce invasive species and restore degraded riparian areas. We will increase wilderness protection on 19,942 acres, initially close 21 miles of roads, and seasonally close 15 miles of roads if needed to protect wildlife. We will work with others to restore or establish new populations of species like Rocky Mountain bighorn sheep.

Alternative B shares many similar, if not identical, strategies as alternative D for improving habitat for wildlife populations. Nonetheless, there are several key differences in management approaches. Alternative D emphasizes the importance of building diverse and healthy habitats, which in turn should provide for diverse and abundant wildlife populations, whereas, under alternative B, we would target key wildlife species together with maximizing an abundance of wildlife.

Some aspects of alternative B could be considered to be more environmentally preferable than under alternative D. For example, more roads would be closed (106 miles versus 21 miles in alternative D), and more acres of wilderness would be protected (25,869 acres versus 19,942 acres in alternative D). Alternative B would also implement prescriptive

grazing in a faster timeframe (4–7 years versus 6–9 years in alternative D); therefore, riparian areas could be restored at a slightly more aggressive rate (85 percent of the streams versus 75 percent in alternative D). However, with some exceptions, most of the roads found on the refuge are two-track roads that are lightly used, most often during hunting season. Therefore, closing roads may not equate to substantially less impact. Many areas of the refuge are inaccessible during the winter months or prolonged wet periods. None of the more heavily used roads (all-season gravel) would be closed under any of the action alternatives. By taking a slower approach to closing roads as identified under alternative D, we believe it will enable the refuge to achieve many of the same objectives as in alternative B for protecting habitat and wildlife. We will begin by developing a step-down transportation plan that includes monitoring boat use on the river, increasing wildlife security, and addressing future access needs. If future road closures are necessary, either through permanent or seasonal closures, we will have better information to make those determinations.

Conversely, we believe the magnitude of negative effects has the potential to be greater under alternative B than under alternative D. Maximizing wildlife populations in alternative B would not necessarily increase biological diversity, integrity, and environmental health nor would it increase the resiliency of the refuge due to climate change, drought, and invasive species. Although careful management of wild ungulates under alternative B should benefit habitat conditions overall if the objectives and strategies were implemented successfully, it could also result in minor to moderate negative effects due to overgrazing by all ungulates. Closing roads could have negative effects, particularly in riparian areas, if harvest objectives were not met. The attraction of wild ungulates to these areas could add to any negative effects that have occurred in the past. Overbrowsing by all ungulates, both domestic livestock and wild ungulates, has been found to negate efforts to restore riparian and wetland health on the refuge. In addition, the planting of nonnative monoculture crops to restore the river bottoms in alternative B could reduce the plant diversity in some areas in the river bottoms, limiting or reducing the availability of diverse habitats for some wildlife species.

MEASURES TO MINIMIZE ENVIRONMENTAL HARM

Throughout the planning process, we took into account all practical measures to avoid or minimize environmental impacts that could result from the implementation of alternative D. These measures include the following:

- To reduce the refuge’s carbon footprint (carbon emissions), we will use strategies such as driving fuel-efficient vehicles, considering more road closures, upgrading offices to make them more energy-efficient, conducting more teleconferences, and recycling.
- We will minimize emissions and particulates by following the best management practices when using motorized equipment and conducting restoration activities. Reducing fuel buildup and restoring a more natural fire regime will reduce the risk of larger wildfires.
- Successful revegetation in the river bottoms and restoration of closed roads will reduce the effects of invasive species.
- Prescribed fire will be carried out under an approved fire plan and stringent smoke management plans. We will consider the application and timing of prescribed fire to reduce wildlife mortality, particularly during breeding seasons. Limiting the use of prescribed fire during drought conditions and using ignition techniques that lessen the intensity of the burn (small spot fires) will reduce soil erosion following fires.
- We will reduce potential negative effects on water quality by limiting the amount of bare soil using soil erosion barriers, limiting the use of herbicides, hardening popular public use areas, and implementing a prescriptive fire and grazing program.
- Careful planning in locating and building visitor facilities or road improvements will minimize disturbances to wildlife, particularly during critical breeding periods. Undertaking further studies to fully assess the effects of boating and fishing along the Missouri River will enable us to find ways to work with partners to reduce disturbances to threatened and endangered species and species of concern including many bird species.
- Moving toward a greater reliance on prescriptive grazing will enable us to fully assess the effects on plants by all ungulates. Soil erosion and impacts to water quality will be lessened with lighter grazing levels, limiting livestock grazing during the hot season, and fencing livestock out of riparian areas. The plan will incorporate the following measures: (1) controlling the numbers of domestic and wild ungulates; (2) using fire to move ungulates to other areas; (3) making reductions in livestock grazing; (4) expanding boundary fencing; (5) removing fencing, and (6) managing water structures. These actions will also benefit other species of concern including greater sage-grouse and Sprague’s pipit.
- Permittees for paleontological excavations will be required to reclaim areas.
- Mitigation measures for cultural resources will be addressed with the State Historic Preservation Office if required as a result of an undertaking.

CONSULTATION REQUIREMENTS: SECTION 7 OF THE ENDANGERED SPECIES ACT

Several wildlife species with populations or habitat on the refuge are listed as threatened or endangered species under the Endangered Species Act or are candidate species being considered for listing. These species were documented through an intra-Service section 7 consultation. Three endangered species—black-footed ferret, least tern, and pallid sturgeon—and the threatened piping plover are found on the refuge. Two species, the endangered whooping crane and the threatened grizzly bear, are not found on the refuge but have been found nearby: (1) whooping cranes migrate through McCone, Valley, and Phillips Counties; and (2) several grizzly bears found on the east side of the Rocky Mountain Front have ventured toward the Missouri River corridor. Candidate species are greater sage-grouse and Sprague’s pipit. The intra-Service consultation concluded that the preferred alternative (D) may affect but is not likely to adversely affect any protected species. Similarly, the preferred alternative may affect but is not likely to jeopardize candidate or proposed species or critical habitat for greater sage-grouse or Sprague’s pipit.

SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT

Activities outlined in alternative D have the potential to negatively affect cultural resources, either by direct disturbance during construction of habitat projects and facilities related to public use or administrative operations or indirectly by exposing cultural and historic artifacts during management activities such as habitat restoration or prescribed burning. Before any undertaking that is subject to section 106 of the National Historic Preservation Act, activities that could negatively affect cultural resources will be identified. Options for minimizing negative effects will be discussed before implementation of the preferred alternative including entering into consultation with the State Historic Preservation Officer and other parties as appropriate. We will protect all known gravesites.

PROTECTION OF RIPARIAN AREAS AND WETLANDS

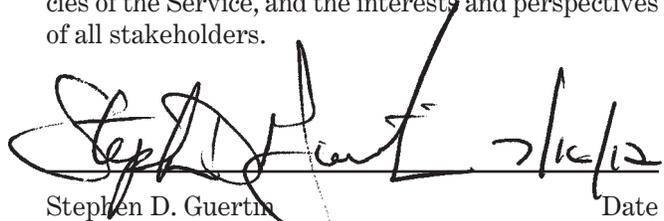
Many of the refuge’s streams and riparian areas have seen improvements in overall health and function since 1995, when the University of Montana’s

Riparian and Wetland Research Program evaluated riparian areas. However, not all riparian areas have improved equally, and problems remain. Activities outlined in alternative D are aimed at restoring several riparian areas and wetlands that were identified as nonfunctioning or functioning at risk during the most recent study completed by Ecological Solutions Group in 2009. Restoration measures will vary depending on the conditions and trends of riparian habitat. Most management actions identified in the preferred alternative (D) will provide many benefits and improvements to degraded riparian areas: establishing stream gauges on the refuge; restoring eroded streambanks; planting vegetation; fencing riparian areas; reducing livestock grazing or wild ungulate grazing in these areas; reducing invasive species; and restoring the function of streams that were once perennial. When water right issues for the refuge have been fully adjudicated (outside the scope of this record of decision) and the stock ponds provide no other wildlife benefit, we will eliminate stock ponds that are negatively affecting riparian areas downstream and are reducing the flow regime. We will incorporate applicable regulatory compliance such as wetland permitting and dam safety into any stock pond removal efforts.

FINDING AND BASIS FOR DECISION

I have considered the environmental and relevant concerns presented by agencies, tribes, organizations, and individuals on the proposed action to develop and implement a comprehensive conservation plan for Charles M. Russell National Wildlife Refuge and UL Bend National Wildlife Refuge. The substantive issues and comments raised have been addressed in the final CCP and EIS. Comments and responses on the final CCP and EIS are addressed above.

Based on the above information, I have selected alternative D for implementation, because it achieves a reasonable balance between significant resource management issues, the refuge purposes, National Wildlife Refuge System mission, management policies of the Service, and the interests and perspectives of all stakeholders.



The image shows a handwritten signature in black ink, which appears to read "Stephen D. Guertin". To the right of the signature, the date "7/16/12" is written in the same ink.

Stephen D. Guertin
Regional Director, Region 6
U.S. Fish and Wildlife Service
Lakewood, Colorado

Date

Appendix B

List of Preparers and Contributors

This document is the result of the extensive, collaborative, and enthusiastic efforts by the members of the planning team, cooperating agencies, and other Service or agency contributors listed below.

U.S. FISH and WILDLIFE SERVICE STAFF on the PLANNING TEAM

<i>Name</i>	<i>Agency, position, and location</i>	<i>Education and experience</i>	<i>Contribution</i>
Laurie Shannon	U.S. Fish and Wildlife Service (USFWS) region 6 planning team leader; Lakewood, Colorado	B.S. recreation resources management; 27 years	Project coordination, organization, writing and review
Barron Crawford	Charles M. Russell Refuge project leader until 2010; Lewistown, Montana	B.S. and M.S. wildlife and fisheries science; 18 years	Project oversight, writing and review
Rick Potts	Charles M. Russell Refuge project leader from 2010; Lewistown, Montana	B.S. animal science, M.S. animal nutrition and wildlife management; 33 years	Project oversight and review
Bill Berg	Charles M. Russell Refuge deputy project leader; Lewistown, Montana	B.S. wildlife management and zoology; 29 years	Writing, review, and oversight
Trina Brennan	Charles M. Russell Refuge wildlife refuge specialist; Lewistown, Montana	B.S. fisheries and wildlife management; 5 years	Help with project coordination, organization and writing
Matt Derosier	Charles M. Russell Refuge, Sand Creek Field Station manager; Lewistown, Montana	B.S. wildlife management; 21 years	Writing and review
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Danielle Kepford	Charles M. Russell Refuge realty specialist; Lewistown, Montana	B.S. wildlife and fisheries sciences; 10 years	Realty and land acquisition review

U.S. FISH and WILDLIFE SERVICE STAFF on the PLANNING TEAM

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Bob Skinner	Charles M. Russell Refuge habitat biologist; Lewistown, Montana	B.S. zoology, M.S. wildlife management, Ph.D. wildlife management; 30 years	Writing and review

COOPERATING AGENCY MEMBERS

<i>Name</i>	<i>Agency, position, and location</i>	<i>Education and experience</i>	<i>Contribution*</i>
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Gary Benes	BLM district manager; Central Montana; Lewistown, Montana	B.A. geography and history, B.S. natural resource conservation	Planning team member
John Daggett	USACE operations project manager; Fort Peck, Montana	B.S. civil engineering; 20 years at Fort Peck	Planning team member
Lee Iverson	Petroleum County commissioner; Winnett, Montana	B.S. animal husbandry; 12 years	Planning team member
Vicki Marquis	Missouri River Conservation District Council coordinator; Great Falls, Montana	B.A. chemistry; 5 years on council	Planning team member
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Clive Rooney	DNRC, Northeastern Land Office, area manager; Lewistown, Montana	B.A. business administration; 20 years	Planning team member
Tom Stivers	MFWP wildlife biologist; Lewistown, Montana	B.S. wildlife biology, M.S. fish and wildlife management; 30 years	Planning team member
Mark Sullivan	MFWP region 6 wildlife program manager; Glasgow, Montana	B.S. biology, M.S. fish and wildlife management; 20 years	Planning team member

*Primary representative of respective agency at meetings; participated on planning team; helped identify issues; provided input on alternatives, objectives, and strategies; reviewed planning documents; and provided information as requested.

**Replaced Rick Strohmeyer.

OTHER SERVICE or AGENCY CONTRIBUTORS

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Shannon Heath	USFWS region 6 outdoor recreation planner; Helena, Montana	Help with developing public use objectives and overview of visitor services
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Meg Van Ness	USFWS region 6 archaeologist; Lakewood, Colorado	Help with cultural resources objectives

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<i>Name</i>	<i>Agency and position</i>	<i>Contribution</i>
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Jessica Clement	Colorado State University; Fort Collins, Colorado	Help in facilitation of public use objectives workshop
George Fekaris	Federal Highways Administration, Western Lands Office; Vancouver, Washington	Help with transportation planning
Lynne Koontz, Ph.D.	USGS Fort Collins Science Center economist; Fort Collins, Colorado	Analysis of socioeconomic impacts
Mimi Mather	Shapins–Belt Collins planner; Boulder, Colorado	Facilitation of planning team and public meetings; help with document preparation

OTHER CONSULTANTS

<i>Name</i>	<i>Agency and position</i>	<i>Contribution</i>
Bill Mangle	ERO Resources natural resources planner; Denver, Colorado	Help with analysis and research for reasonably foreseeable activities and cumulative impacts, and other environmental analysis documentation
Natalie Sexton	USGS Fort Collins Science Center wildlife biologist (human dimensions); Fort Collins, Colorado	Facilitation and help with public use objectives and analysis of socioeconomic impacts
Rick Schroeder	USGS Fort Collins Science Center biologist (retired); Fort Collins, Colorado	Help with vision and goals; provided input on writing biological objectives

Many other individuals also provided invaluable help with the preparation of this CCP. The Service acknowledges the efforts of the following individuals and groups toward the completion of this plan. The diversity, talent, and knowledge contributed and dramatically improved the vision and completeness of this document.

- Mark Albers, BLM field manager; Malta, Montana
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- Brian Haugen, Charles M. Russell Refuge; Lewistown, Montana
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- Jody Jones, Charles M. Russell Refuge; Lewistown, Montana
- Bob King, Charles M. Russell Refuge; Lewistown, Montana
- Chris King, Petroleum County commissioner; Winnett, Montana
- Gerry Majerus, BLM; Lewistown, Montana
- Paul Pallas, Charles M. Russell Refuge; Lewistown, Montana
- Margaret Raper, BLM field manager; Miles City, Montana
- John Ritten, Ph.D., University of Wyoming professor; Laramie, Wyoming (helped USGS with the socioeconomic analysis)
- Carl Seilstad, Fergus County commissioner; Lewistown, Montana
- David Taylor, Ph.D., University of Wyoming professor; Laramie, Wyoming (helped USGS with the socioeconomic analysis)
- Dale Tribby, BLM; Miles City, Montana

Appendix C

Public Involvement Summary

Following the guidance found in the National Environmental Policy Act, the Improvement Act, and the Service's planning policy, the planning team has made sure all that all interested groups and the public have had an opportunity to be involved in the planning process. The term "stakeholder" is commonly used to refer to individual citizens; organizations; businesses; Native American tribes; Federal, State, and local governmental agencies; and others who have expressed an interest in the issues and outcomes of the planning process.

C.1 PUBLIC SCOPING ACTIVITIES

The formal scoping period began on December 4, 2007, with the publication of a notice of intent in the Federal Register (FR 23467). The notice of intent notified the public of the Service's intent to begin the CCP and EIS process and solicited public comments.

OUTREACH ACTIVITIES

Early in the pre-planning phase and before publication of the notice of intent in the Federal Register, the Service outlined a process inclusive of diverse stakeholder interests and involving a range of activities for keeping the public informed and ensure meaningful public input. This process was summarized in a planning update titled Public Involvement Summary (FWS 2007a) and posted to the project Web site. The full report, titled "Charles M. Russell National Wildlife Refuge Public Involvement Process," was included as an appendix to the scoping report (FWS 2008b), which was posted on the project Web site. Throughout scoping, the planning team used various methods to solicit guidance and feedback from interested groups and the public. These methods included a variety of outreach materials, public meetings, cooperating agency meetings, briefings and presentations, as well as personal conversations, letters, email and telephone calls.

Planning Updates

A planning update (issue 1, January 2008) (FWS 2007a) was mailed to the initial mailing list of 625 people and businesses before the first round of public meetings. The planning update, together with the earlier Planning Involvement Summary (FWS 2007a),



Refuge staff talk about refuge management with the public.

outlined the planning process, draft vision and goals for the CCP, and dates, times and locations of the public scoping meetings. Refuge staff handed out the updates at various local agency meetings. The planning update distribution list consisted of individuals, agencies, and organizations who had previously expressed an interest in refuge activities. Following the close of the public comment period for scoping, Planning Update, Issue 2, May 2008 (FWS 2007a) was mailed and posted to the planning Web site. This update summarized the comments and key findings from scoping.

News Release

A news release announcing the planning process and notifying the public of the schedule and location of the public meetings was sent to nearly 270 media organizations throughout Montana including congressional offices, other Federal and State agency offices, and tribal agencies. Several news articles featured the planning process in newspapers, radio, TV, and online publications before the meetings. The Service distributed a second news release when one of the meetings (Bozeman) had to be rescheduled due to inclement weather.

Paid Advertisements

The Service placed paid advertisements in nine newspapers to publicize the project and invite the public to the scoping meetings. The advertisements, 3.75x6 inches, were placed in the Billings Gazette (January 24), Bozeman Daily Chronicle (January 24), Great Falls Tribune (January 24), Circle Banner (January 17), Glasgow Courier, Glendive Ranger Review (January 17), Jordan Tribune (January 25), Lewiston News-Argus (January 16), and Phillips County News (January 16).

Project Web Site

The Service established a project Web site <www.fws.gov/cmrr/planning> in January 2008 (FWS 2007a). From the Web site, interested groups and the public could learn about meetings, download documents, get their name added to the project mailing list, and provide comments.

Public Scoping Meetings

Approximately 210 people attended one of seven public scoping meetings across Montana from January 29–February 21, 2008 in Great Falls, Fort Peck, Malta, Lewistown, Jordan, Billings, and Bozeman. The planning team listened to many ideas and concerns that were expressed and answered questions from a variety of interested groups and the public. The initial comment period was scheduled to end on February 4, 2008, but was extended to February 29, 2008.

Following a brief welcome and introduction, Service staff made a 15-minute presentation that outlined the following points:

- description of the Service and the purpose of the Refuge System
- key points of the legislation establishing the Charles M. Russell and UL Bend Refuges
- CCP and EIS process
- project schedule

The remainder of the meeting was broken up into two components: (1) a question and answer session; and (2) an opportunity for participants to make official public comments.

SCOPING SUMMARY and UPDATE

During the comment period for scoping, the Service received 23,867 (FWS 2008b) written responses in the form of letters, emails, or from the handout sheet provided at the public meeting. Twenty-three organizations submitted comments.

Following the comment period, the planning team prepared a scoping report summarizing the scoping phase. Copies of the report were provided to the cooperating agencies and posted to the project Web site. The comments were placed into a spreadsheet and included in the scoping report. Additionally, the team summarized the key activities in a second planning update (issue 2, January 2008) (FWS 2007a), which was mailed out to the entire mailing list and posted to the project Web site.

The comments were consolidated into seven significant topics of concern with several subtopics. The seven primary topics are habitat and wildlife, public uses and access wilderness, socioeconomic issues, water resources, adjacent lands and partnerships and cultural values, traditions, and resources. These are addressed in more detail in chapter 1.

C.2 COOPERATING AGENCIES and TRIBAL COORDINATION

In accordance with the Service's planning policy (FWS 2000c), the pre-planning and scoping process began with formal notification to Native American tribes and other Federal and State agencies with a land management interest and inviting them to participate as cooperating agencies and members of the planning team.

NATIVE AMERICAN TRIBES

The Service sent letters of notification about the planning process including an invitation to participate on the planning team to the following tribes: Arapahoe Business Council, Chippewa Cree Tribe, Crow Tribal Council, Fort Belknap Tribal Council, Fort Peck Tribal Council, and Northern Cheyenne Tribe. In July 2009, the Service reached out again to several of the closest tribes to the refuge, Fort Peck and Fort Belknap and made arrangements for a formal briefing and consultation (July 8–9, 2009).

FEDERAL, STATE, and LOCAL AGENCIES

In addition to notifying the tribes, the Service sent letters about the planning process including an invitation to participate on the planning team to the following agencies: USACE, BLM, MFWP, and DNRC. The Service sent notification letters to the Montana State Historic Preservation Office and to the six counties (Fergus, Garfield, McCone, Petroleum, Phillips, and Valley). In September 2007, Service staff met with representatives from the conservation districts and the counties to inform them of the CCP and EIS process and discuss the project.

As a result, the Service received formal letters requesting cooperating agency status from the six counties, the Garfield County Conservation District, and the Missouri River Conservation District Council. The Service granted the six counties cooperating agency status. Two representatives attended planning team meetings on behalf of all the counties. Additionally, the Service granted the six conservation districts that surround the refuge cooperating agency status, allowing for one representative to attend meetings on behalf of all the conservation districts.

In summary, the cooperating agencies included USACE, BLM, MFWP, DNRC, Fergus, Garfield, McCone, Petroleum, Phillips, and Valley Counties, and the Missouri River Conservation Districts. A memorandum of understanding was signed by all the agencies, and the signed document was posted to the planning Web site (FWS 2007a).

C.3 PLANNING TEAM MEETINGS

In November 2007, the planning team met with the Federal and State agencies. Following the addition of the counties and Missouri River Conservation Districts as cooperating agencies, in April 2008 the entire planning team met twice. The first meeting occurred April 15 for bringing all the cooperating agencies together, as several agencies had been added since the first meeting in the fall of 2007. Key topics included developing of the Memorandum of Understanding, discussion of the Scoping Report, the upcoming alternatives development workshop, and a preliminary discussion about alternative scenarios.

A second meeting occurred when the refuge staff met for a 3-day alternatives workshop, which included representation from most of the cooperating agencies involved in the project. At this workshop preliminary alternative concepts were further developed. Some agency representatives chose instead to take part in a 2-day briefing held June 17–18, 2008, to discuss the concepts that had been further refined and to go out onto the refuge to discuss specific issues. For this meeting, the Service mailed all of the cooperating agencies a copy of the revised draft alternatives table before the meeting. The cooperating agencies offered substantial input and feedback on the initial draft alternatives during the June briefing including written comments that were submitted by McCone County. The Service incorporated many of those comments and concerns before publishing the entire alternatives chart for the public on the Web site in early August.

In early January and February 2009, the planning team met twice to develop preliminary objectives and strategies for all the alternatives. In May of 2009, the Service held another planning team meeting, which included all the county commissioners for the purposes of discussing roads and the accuracy of the data the Service had acquired to date.

The Service provided the cooperating agencies with copies of the internal review document in April 2010. Following a 5-week review period, the Service met with the cooperating agencies in June 2010 to discuss the significant issues identified during their review. Before release of the public draft, the Service met again with the cooperating agencies to advise them of any significant changes to the document.

ALTERNATIVES DEVELOPMENT

The Service considers alternatives development as part of an iterative process in the development of the draft CCP and EIS (FWS 2000c). This phase of the

project began in spring 2008, and public input ended in late fall 2008. Following input by the cooperating agencies and the public on the draft alternatives, detailed objectives and strategies for all the alternatives were developed in early 2009 with input by the cooperating agencies.

OUTREACH ACTIVITIES

In August 2008, the planning team presented four draft alternatives to the public including a no-action alternative. One alternative (D) was identified as the proposed action. The Service's planning policy (FWS 2000c) requires that one alternative be identified as the proposed action in an environmental analysis document per the National Environmental Policy Act. It is the alternative that the Service believed best fulfills the refuge purpose, mission, vision, and goals of the National Wildlife Refuge System. At this stage, the alternatives were described as conceptual approaches or themes including the type of management actions that would occur under each approach. For a planning process such as for the Charles M. Russell and UL Bend Refuges, where an EIS is being prepared, the Service often solicits feedback on the draft alternatives before full development of them. While not required under the National Environmental Policy Act, this allowed the public an opportunity to provide input earlier into the alternatives process. It also gave the refuge staff a chance to talk about what they wanted to achieve.

Planning Updates

Planning Update, Issue 3, August 2008, was mailed or handed out in the refuge headquarters to over 720 persons and businesses during the comment period with most of the updates mailed the week of August 4, 2008 (FWS 2007a). This planning update outlined the initial draft alternatives developed by the planning team and provided the dates, times, and locations of the public workshops. The distribution list consisted of individuals, agencies, and organizations who had previously expressed an interest in refuge activities. In addition, the planning update was handed out at the meetings.

The Service followed up with another update (Planning Update, Issue 4, January 2009), which summarized what had been learned during the comment period. Both updates and a more detailed summary of comments were posted on the project Web site.

News Release

On August 18, 2008, the Service issued a news release notifying the public of the schedule and location of the public meetings to nearly 270 media organizations throughout Montana including congressional offices, other Federal and State agency offices, and

tribal agencies. Several news articles about the planning process appeared in newspapers, radio, TV, and online publications before the meetings.

Paid Advertisements

The Service placed paid advertisements in nine newspapers to announce the 2008 meetings. The advertisements, 3.75×6 inches, were placed in the Billings Gazette (August 21), Bozeman Daily Chronicle (August 21), Great Falls Tribune (August 18), Circle Banner (August 21), Glasgow Courier, Glendive Ranger Review (August 20–21), Jordan Tribune (August 20–21), Lewiston News–Argus (August 20), and Phillips County News (August 20).

Public Workshops

One hundred and eighty-eight people attended one or more of the seven workshops from September 2–17, 2008, in Lewistown, Jordan, Malta, Glasgow, Billings, Bozeman, and Great Falls.

Following a brief welcome and introduction, the project leader made a short presentation highlighting the following:

- project schedule
- mission of the National Wildlife Refuge System and purposes of the refuge
- process for alternatives development
- definitions of reasonable alternatives, alternative concepts, objectives and strategies, and definition of proposed action versus preferred alternative (not until end of project)
- overview of the alternatives
- common issues

Following the presentation, the planning team used the remainder of the meeting to solicit feedback on the alternatives. For the first four meetings (Lewistown, Glasgow, Malta, and Jordan) participants broke into small working groups and rotated every 20–25 minutes through a discussion specific to each alternative. During the second week of meetings, audiences were small (average 15–25 people), and the Service held the discussions as one group. For all meetings, refuge staff presented information about each of the alternatives, and participants were asked to provide feedback and ask questions.

The Service did not use a public hearing format for public testimony, as the intent of the workshop format was to facilitate smaller group discussions during this phase of the project. Many participants liked this format, but others raised concerns in their written comments about not having an opportunity to provide scoping comments in a legal hearing format. The Service appreciates any feedback including criticism about the format used for meetings. A hearing format was used for the meetings on the draft CCP and EIS. The Service has fully followed

the requirements set forth in the National Environmental Policy Act in addition to departmental and bureau policies during the scoping process.

Other Meetings with Individuals and Groups

When asked, refuge staff provided briefings and status updates to stakeholder groups including the Conservation Districts, the Wilderness Society, World Wildlife Fund, Ranchers Stewardship Alliance, Montana Association of State Grazing Districts, Kalispell Sportsmen group, Gallatin Wildlife Association, and others.

The Service held several seminars during the development of the draft CCP and EIS to provide information about the Service's plans to use prescribed fire and grazing to meet the objectives of the draft CCP. These seminars included presentations by Dr. Sam Fuhlendorf and Dr. Cecil Frost, who helped the Service in developing information for the analysis in the draft CCP and EIS. Many Federal, State, and local agencies, conservation organizations, and members of the public attended one or more of these sessions.

Other one-on-one discussions, briefings, and field trips occurred throughout the planning process. Service representatives engaged in many conversations with individuals that called or stopped by the refuge offices.

C.4 COMMENT PERIOD

The Service accepted comments from early August 2008 through October 31, 2008, but also informed the public that comments were welcome throughout the development and writing of the draft CCP and EIS until the formal comment period on the draft CCP and EIS ended. The Service established an ending date for comments on the draft alternatives to use the information learned to fully develop each alternative with detailed objectives and strategies that would form the basis of the environmental analysis. The Service received one written request from the Six County Fort Peck Road Group, a group formed earlier by the six counties next to the refuge, to extend the deadline for submitting comments on the draft alternatives. The Service denied the request and reiterated that comments were welcome past the October 31 deadline, but that the process needed to move forward, and sufficient time had been provided for review of the preliminary draft alternatives. The Service made all of its information available to the public in early August 2008, providing the public over 60 days to provide input. In addition, representatives of the cooperating agencies provided input into the alternatives concepts during several meetings held in April and June of 2008, and during the development

of objectives and strategies in early 2009. Members of the Six County Fort Peck Road Group (a group of county commissioners that address roads) were also given an opportunity to take part in a meeting that specifically addressed roads in May 2009.

METHODS for COMMENT COLLECTION and ANALYSIS

The Service's primary objective in providing the public an early opportunity to review the alternatives was to gather more input before writing the objectives and strategies and conducting the environmental analysis. The planning team made every effort to document all issues, questions, and concerns. Regardless of whether comments and questions were general in nature or about specific points of concern, they were identified.

All comments were considered to be of equal importance. While the planning team valued the comments made in support or opposition to a specific alternative or issue, the team also was seeking feedback on the range of alternatives, whether there were other reasonable alternatives that should be included in the analysis, and whether any of the alternatives should be changed in some way.

The comments, whether from written submissions or recorded at the public meetings, were organized by topic into a spreadsheet and coded for organizational purposes. Volume 2 of the final CCP and EIS contains the Service's summarization and response to public comments and testimony received during the public review of the draft CCP and EIS.

NUMBER and SOURCE of COMMENTS RECEIVED

During the course of the comment period, the planning team received hundreds of questions and comments during the seven public meetings held across Montana and nearly 300 written responses in the form of letters, emails, and from the handout sheet provided at the public meetings. Twenty-six agencies and organizations submitted comments; the breakdown of type and number of comments follows.

<i>Type of Comment</i>	<i>Number of Comments</i>
Public meetings	hundreds
Form letters	123
Individuals letters, emails, questionnaires	134
Agency, organizations (included two legal letters)	27

There were two distinct form-type letters. While similar in content, one was generated from the Gar-

field County Conservation District and sent to livestock owners and published in at least some of the local papers. Nine people submitted a second form-type letter and, while the affiliation is not known, most came from the Glasgow area. The key issues identified in both form letters follow:

- the importance of livestock grazing and general opposition to prescriptive grazing
- opposition to wildlife reintroduction
- opposition to removal of interior fences
- support for more water development in uplands and maintenance of current structures
- desire for access for recreation, fire suppression, and livestock management
- concern that Payment in Lieu of Tax payments are too low and do not represent fair market value
- desire for reevaluation of proposed wilderness units
- desire to keep wildlife on the refuge
- support for increased predator control
- concern that the refuge is the largest source of invasive plants
- desire for increased fire suppression and opposition to use of prescribed fire

An action alert by the Montana Wilderness Association generated many individual letters and emails containing the following key issues:

- support for alternative D
- support for reducing the 700-mile road network or limiting off-road travel
- support for wilderness values particularly the proposed wilderness units
- support for prescriptive grazing and restricting livestock grazing where needed to maintain wildlife habitat
- desire for removal of obsolete fencing and letting wildlife move more freely
- desire for a ban on hot-season grazing in the river bottoms and limiting livestock grazing in riparian areas

In addition, many other individuals and organizations voiced their concerns about other topics. Examples included concerns about boat access and types of boats, and hunting and general recreational access or the type of expertise the Service was using in the preparation of the CCP and EIS.

SUMMARY of COMMENTS

Commenters expressed highly varied opinions in support of or opposition to a range of topics including alternative preferences, habitat and wildlife management, prescriptive livestock grazing, wilderness, wildlife reintroductions, public access,

roads, commercial recreation, interior fencing, water development, and prescribed fire. A summary of the comments was posted on the project Web site, and another planning update (issue 4) was mailed to the mailing list (FWS 2007a).

Volume 2 of the final CCP and EIS contains detailed descriptions of the public comments and the associated responses provided by the Service.

C.5 CHANGES to the DRAFT ALTERNATIVES

From a review of all of the comments, no new significant topics or issues were identified that had not been identified during scoping (refer to chapter 1). All of the action alternatives were clarified or refined in some way as a result of the comments.

C.6 RELEASE of the DRAFT CCP and EIS

The draft CCP and EIS was released to the public for a 60-day review and comment period on September 7, 2010, following publication of a notice of availability in the Federal Register (75 FR 54381). A 60-day comment period for the document closed on November 16, 2010, and then was extended to December 10, 2010, following publication of a notice for extension in the Federal Register (75 FR 67095).

OUTREACH ACTIVITIES

A planning update (Issue 5, September 2010) was mailed to everyone on the project mailing list. The draft CCP and EIS was mailed to the entities listed in section C.10 below and to others who requested one. Before publishing the draft CCP and EIS, the Service mailed out a postcard to the mailing list asking recipients to identify their needs for reviewing the document (compact disc, full document, or executive summary). News releases, the project Web site, and paid newspaper advertising were also used to announce the availability of the document and the public hearing schedule.

The Service held public hearings in Montana in the following cities: Billings on September 28, 2010; Bozeman on September 29, 2010; Great Falls on September 30, 2010; Lewistown on October 12, 2010; Jordan on October 13, 2010; and Glasgow and Malta on October 14, 2010. The meetings were recorded by a court reporter and transcripts from those meetings are included in volume 2 of the final EIS and CCP. Three hundred twelve people attended the meetings with 39 at Billings, 51 at Bozeman, 37 at Great

Falls, 33 at Lewistown, 55 at Jordan, 51 at Glasgow, and 46 at Malta. The public hearings began with a short presentation by the project leader, followed by an opportunity for all who wished offer public testimony 3 minutes to speak. Comment sheets were available for anyone who preferred to submit comments in writing. On request, the Service briefed several agencies and stakeholder groups on the draft CCP and EIS.

COMMENTS on the DRAFT CCP and EIS

Throughout the comment period, the Service received more than 1,700 comments from 919 individual submittal documents (primarily emails, letters, and verbal comments during public meetings), 53 letters from Federal, State, or local government agencies and organizations, and 19,627 form letters. Refer to volume 2 of the final EIS and CCP for an indepth description of the comments and the Service responses.

C.7 SIGNIFICANT CHANGES to the FINAL CCP and EIS

The following discussion summarizes significant changes that were made in the process of developing the final CCP and EIS.

WILDERNESS

Several changes were made to the wilderness inventory and review (appendix F). The acreage for the new wilderness study areas (alternatives B and D) was modified slightly due to a mapping error in the draft CCP and EIS (640 acres within East Seven Blackfoot were previously mislabeled as State lands). Under alternative D, Mickey Butte (550 acres) was added (previously in alternative B only). As a result, 25,879 acres under alternative B and 19,942 acres under alternative D were identified in the final CCP and EIS. No areas were added in alternative C. In consideration of significant public comment on the proposed wilderness areas and a review of the Service's wilderness policy (FWS 2008c), the Service found that the wilderness characteristics of the 15 proposed wilderness areas have not declined in any measurable way since 1974 when they were originally proposed. There is not sufficient justification for recommending to Congress the removal of any of the existing proposed wilderness. As a result, this consideration was rejected for both alternatives C and D.

ACCESS ROADS

Several changes were made to alternative D, which included changing road 315 from closed to seasonally closed from its junction with road 838 to its end.

About 13 miles of roads on the north side will be designated as game retrieval roads. These include roads 440, 331, 332, and 333. These roads will be open for retrieval of game for about 4 hours per day during hunting season. This will provide for greater wildlife security and as a result will likely enhance elk harvest in these areas. It will also provide greater accessibility particularly for hunters with disabilities to be able to retrieve game.

WILDLIFE OBJECTIVES

In response to public and agency comments on the draft CCP and EIS, the big game objectives were adjusted to clarify that big game management on the refuge will meet or exceed the objectives in approved State conservation plans. In accordance with national policy striving to the extent practicable to achieve consistency with State management objectives and regulations, refuge-specific abundance and population composition objectives could be established through the HMPs and will be tailored to regional habitat conditions, productivity and other considerations. Those objectives will consider naturally functioning ecosystem processes, biological integrity, hunting opportunities and quality of recreational experiences.

Information on threatened and endangered species and species of concern was updated as a result of status changes of several species including northern gray wolf, Sprague's pipit, mountain plover, and northern leopard frog.

HABITAT OBJECTIVES and STRATEGIES

Several organizational changes were made to clarify how the Service will achieve its habitat-based goals and objectives on the refuge. The definition of and use of prescription grazing as a management tool was clarified and expanded, and more details were provided. The Service has been transitioning away from annual grazing in favor of a habitat-based or prescriptive component for nearly 20 years and this will continue. Alternatives B and D would carry out this transition more quickly to adhere to Service legal mandates and policies. The timeframe for moving toward implementing prescriptive grazing was moved from the objective level to the strategy level, which is more consistent with Service planning policy. The objectives identify the specific measurable objectives for enhancing the diversity, viability, and resiliency of plant species on the refuge.

FOCAL BIRD SPECIES

The Service added a discussion and several tables describing focal bird species and included a description in the glossary and in "Appendix G, List of Plant and Animal Species." Previously, potential bird species were identified. These bird species represent a

broader range of species with similar conservation needs and are often part of a larger landscape conservation effort (FWS 2011c; refer to "Bird Conservation" under section 1.4 in chapter 1). Greater connectivity between the focal bird species and the sentinel plant monitoring program was made, particularly in alternative D and to a lesser extent in alternative B. Focal birds were identified for each type of habitat: uplands, river bottoms, and riparian areas and wetlands. Focal birds were not identified for shoreline areas due to its highly dynamic nature.

RIPARIAN AREAS

The riparian area objectives were modified to better define the restoration goals and the measurements for achieving them within a 15-year timeframe based on emphasis of the alternative.

MINERALS

Several clarifications were made about mineral withdrawals on the refuge. The current mineral withdrawal applies to locatable minerals (diatremes or gems) and does not apply to leasable minerals (oil and gas). To date, no leasable minerals have been developed on the refuge. Currently, the Service is seeking an extension of the 20-year mineral withdrawal. Only Congress can designate a permanent withdrawal and the Service will seek this for protection of refuge habitat and wildlife values.

LAND ACQUISITION

Clarification was made that under all alternatives the Service would continue to acquire lands within its authorized boundary and in accordance with the Enhancement Act (refer to section 1.9 in chapter 1) based on a willing seller and buyer relationship.

LEGAL MANDATES

Additional clarification and information was provided on the passage of the Improvement Act, Service policies, other legal mandates, and the refuge's history.

WATER QUALITY and AIR MONITORING

Additional information and clarification were provided on water quality and air monitoring on the refuge. Other factual errors were corrected and updates were made where appropriate.

C.8 RELEASE of the FINAL CCP and EIS

The Service responded to all substantive comments that were received about the draft CCP and EIS.

The final CCP and EIS was released to the public on May 7, 2012, following publication of a notice of availability in the Federal Register (77 FR 26781). All interested groups and the public on the project mailing list (more than 800 names) received a copy of Planning Update, Issue 6, which summarized the contents of the final CCP and EIS.

COMMENTS on the FINAL CCP and EIS

The Service received two comments on the final CCP and EIS during the 30-day waiting period that ended June 18, 2012. These comments are addressed in the record of decision (appendix A).

C.9 RECORD of DECISION

The Regional Director for region 6 signed the record of decision on July 16, 2012 (appendix A), selecting alternative D of the final EIS to implement as the CCP.

C.10 LIST of ENTITIES RECEIVING the DRAFT and FINAL CCP and EIS

The following Federal and State agencies, along with nonprofit organizations, grazing or outfitting permittees, and other businesses received copies of the draft CCP and EIS and the final CCP and EIS.

FEDERAL ELECTED OFFICIALS

- U.S. House of Representatives, Montana Representative Dennis Rehberg
- U.S. Senate, Montana Senator Max Baucus
- U.S. Senate, Montana Senator Jon Tester

FEDERAL AGENCIES

- Bureau of Land Management: Field offices in Lewistown, Malta, and Miles City; Montana State Office in Billings
- Department of Agriculture, Natural Resource Conservation Service, Bozeman, Montana; Forest Service, Rocky Mountain Research Station, Ogden, Utah
- Environmental Protection Agency, Helena, Montana
- Federal Highways Administration, Western Lands Office, Vancouver, Washington
- U.S. Army Corps of Engineers, Fort Peck

- U.S. Fish and Wildlife Service: region 6 programs in Lakewood, Colorado; Invasive Strike Team in Great Falls, Montana; Ecological Services in Helena, Montana; region 9 in Washington, DC
- National Park Service, Lewis and Clark National Trail: Omaha, Nebraska; regional office in Lakewood, Colorado

TRIBES and TRIBAL ORGANIZATIONS

- Arapaho Business Council
- Assiniboine and Gros Ventre Tribes (Fort Belknap)
- Assiniboine and Sioux Tribes (Fort Peck)
- Chippewa Cree Tribe
- Northern Cheyenne Tribe
- Crow Tribe

MONTANA ELECTED OFFICIALS

- Governor Brian Schweitzer
- Representative Ed Butcher
- Representative Dave Kastin
- Representative Wayne Stahl
- Senator Jim Peterson
- Senator John Brenden
- Senator Johnathan Windy Boy

MONTANA STATE AGENCIES

- Department of Fish, Wildlife and Parks: director in Helena; region 4 in Great Falls; Lewistown Area Resource Office; region 6 in Glasgow; region 7 in Miles City; State Wildlife Grants in Great Falls
- Department of Natural Resources: director in Helena; Lewistown; Miles City
- Department of Transportation, Lewistown
- Montana Historical Society and Preservation Office
- Natural Heritage Program, Helena

COUNTY and LOCAL GOVERNMENTS and AGENCIES

- Fergus County Commissioners
- Garfield County Commissioners
- McCone County Commissioners
- Petroleum County Commissioners
- Phillip County Commissioners
- Valley County Commissioners
- Missouri River Council of Conservation Districts in Great Falls: Fergus County Conservation District, Garfield County Conservation District, McCone County Conservation District, Petroleum County Conservation District, Phillips County Conservation District, Valley County Conservation District

ORGANIZATIONS and EDUCATIONAL INSTITUTIONS

- American Bird Conservancy, The Plains, Virginia
- American Prairie Reserve, Bozeman, Montana
- Defenders of Wildlife, Bozeman, Montana, Missoula, Montana, Washington, DC
- Denver Museum of Nature and Science, Curator of Vertebrate Paleontology, Denver, Colorado
- Department of Natural Resource Ecology and Management, Iowa State University, Iowa
- Ducks Unlimited, Memphis, Tennessee
- Environmental Defense Center for Conservation Incentives, Boulder, Colorado
- Fort Peck Lake Association, Fort Peck, Montana
- Foundation for North American Wild Sheep, Cody, Wyoming
- Friends of the Missouri River Breaks, Lewistown, Montana
- Gallatin Wildlife Association, Bozeman, Montana
- Hellgate Hunters and Anglers, Missoula, Montana
- Izaak Conservation League, Gaithersburg, Maryland
- Maryland Ornithological Society, Ellicott City, Maryland
- Missouri River County, Wolf Point, Montana
- Montana Audubon, Helena, Montana
- Montana Farm Bureau, Bozeman, Montana
- Montana Mountain Bike Alliance, Bozeman, Montana
- Montana Petroleum Association, Helena, Montana
- Montana Trail Vehicle Riders Association, Great Falls, Montana
- Montana Trappers Association, Winnett, Montana
- Montana Wildlife Federation, Helena, Montana
- Montana Wilderness Association, Great Falls, Helena, Montana
- Montana Wildlands Association, Central and Eastern Association, Lewistown and Billings, Montana
- Mule Deer Foundation, Eastern, Bismarck, North Dakota
- Museum of the Rockies, Montana State University, Bozeman, Montana
- National Audubon Society: New York, Washington, DC
- National Trappers Association, New Martinsville, West Virginia
- National Wildlife Federation: Reston, Virginia; Northern Rockies Project Office in Missoula, Montana
- National Wildlife Refuge Association, Washington, DC
- Nature Conservancy, Matador Ranch, Dodson, Montana
- Our Montana, Inc., Billings, Montana
- Ranchers Stewardship Alliance, Malta, Montana
- Sierra Club, San Francisco, California
- The Wilderness Society, Bozeman, Washington, DC
- University of Montana, Missoula, Montana
- Upper Missouri Breaks Audubon, Great Falls, Montana
- U.S. Humane Society, Washington, DC
- Walleyes Unlimited of Montana, Big Sandy, Montana; Crooked Creek Chapter, Malta, Montana
- Western Watersheds Project, Inc., Mendon, Utah
- Wild Sheep Foundation, Montana Chapter
- Wildlife Conservation Society, Bozeman Montana
- World Wildlife Fund, Bozeman, Montana
- Yellowstone Buffalo Foundation, Bozeman, Montana
- Yellowstone Valley Audubon, Bozeman, Montana

PUBLIC LIBRARIES

- Colorado State University, Morgan Library, Fort Collins, Colorado
- Garfield County Library, Jordan Montana
- Glasgow Library, Glasgow, Montana
- Great Falls Public Library, Great Falls, Montana
- Lewistown Public Library, Lewistown, Montana
- McCone County Library, Circle, Montana
- Montana State University Libraries: Billings, Bozeman, Havre, Montana
- Phillips County Library, Malta, Montana
- Petroleum County Library, Winnett, Montana
- U.S. Fish and Wildlife Service, National Conservation Training Center Library, Shepherdstown, West Virginia

Appendix D

Compatibility Determinations

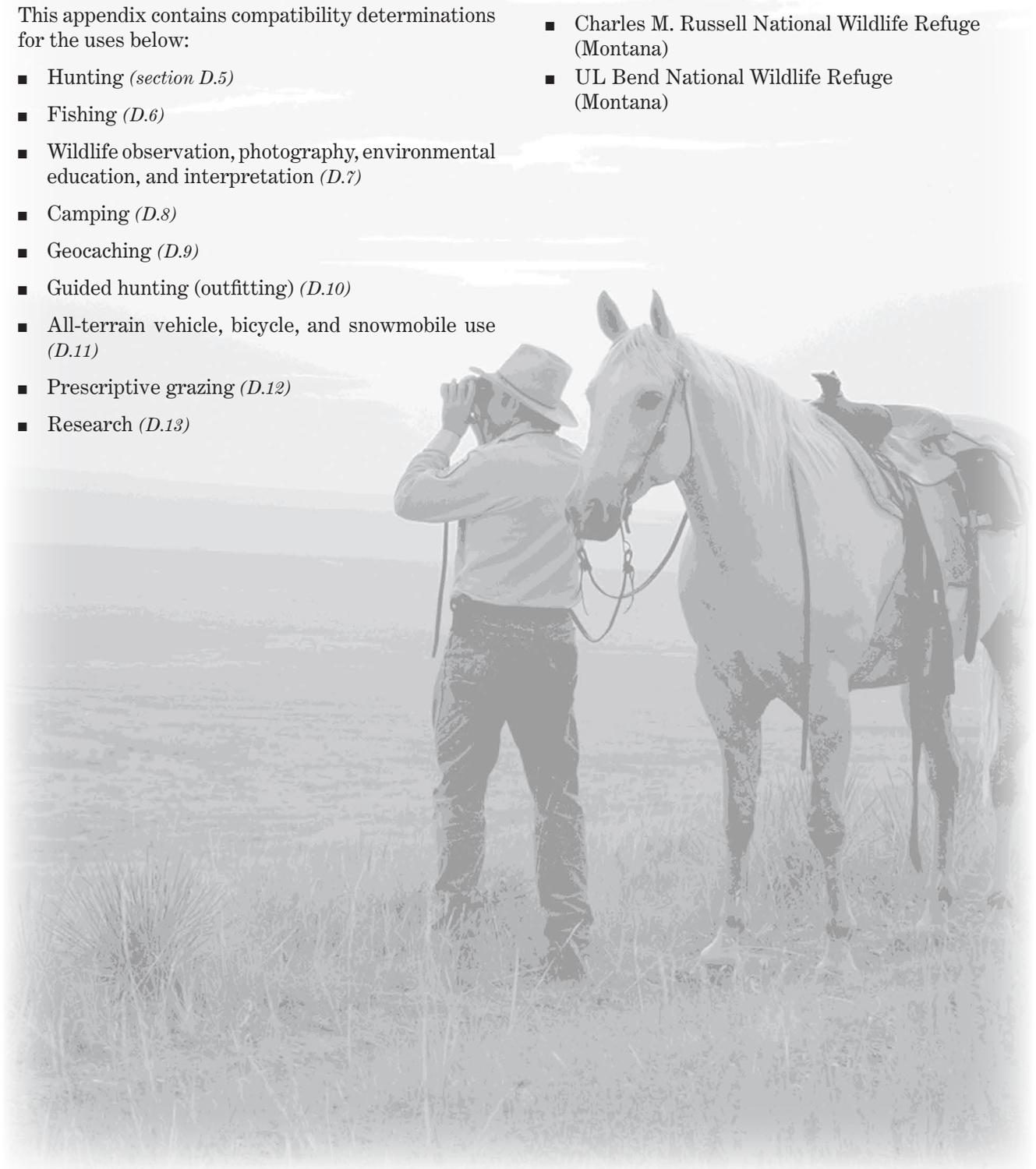
D.1 USES

This appendix contains compatibility determinations for the uses below:

- Hunting (*section D.5*)
- Fishing (*D.6*)
- Wildlife observation, photography, environmental education, and interpretation (*D.7*)
- Camping (*D.8*)
- Geocaching (*D.9*)
- Guided hunting (outfitting) (*D.10*)
- All-terrain vehicle, bicycle, and snowmobile use (*D.11*)
- Prescriptive grazing (*D.12*)
- Research (*D.13*)

D.2 REFUGE NAMES

- Charles M. Russell National Wildlife Refuge (Montana)
- UL Bend National Wildlife Refuge (Montana)



D.3 ESTABLISHING and ACQUISITION AUTHORITIES

The following laws and Executive order established the refuges and authorized acquisition of refuge lands.

CHARLES M. RUSSELL NATIONAL WILDLIFE REFUGE

- Executive Order 7509, dated December 11, 1936
- Refuge Recreation Act
- Bankhead-Jones Farm Tenant Act
- Migratory Bird Conservation Act of 1929

UL BEND NATIONAL WILDLIFE REFUGE

- Fish and Wildlife Coordination Act
- Migratory Bird Conservation Act
- Fish and Wildlife Act 1956
- Refuge Administration Act
- Wilderness Act legislation

D.4 REFUGE PURPOSES

Each refuge was established for specific purposes, as described below.

CHARLES M. RUSSELL NATIONAL WILDLIFE REFUGE

- “For the conservation and development of natural wildlife resources and for the protection and improvement of public grazing lands and natural forage resources: Provided, That nothing herein contained shall restrict prospecting, locating, developing, mining, entering, leasing, or patenting the mineral resources of the lands under the applicable laws: ... Provided, however, That the natural forage resources therein shall be first utilized for the purpose of sustaining in a healthy condition a maximum of four hundred thousand (400,000) sharp-tailed grouse, and one thousand five hundred (1,500) antelope, the primary species, and such nonpredatory secondary species in such numbers as may be necessary to maintain a balanced wildlife population but, in no case, shall the consumption of forage by the combined population of the wildlife species be allowed to increase the burden of the range dedicated to the primary species: Provided further, That all the forage resources within this range or preserve shall be available, except as herein provided with respect to wildlife, for domestic livestock.” (Executive Order 7509, dated December 11, 1936)

- “Shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon.” (16 U.S.C. 664, Fish and Wildlife Coordination Act)
- “Suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species” (16 U.S.C. 460k-1), “ the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors.” (16 U.S.C. 460k-2, Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)
- “Purposes of a land-conservation and land-utilization program.” (7 U.S.C. 1011, Bankhead-Jones Farm Tenant Act)
- “Particular value in carrying out the national migratory bird management program.” (16 U.S.C. 667b, An Act Authorizing the Transfer of Certain Real Property for Wildlife)
- “Conservation, management, and ... restoration of the fish, wildlife, and plant resources and their habitats ... for the benefit of present and future generations of Americans.” (16 U.S.C. 668dd [a] [2], National Wildlife Refuge System Administration Act)
- “For use as an inviolate sanctuary, or for any other management purpose, for migratory birds.” (16 U.S.C. 715d, Migratory Bird Conservation Act)

UL BEND NATIONAL WILDLIFE REFUGE

- “For use as an inviolate sanctuary, or for any other management purpose, for migratory birds.” (16 U.S.C. § 715d, Migratory Bird Conservation Act), “reserved for the UL Bend National Wildlife Refuge” (Public Land Order 4588, dated March 25, 1969), “for the protection of lands for migratory waterfowl management.” (Public Land Order 4826, dated May 15, 1970)
- “Shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon.” (16 U.S.C. § 664, Fish and Wildlife Coordination Act)
- “Particular value in carrying out the national migratory bird management program.” (16 U.S.C. § 667b, An Act Authorizing the Transfer of Certain Real Property for Wildlife)

- “For the development, advancement, management, conservation, and protection of fish and wildlife resources.” (16 U.S.C. § 742f [a] [4])
- “For the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude.” (16 U.S.C. § 742f [b] [1], Fish and Wildlife Act of 1956)
- “Conservation, management, and ... restoration of the fish, wildlife, and plant resources and their habitats ... for the benefit of present and future generations of Americans.” (16 U.S.C. § 668dd [a] [2], National Wildlife Refuge System Administration Act)
- “To secure for the American people of present and future generations the benefits of an enduring resource of wilderness ... wilderness areas ... shall be administered for the use and enjoyment of the American people in such manner as would

leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information about their use and enjoyment as wilderness.” (16 U.S.C. 1131, Wilderness Act)

NATIONAL WILDLIFE REFUGE SYSTEM MISSION

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

D.5 DESCRIPTION of USE:

Hunting

The Charles M. Russell National Wildlife Refuge hunting program allows for the take of elk, pronghorn, white-tailed deer and mule deer, waterfowl (ducks and geese), upland gamebirds (turkey, ring-necked pheasant, mourning dove, sage-grouse, sharp-tailed grouse, Hungarian partridge) and coyotes. Season dates, limits, and harvest methods are generally consistent with State regulations, with the exception of mule deer and coyotes. Both have refuge-specific restrictions at the time of publishing. Specific regulations are available to the public at the Web site at www.fws.gov/cmr or at any office of the refuge (Lewistown, Sand Creek, Jordan, and Fort Peck).

In 2009, there was an estimated 103,000 hunter visits on the refuge, which is about 41 percent of the annual visitation for the refuge (annual visitation is about 250,000). The refuge is one of the most notable areas in the State of Montana for big game hunting. The refuge staff observes a small number of waterfowl and upland bird hunters each year. Hunting is one of the six wildlife-dependent recreational uses on the refuge. Managed hunting is a tool used by the Refuge System for control of wildlife populations to maintain biological diversity and mimic natural processes that are missing or diminished.

Hunting takes place refugewide with the exception of administrative areas, closed areas (Slippery Ann Elk View Area), and recreational areas. Dual collateral refuge officers and currently one full-time refuge officer monitor hunters and their take. Especially during the big game rifle season when use on the refuge reaches its peak, refuge officers work in coordination with other Federal officers and State game wardens to ensure the use of safe and legal hunting practices.

AVAILABILITY of RESOURCES

Adequate resources are available to manage the existing hunting program at the current level of participation. The current road system provides access for hunters onto the refuge for hunting. Most refuge roads become impassible with only a minimal amount of precipitation. During the hunting season, this may cause clustering of hunters in localized, accessible areas of the refuge.

Increased use of the river as a motorway for access has provided many the opportunity for solitude and a primitive and unconfined hunt. This allows for access to resources that cannot be attained via the road system or easily on foot. Several wilderness units are only accessible on foot or via the Missouri River.

Aerial big game surveys are used during the year to establish counts and population statistics on elk,

mule deer, white-tailed deer, and pronghorn. These monitoring surveys help in managing the overall health of the populations, which could be used to establish limits or expand the hunting program. To help enforcement on the refuge, all four of the dual-function officers participate in a weekend rotation conducting law enforcement duties. The refuge currently has only one full-time officer. Additional needs are addressed in the CCP.

A refuge hunting regulation brochure is available to inform the public of hunting opportunities, refuge regulations, and safety precautions. Maps are also available, which show the location of roads, recreation areas, and those areas closed to hunting.

ANTICIPATED IMPACTS of the USE

Temporary disturbance will exist to wildlife near the activity. Animals surplus to populations will be removed by hunting. A temporary decrease in populations of wildlife might help ensure that carrying capacity (especially for big game species) is not exceeded. Closed areas will provide some sanctuary for game and nongame species, minimize conflicts between hunters and other visitors, and provide a safety zone around communities and administrative areas. The harvest of these species will be compensatory mortality, with minimal impact to the overall health of their populations.

Temporary negative effects on the habitat are expected due to the use of camping grounds, tree stands, and possible illegal off-road travel. To mitigate the possible impacts, the refuge has established camping areas providing parking and vault toilets. The Service also enforces a pack-in, pack-out policy encouraging folks to remove their trash.

PUBLIC REVIEW and COMMENT

Public review and comment was solicited through posting of notices at the refuge, notices in local newspapers and the Federal Register, public meetings held during the CCP process, and formal public review of this compatibility determination as part of the draft CCP and EIS for the refuge.

DETERMINATION

Public hunting is compatible.

Stipulations Necessary to Ensure Compatibility. To ensure compatibility with refuge purposes and the mission of the National Wildlife Refuge System, hunting can occur on the refuge if the following stipulations are met:

1. Hunting is prohibited in all administrative sites, closed areas, and recreational areas.
2. Target shooting with firearms is prohibited at all times on the refuge.

3. Collection of antlers, artifacts, and fossils is prohibited.
4. All boats, trailers, and ATVs must be properly licensed from the State of origin. In addition, all ATVs must be street-legal, which requires brake lights and rear mirror in addition to licensing.
5. All vehicles including ATVs are only allowed on open, numbered roads.
6. Nonmotorized game carriers are allowed on the refuge except on the UL Bend Wilderness.
7. The use of firewood is allowed for those dead and downed trees. No live cutting is permitted.

Justification. Public hunting is a historical wildlife-dependent use of the refuge complex, and is desig-

nated as one of the priority public uses as specified in the Improvement Act. Infrastructure is already in place to support hunting programs, and current personnel levels and money are adequate. Special regulations are in place to minimize negative effects on the refuges and associated wildlife. Montana State law further controls hunter activities. Hunting is a legitimate wildlife management tool that can be used to control wildlife populations. Hunting harvests a small percentage of the renewable resources, which is in accordance with wildlife management objectives and principals.

Mandatory 15-Year Reevaluation Date: 2027.

D.6 DESCRIPTION of USE: Fishing

The refuge allows public fishing in accordance with the State fishing regulations and seasons, and in coordination with refuge and USACE regulations. The uses covered in the determination will be fishing on refuge reservoirs, fishing on the Missouri River, and fishing on the Fort Peck Lake as well as the use of boat ramps, parking areas, fishing areas, and other structures maintained to facilitate the refuge's fishing program.

During the months that ice fishing is available, icehouses are permitted on the Fort Peck Reservoir December 1 to March 31. The owner's name and address must be attached to the outside wall of the structure.

In 2009, the refuge had more than 60,000 visitors for fishing. Lake trout, salmon, bass and upriver paddle fish are some of the more popular species sought after. Fishing is allowed throughout the year; however, access is variable based on road conditions. Licensed vehicles and licensed ATVs are allowed on refuge numbered routes and the ice surface of Fort Peck Lake. Snowmobiles are only allowed to travel on the surface of Fort Peck Lake. Travel off Fort Peck Lake and numbered routes is not allowed with any vehicle (i.e., travel along the shoreline).

AVAILABILITY of RESOURCES

Anglers use the existing network of roads to access the river, lake, and various reservoirs of the refuge for fishing. There are twelve locations for launching boats; however, with the water level fluctuation of the Fort Peck Reservoir some boat ramps may be inaccessible to the water. The refuge complex has adequate administrative and management staff to manage its fishing program.

Annual funding is needed for seasonal workforce salary and for supplies to maintain fishing facilities (including mowing, painting, and repairing facilities; litter pick up; restroom cleaning supplies; and periodic pumping costs of vaulted toilets). Money is needed for law enforcement staff salaries, fuel costs, repairs, maintenance of patrol vehicles, and associated costs to support the law enforcement program. Routine law enforcement patrols occur year-round. The refuge is currently hiring an additional law enforcement officer at the Fort Peck Field Station and part of their duties will be to patrol fishing on the refuge.

ANTICIPATED IMPACTS of the USE

The anticipated impacts of fishing are considered minimal. Fishing is one of the six wildlife-depen-

dent priority public uses identified by Service policy. These uses are encouraged when compatible with refuge purposes. The disturbance is expected to be limited in scope and duration. All motor vehicle use is restricted to numbered routes and parking areas, which reduces disturbance to wildlife. The vast size of the nearly 250,000-acre Fort Peck Reservoir allows for a large number of anglers and an opportunity for solitude.

The CCP recommends establishing clear access for ice fishing. This recommendation could help divert potential violators from disturbing shoreline and upland habitat to access the ice for fishing. Anglers occasionally violate regulations; however, these incidents usually have only minor negative effects on fish populations or refuge resources.

PUBLIC REVIEW and COMMENT

Public review and comment was solicited through posting of notices at the refuge, notices in local newspapers and the Federal Register, public meetings held during the CCP process, and formal public review of this compatibility determination as part of the draft CCP and EIS for the refuge.

DETERMINATION

Public fishing is compatible.

Stipulations Necessary to Ensure Compatibility. To ensure compatibility with refuge purposes and the mission of the National Wildlife Refuge System, fishing can occur on the refuge if the following stipulations are met:

1. This use must be conducted in accordance with State and Federal regulations and applicable special refuge regulations published.
2. Travel is only permitted on numbered routes with licensed motor vehicles.
3. Travel is permitted on the surface of Fort Peck Reservoir with licensed motor vehicles and snowmobiles.
4. Shoreline travel is not permitted on the refuge.

Justification. Fishing is a historical wildlife-dependent use at Charles M. Russell National Wildlife Refuge and is one of the priority public uses as specified in the Improvement Act. Infrastructure is already in place to facilitate this activity. Current personnel levels and funding resources are adequate. Special refuge regulations are in place to minimize negative effects on refuge habitat and wildlife.

Mandatory 15-Year Reevaluation Date: 2027.

D.7 DESCRIPTION of USE: Wildlife Observation, Photography, Environmental Education, and Interpretation

Currently, the Service estimates the number of visitors who take part in nonconsumptive uses at about 87,100. This includes participants in wildlife observation, wildlife photography, environmental education, interpretation and other recreational participants. These activities may take place on foot, bicycle, automobile, motorized boat, canoe, horse, cross-county skis and snowshoes. The refuge complex is open from dawn to dusk, and entry into closed areas is allowed through a special use permit and special conditions that are evaluated on a case-by-case basis.

With four of the above accounted uses being one of the six priority public uses of the Refuge System, these uses are to be encouraged when found to be compatible with the refuge purpose.

Refuge staff will help with activities when available. Organized groups, such as schools, Scouts, and 4-H organizations, may have instructors or leaders who will use refuge habitat and facilities to conduct compatible programs. Ages of participants range from preschool to college and beyond.

AVAILABILITY of RESOURCES

The refuge provides outstanding opportunities for the above uses due to the abundance of deer, elk, eagles, prairie dogs, and other unique species that people find interesting. The opportunity for solitude and premier landscape views are numerous across the entire refuge.

The CCP recommends expanding interpretation and environmental education and maintaining wildlife observation programs and facilities. The interpretation and environmental education programs will emphasize the principles of natural plant and animal communities and ecological processes and restoration.

Implementing improvements or expanding public use opportunities will be addressed in future step-down management plans and through future money requests. Program expansion will require increased money for operations and maintenance. When money is not adequate to run and maintain programs, they will be reduced in scope or discontinued. Information kiosks, interpretive signs, and other infrastructure are in place for the present level of public use activities.

ANTICIPATED IMPACTS of the USE

The disturbance of wildlife is considered a minimal impact of public use. The disturbance is considered

temporary and local, such as running off feeding deer and elk or the flushing of upland bird species. The benefits of educating the public and providing for a quality outdoor recreational experience are considered to outweigh the potential impacts of disturbing wildlife and the associated habitat.

PUBLIC REVIEW and COMMENT

Public review and comment was solicited through posting of notices at the refuge, notices in local newspapers and the Federal Register, public meetings held during the CCP process, and formal public review of this compatibility determination as part of the draft CCP and EIS for the refuge.

DETERMINATION

Wildlife observation, photography, environmental education, and interpretation is compatible.

Stipulations Necessary to Ensure Compatibility. To ensure compatibility with refuge purposes and the mission of the National Wildlife Refuge System, wildlife observation, photography, environmental education, and interpretation can occur on the refuge if the following stipulations are met:

1. Managers need to monitor use patterns and densities and make adjustments in timing, location, and duration as needed to limit disturbance.
2. Use should be directed to public use facilities (both existing and in the future) or those areas appropriate for the use, which will not be within sensitive areas.
3. Observation areas need to provide wildlife information and safe areas for the public to pull the main roadway for view and photography.

Justification. Public use for wildlife observation, photography, environmental education, and interpretation is a historical wildlife-dependent use of the refuge. These activities are designated as priority public uses as specified in the Improvement Act. Special regulations are in place to minimize negative effects on the refuges and associated wildlife. The CCP supports the addition of two outdoor recreation specialists to help in the area of public use. Disturbance to wildlife is limited by the size and remote nature of large parts of the refuge. Disturbance is also generally short-term and only temporarily displaces wildlife and the adjacent wildlife habitat.

Mandatory 15-Year Reevaluation Date: 2027.

D.8 DESCRIPTION of USE: Camping

Camping is defined as erecting a tent or shelter, preparing a sleeping bag or other bedding material for use, parking of a motor vehicle or camper trailer fit for occupancy. The use of camping on the refuge is not considered one of the wildlife-dependent uses established in the Improvement Act, but it facilitates the use of all six uses considered wildlife-dependent. Due to the remote location of the refuge, it is necessary for the health and safety of those who are recreating on the refuge to be allowed to establish a location to camp. This use is being proposed due to the remote location of the refuge and as a necessary convenience when taking into consideration the health and safety of the recreationists using the refuge.

The refuge currently has 21 established camping areas. While camping is allowed refuge wide, these areas contain facilities that are not available everywhere. Driving off-road to establish a campsite is only allowed within 100 yards of a numbered route. Driving off-road for all other purposes is prohibited. Camping is allowed to occur at all times on the refuge. Most of the camping occurs during open hunting seasons in August through most of November. Most camping takes place within 100 yards of a numbered route and ranges in facilities such as a tent of natural or synthetic material or a camper trailer with minimal modern conveniences.

AVAILABILITY of RESOURCES

Resources Involved in the Administration and Management of the Use: Resources involved in the use of camping on the refuge will include law enforcement officers to ensure compliance with refuge regulations, maintenance of facilities available for recreationists and camping, and funding to produce refuge brochures explaining refuge regulations and mapping locations.

Maintenance Costs, Special Equipment, Facilities, or Improvements Necessary to Support the Use: Maintenance of current vault toilets and hardened campsites is minimal and although funding is not optimum, personnel is available to allow this use at current levels.

Offsetting Revenues: The refuge does not currently charge a fee or require a permit for camping.

ANTICIPATED IMPACTS of the USE

Short-Term Impacts: There will be localized disturbance of vegetation in the area where camping facilities are set up. Other uses such as setting up a campfire and general use of the area around the campsite will have an impact on the vegetation and cause a disturbance to wildlife in the area. Due to the refuge limit of

camping for a maximum of 14 days within any 30-day period, these effects will be short term, and areas are expected to recover back to a natural state with little to no restoration conducted by refuge staff.

Long-Term Impacts: Due to the high number of campers during the hunting season, certain locations on the refuge receive a higher concentration of users. These areas have consistent use and require longer to recover back to a natural state. In these areas, not only is the refuge vegetation and wildlife heavily impacted, but refuge regulation violations can be high as well. During fishing and hunting season, it is more common to find violations due to dogs off leash, intoxication, illegal drugs, illegal firearm use, human waste, littering, disturbances to other users, and noise violations. This increase in refuge violations has become a recurring expense on the refuge law enforcement.

Cumulative Impacts: While certain times of year and locations receive a greater number of users and a higher potential for long-term impacts, the use of camping on the refuge is deemed to have a greater benefit to the public by supporting wildlife-dependent uses on the refuge.

PUBLIC REVIEW and COMMENT

Public review and comment was solicited through posting of notices at the refuge, notices in local newspapers and the Federal Register, public meetings held during the CCP process, and formal public review of this compatibility determination as part of the draft CCP and EIS for the refuge.

DETERMINATION

Camping is compatible.

Stipulations Necessary to Ensure Compatibility. To ensure compatibility with refuge purposes and the mission of the National Wildlife Refuge System, camping can occur on the refuge if the following stipulations are met:

1. Vehicle access to camping areas is allowed, by the shortest route, within 100 yards of numbered roads except where closed. Off-road vehicle access to camp sites is not allowed in proposed wilderness, wilderness study areas, designated wilderness where habitat impacts warrant closing a site with a "No Vehicle" sign, and administrative areas that are posted as closed. Backpack camping is allowed throughout the refuge unless specifically closed.
2. All camping is limited to 14 days within any 30-day period. Any property including camping equipment, boats, trailers, and other personal property left unattended for a period in excess of 72 hours is subject to removal.

3. Use of dead and downed wood for campfires is allowed on the refuge. Removal of live limbs and trees is prohibited.
4. The pack-in, pack-out policy will be promoted for trash removal and campsite restoration.
5. Public use regulations will be enforced to protect habitat and limit disturbance to other refuge visitors.

Justification. Currently, all six of the wildlife-dependent uses are used on the refuge. Due to the remote location of the refuge, lodging establishments are non-existent. For the health and safety of those who are using the resources of the refuge and taking part in recreational activities, camping is necessary. The time at which camping on the refuge is at its peak is not considered to be a critical period for wildlife on the

refuge. In the fall during hunting season, all wildlife has produced young of the year and migratory bird species have completed nesting. The size of the refuge and difficulty of public access to certain locations provides alternative areas for disturbed wildlife.

While regulation violations and disturbance to other visitors can locally be a problem, with the cooperation of State and local law enforcement the workload is minimized. Due to the primitive nature of camping sites throughout the refuge and the existence of very few facilities, maintenance needs are minimal.

Given the above, camping does not materially interfere with the purposes of the refuge or the mission of the Refuge System.

Mandatory 10-Year Reevaluation Date: 2022.

D.9 DESCRIPTION of USE: Geocaching

Traditional geocaching (the burying, placement or removal of a physical cache) is generally not an appropriate use for national wildlife refuges in accordance with Service and Department of the Interior regulations and policies. However, other forms of geocaching have emerged that do not require burying, placing, or removing objects. Some of the most current types are Virtual Geocaching, Letterboxing, Earthcaching, Trail Link, and GPS Adventures. Geocaching is not a priority public use; however, certain types of geocaching may offer benefits to support the refuge's educational and interpretive programs and to learn more about refuge visitors.

The use of geocaching will be allowed refuge wide with the exception of closed areas. Those participating in geocaching will be responsible for following all rules and regulations required of all refuge users. Geocaching will be allowed year-round with the understanding that access to the refuge during the winter months is highly variable and most likely very limited. Refuge roads are often impassible due to the drifting of snow, and most roads are not maintained in the winter season. The refuge will evaluate the type of geocaching requested and how it benefits environmental education and interpretation. In accordance with refuge policy, refuge users are prohibited from disturbing archaeological resources, removing refuge resources such as plants, artifacts, and sheds, and abandoning property.

Geocaching has become a rapidly growing outdoor recreational activity. While traditional geocaching, which consists of burying or placing of a physical cache, could cause damage to the wildlife habitat, other forms of geocaching facilitates environmental education and interpretation, which are both wildlife-dependent priority public uses. By allowing geocaching to take place on the refuge, the Service is providing the opportunity for those who take part in the recreational activity to view wildlife and wildlife habitat.

AVAILABILITY of RESOURCES

Resources Involved in the Administration and Management of the Use: The issuance of special use permits to those wanting to participate in geocaching on the refuge will involve additional administrative action. The level of need for special use permits for geocaching is not known at this time. Depending on the number of user groups, it may be that the current level of refuge resources is sufficient, or it may show that there is a greater than anticipated interest and additional resources are necessary.

Special Equipment, Facilities, or Improvements Necessary to Support the Use: The refuge is not responsible for providing any additional equipment necessary to conduct this recreational use. The current refuge facilities that support refuge visitors are considered sufficient for the expected number of users.

Maintenance Costs: The maintenance of general recreational facilities is not expected to significantly increase due to the use of geocaching on the refuge.

Monitoring Costs: The increase in unfamiliar monitoring techniques using Web sites and additional monitoring methods with the frequently changing technological activities will require additional administrative resources. Web sites that track geocaches and allow for a central location for users to communicate can also be used if there is an unapproved cache or abuse of the use on the refuge by disabling the proposed activity from its Web pages and alerting its users of the inappropriate use.

Offsetting Revenues: None.

ANTICIPATED IMPACTS of the USE

Short-Term Impacts: The disturbance of wildlife, trampling of vegetation, and potential littering are all considered to be a minimal impact of public use. The prohibited practice of removing or leaving a cache on the refuge is considered to negatively affect the refuge resources, but by monitoring the use and communicating the rules and regulations, the benefits of educating the public and providing for a quality outdoor recreational experience are considered to outweigh the potential impacts.

Long-Term Impacts: There are no long-term impacts foreseen with the use of geocaching. By complying with refuge rules and regulations for this use, the long-term impacts are considered minimal to non-existent.

Cumulative Impacts: The potential short-term and long-term impacts are considered to be minimal the use of geocaching on the refuge is considered to have a positive effect by facilitating environmental education, interpretation, and wildlife observation.

PUBLIC REVIEW and COMMENT

Public review and comment was solicited through posting of notices at the refuge, notices in local newspapers and the Federal Register, public meetings held during the CCP process, and formal public review of this compatibility determination as part of the draft CCP and EIS for the refuge.

DETERMINATION

Geocaching is compatible.

Stipulations Necessary to Ensure Compatibility. To ensure compatibility with refuge purposes and the mission of the National Wildlife Refuge System, geocaching can occur on the refuge if the following stipulations are met:

1. All refuge recreationists are responsible for knowing and following all refuge regulations.
2. The removal of refuge resources is prohibited. That includes, but is not limited to, the illegal take of wildlife, vegetation, archaeological resources, antler sheds, and geological resources.
3. The burial of caches on the refuge is prohibited.
4. The abandonment or leaving of a cache on the refuge is prohibited.
5. Caches that deface public or private property, whether a natural or constructed object, to provide a hiding place, a clue or a logging method are prohibited.

Justification. The use of geocaching on the refuge is determined to be compatible with the refuge purpose and the mission of the Service. It allows an opportunity for the public to take part in wildlife observation, wildlife photography, environmental education, and interpretation, which are all considered priority public uses. With recreationists adhering to refuge regulations, it will minimize the negative effects on wildlife and wildlife habitat. By allowing the use of this rapidly growing activity, the refuge is providing the opportunity for the American public, not currently aware of the Refuge System's conservation mission, to be environmentally educated and involved in conservation.

Mandatory 10-year Reevaluation Date. 2022.

D.10 DESCRIPTION of USE: Guided Hunting (Outfitting)

The refuge will authorize commercial hunting guide operations within the refuge, and regulate such use through the implementation of a hunting guide program and issuance of special use permits with conditions. This activity provides recreational opportunity for hunters who desire a successful, quality experience, but who may lack the necessary equipment, skills, or knowledge to hunt within the expansive Missouri River, Missouri River Breaks, and the rugged country the refuge encompasses. While guided hunts are not specifically identified as a priority public use, hunting is a priority public use.

Guided hunting operates under the same regulations as the public hunting. The use is allowed refuge wide with the exception of closed areas, recreational areas, and administrative sites. There are currently 11 special use permits issued to outfitters on the refuge to conduct guided hunts. These 11 are spread throughout the entire refuge. Guided hunts are under the same Federal and State regulations and must adhere to the same limits, season dates, and wildlife-specific regulations. All guided hunts take place during the big game hunting seasons starting with bow season in late August through the general rifle season in November.

The refuge has consistently issued special use permits and established special conditions in addition to the Service's general conditions for special use permits. Refuge law enforcement will be responsible for regulating the use and any compliance issues that arise. Each outfitter will receive an outfitter identification card for operations on the refuge. The permits are valid only within the Charles M. Russell National Wildlife Refuge and UL Bend National Wildlife Refuge Executive order boundaries. Including Service lands and USACE lands. All refuge outfitters must keep a log of use, and when requested by a refuge officer, State warden, or special agent, shall provide for inspection, current outfitter records as specified by 8.39.703 (Outfitters Records) of "Chapter 39—Montana Administrative Rules."

Based on the existing client demand for guide services, a significant number of the hunting public is willing to pay for the expertise and local knowledge provided by guides. To increase the chance of the public having a successful and quality hunting experience, the use of guides is a necessary approach due to the remote location and vast area of land.

AVAILABILITY of RESOURCES

Resources Involved in the Administration and Management of the Use: The use of refuge law enforcement in cooperation with other Federal, State, and local offi-

cers during the hunting season is no greater due to guided hunts than with the public hunters. The issuance of special use permits takes the time and effort of refuge staff with costs for printing the permits, issuing identification cards, and keeping records. The current staff is capable of issuing permits and managing the guided hunting program on the refuge.

Special Equipment, Facilities, or Improvements Necessary to Support the Use: The current equipment and facilities are adequate to meet the needs of the guided hunting program and the current participation levels.

Maintenance Costs: As with the public hunting program, maintenance of vault toilets and camping facilities is necessary during peak recreation times of the year. Starting in August with big game bow hunting through the end of the big game rifle season in November, maintenance of recreation areas, vault toilets, camping areas, and general use of the refuge is necessary.

Monitoring Costs: The cost of law enforcement, both full-time, dual collateral, other Federal, State, and local officers, is at its highest during the fall hunting season. The addition of a full-time refuge officer on the east end of the refuge will help with the heavy burden during this time of year. All other needs are addressed in the comprehensive conservation plan.

Offsetting Revenues: The current fee for an outfitting permit on the refuge is \$250. This fee is kept by the refuge to use as discretionary funding whether to provide overtime for employees or to maintain and enhance current refuge facilities.

ANTICIPATED IMPACTS of the USE

Short-Term Impacts: It is anticipated that the disturbance of guided hunting will not be measurably greater than the disturbance from the general hunting public.

Temporary disturbance will exist to wildlife near the activity. Animals surplus to populations will be removed by hunting. A temporary decrease in populations of wildlife might help ensure that carrying capacity (especially for big game species) is not exceeded. Closed areas will provide some sanctuary for game and nongame species, minimize conflicts between hunters and other visitors, and provide a safety zone around communities and administrative areas. The harvest of these species will be compensatory mortality, with minimal impact to the overall health of their populations.

Temporary negative effects on habitat are expected due to the use of camping grounds, tree stands, and possible illegal off-road travel. To mitigate the possible impacts, the refuge has established camping areas providing parking and vault toilets. The Service also enforces a pack-in, pack-out policy encouraging folks to remove their trash.

Long-Term Impacts: The primary concern about commercial guided hunting activities is the potential for conflict between guided activities and other refuge users, particularly unguided hunters. Based on experiences on this refuge and on other national wildlife refuges, commercial guiding operations can increase user conflicts. An important part of this issue is public perception that hunting guides and clients have an advantage of equipment and technique and are taking game that would otherwise be available to regular hunters. Guides, because they are running a business, may also be viewed as more aggressive when compared to unguided hunters. The State and refuge regulations should help ease the tensions between guided hunters and the public hunters. However, this conflict between hunters could be considered a potential long-term impact.

Cumulative Impacts: Guide operations may increase use of some refuge facilities such as boat ramps, campsites, and other facilities frequented by general user groups. With the dispersal of outfitters throughout the entire refuge from one end to the other, this increase will not be significant compared to the overall use.

PUBLIC REVIEW and COMMENT

Public review and comment was solicited through posting of notices at the refuge, notices in local newspapers and the Federal Register, public meetings held during the CCP process, and formal public review of this compatibility determination as part of the draft CCP and EIS for the refuge.

DETERMINATION

Guided hunting (outfitting) is compatible.

Stipulations Necessary to Ensure Compatibility. To ensure compatibility with refuge purposes and the mission of the National Wildlife Refuge System, guided hunting (outfitting) can occur on the refuge if the following stipulations are met:

1. Regulations for recreational users apply. See refuge guide map and information (revised 2004).
2. Outfitters and their licensed guides must have in their possession an outfitter identification card for the Charles M. Russell Refuge while operating on the refuge.
3. Charles M. Russell Refuge outfitter permits are valid only on lands administered by the Service within the boundary of the Charles M. Russell and UL Bend Refuges (including USACE lands within the refuge).
4. Charles M. Russell Refuge outfitter permits do not give exclusive use of any area.
5. All violations of refuge regulations, special conditions of an outfitter permit, MFWP statutes, or

Board of Outfitters Rules by a Charles M. Russell Refuge outfitter, licensed guide, client, or a violation occurring in the presence of an outfitter or guide must be reported to the proper official immediately. Failure to report violations will be grounds for cancellation of the permit.

6. Permitted outfitters may not use licensed outfitters as guides.
7. Outfitters must meet State of Montana minimum insurance requirements. In addition, the policy shall (1) name the United States Government as coinsured, (2) specify that the insurance company shall have no right of subrogation against the United States of America, and (3) the permittee shall indemnify the United States. A current certificate of insurance must be provided to the refuge's Lewistown office.
8. All refuge outfitters on request of a refuge officer, State warden or special agent, shall provide for inspection, current outfitter records as specified by 8.39.703 (Outfitters Records) of "Chapter 39—Montana Administrative Rules."
9. Refuge outfitters are not allowed to use aircraft for locating game on the refuge.
10. Outfitter logs, along with hunter-use days are required to be turned into Charles M. Russell National Wildlife Refuge, P.O. Box 110, Lewistown, Montana 59457, by December 31 of each year. Failure to submit logs will be grounds for cancellation of the following year's permit.
11. Violation of any permit special conditions may be grounds for cancellation.
12. Outfitters who wish to keep their refuge permit and remain inactive with the State of Montana license requirements, must pay the \$250 permit fee. Outfitters will be allowed to renew their permit with the Charles M. Russell Refuge for 2 years while remaining inactive with the State. If at the beginning of a third year, an outfitter is still inactive with the State, he or she will not be offered an opportunity to renew with the refuge.

Justification. With the current regulations specific to guided hunting, and the spatial distribution of the outfitters, allowing guided hunting on the refuge will not materially interfere with or detract from the purposes of the refuge or the mission of the Refuge System. By allowing guided hunts on the refuge, it will provide an opportunity for those hunters looking to have a quality hunting experience and a greater chance of a successful hunt by using the knowledge, skills and abilities of those with local experience and the necessary equipment.

Mandatory 10-Year Reevaluation Date. 2022.

D.11 DESCRIPTION of USE: All-Terrain Vehicles, Bicycles, and Snowmobiles

This applies to the proposed use and the restriction of use on the refuge uplands, Fort Peck Lake, and the Missouri River. Snowmobile use occurs during the winter season and is only allowed across the Fort Peck Lake. It is prohibited along the Missouri River and across the refuge uplands including all roads. ATV use occurs year-round and is allowed over the Fort Peck Lake during the winter season and on refuge numbered roads. ATV use is prohibited off-road on the refuge uplands and along the Missouri River. Bicycles are currently allowed on numbered roads including seasonally closed roads. These uses are not priority public uses according to the National Wildlife Refuge System Administration Act of 1997.

As the list below shows, ATV use will be allowed on refuge numbered routes and the Fort Peck Lake. Snowmobile access is only allowed over the Fort Peck Lake. Neither use is allowed along the Missouri River nor can either use take place off-road over the refuge uplands.

<i>Vehicle type</i>	<i>Fort Peck Lake</i>	<i>Missouri River</i>	<i>Refuge roads</i>
ATV	allowed	prohibited	allowed
bicycle	prohibited	prohibited	allowed
snowmobile	allowed	prohibited	prohibited

Use locations that are both allowed or prohibited by the use of snowmobiles and ATVs.

ATV use occurs year-round on refuge numbered routes and during the winter months over the Fort Peck Lake. Snowmobile use is only allowed over the Fort Peck Lake during the winter season when ice and snow are present. ATVs are required to use refuge roads, the Fort Peck Lake ice during winter months, and all must be street-legal. Montana residents must have a metal license plate and all operators must possess the proper driver's license. Nonresident operators who wish to operate their ATVs on the refuge should contact the refuge office about proper licensing requirements. Snowmobiles and their operators need to comply with State licensing requirements.

Due to the remote area in and around the refuge, the use of smaller and more navigable motorized vehicles is necessary to access or disperse access for wildlife dependent recreation. Snowmobiles and ATVs are both used to access the large Fort Peck Lake for ice-fishing opportunities away from the main access points. ATVs and, occasionally, bicycles are used on the refuge during hunting season and for general access year-round.

AVAILABILITY of RESOURCES

Resources Involved in the Administration and Management of the Use: The main cost of these uses is going to be the time and effort of regulating the use. With one full-time law enforcement officer and four dual-collateral officers to cover the 1.1 million-acre refuge are considered a marginal number of resources at best given the sheer size of the refuge and the number of users. Other Federal, State, and local law enforcement officers may help, as they are available.

Special Equipment, Facilities, or Improvements Necessary to Support the Use: Additional equipment and facilities are not necessary to monitor the use within the refuge and Fort Peck Lake.

Maintenance Costs: The most obvious maintenance cost is to the road system and to the vehicles used by refuge staff for patrolling the uses on the refuge.

Monitoring Costs: Monitoring use is the most expensive cost for the refuge. Either by plane or by vehicle, the cost of gas and staff time is significant. Due to the remote location and inaccessibility of certain areas, traversing the refuge is extremely time-consuming and a fast reaction to a refuge violation could take hours.

Offsetting Revenues: The refuge does not currently charge a fee for the use of the road system, or for access.

ANTICIPATED IMPACTS OF THE USE

Short-Term Impacts: Snowmobiling has little to no resource impact given the season of use and regulation confining snowmobiles to ice covered waters. Snowmobiles do generate noise that may disturb other users in the area. ATV and bicycle use have little to no resource impacts as they are restricted to refuge numbered routes and to ice covered waters. As with snowmobiles, ATVs generate a disturbance due to noise that may disturb wildlife as well as other users within the area. Neither is considered to have an impact on the refuge habitat, as both are restricted to roads and the ice.

Long-Term Impacts: There are no long-term impacts associated with the use of ATVs, bicycles, and snowmobiles due to the use restrictions. The refuge roads are already disturbed areas of the refuge, and the long-term negative effects on the Fort Peck Lake are considered nonexistent.

Cumulative Impacts: The greatest impact overall will be the disturbance to other users in the area with the use of ATVs, bicycles and snowmobiles. The noise generated from both snowmobiles and ATVs could disturb those who are viewing wildlife, hiking, snowshoeing, cross-country skiing, fishing, and hunters pursuing game.

PUBLIC REVIEW and COMMENT

Public review and comment was solicited through posting of notices at the refuge, notices in local newspapers and the Federal Register, public meetings held during the CCP process, and formal public review of this compatibility determination as part of the draft CCP and EIS for the refuge.

DETERMINATION

The use of ATVs, bicycles, and snowmobiles is compatible.

Stipulations Necessary to Ensure Compatibility. To ensure compatibility with refuge purposes and the mission of the National Wildlife Refuge System, the use of ATVs and snowmobiles can occur on the refuge if the following stipulations are met:

1. All appropriate State and Federal regulations for ATVs and snowmobiles apply.
2. ATVs belonging to Montana residents must be street-legal and have a metal license plate. Operators must also possess the proper driver's license. Nonresident ATV owners who wish to operate their ATVs on the refuge should contact the refuge staff about licensing requirements. Anyone intending to operate an ATV on the refuge should contact the refuge staff to ensure the ATV meets the necessary requirements for legal use.

3. ATVs are required to stay on refuge-numbered routes or over the ice on Fort Peck Lake. Bicycles are required to stay on refuge-numbered roads including seasonally closed roads. ATVs are not allowed on roads when they are seasonally closed.
4. Snowmobiles are only allowed use on the Fort Peck Lake.
5. Off-road operation of ATVs or bicycles, as well as all motor vehicles, is illegal.

Justification. Although there is a minor disturbance to wildlife and other refuge users, the use of snowmobiles, bicycles, and ATVs allows for greater access and more dispersed access benefiting wildlife-dependent public uses. It increases access into areas that may not be accessible with traditional motor vehicles or on foot. While snowmobiles and ATVs generate a noise disturbance, those who are looking for a solitude and quiet recreational experience have many opportunities elsewhere on the refuge. Disturbed wildlife also has many opportunities to retreat to a less disturbed area.

With stipulations in place, recreational snowmobiling, bicycling and ATV use, given the location and season of most use and the physical nature and size of the refuge, do not materially interfere with or detract from the conservation purposes of the refuge.

Mandatory 10-Year Reevaluation Date: 2022.

D.12 DESCRIPTION of USE: Prescriptive Grazing

Prescribed grazing is the planned application of livestock grazing at a specified season, duration and intensity to accomplish specific vegetation management objectives. The objectives are designed to achieve the broader habitat and wildlife goals. Rather than managing refuge resources to support livestock grazing or other economic uses, livestock grazing is used as a habitat management tool to achieve wildlife habitat goals and objectives. The Service employs the strategy of adaptive management in the development of HMPs. Adaptive management is defined as a process that uses feedback from refuge research and monitoring and evaluation of management actions to support or change objectives and strategies at all planning levels.

Prescriptive grazing is used to improve or maintain the health and vigor of selected plants and to maintain a stable and desired plant community, provide or maintain food, cover, and shelter for animals of concern, maintain or improve water quality and quantity and reduce accelerated soil erosion and maintain or improve soil condition.

Prescriptive grazing will be carried out across the refuge to meet wildlife and habitat objectives as identified in various management plans. The Service has been gradually making the transition to prescribed grazing for over 20 years as a result of the 1986 EIS and existing Service policies, and has carried out prescriptive grazing on about 34 percent of the refuge. Most habitat units with annual grazing programs are not meeting residual grass cover for priority species. The use will be implemented across the refuge where the Service has control over the use. For example, habitat units that are fenced from common pastures will be the first units enrolled into prescriptive grazing. Habitat units that are not fenced from private or other government-owned lands will be managed under existing management plans.

The use will be conducted according to approved HMPs to meet specific wildlife and habitat objectives. Use could occur during any season depending on the specific objectives to be achieved. Prescriptive grazing will be administered through issuance of a special use permit. Permittees will be selected using the criteria identified in the Refuge Manual. Habitat management plans will identify season of use, number of animals and length of time to achieve the management objectives.

A critical step in developing an effective and ecologically sound prescriptive grazing program is establishing criteria by which the prescription's implementation and effectiveness will be measured. By collecting quantitative data over time, one is bet-

ter equipped to detect trends toward or away from the desired effects of grazing treatments. Furthermore, monitoring during grazing treatments will help to determine whether grazing treatments are applied at the appropriate season, duration, frequency, and intensity to meet specific wildlife and habitat objectives.

This use will move from an annual grazing program to a prescriptive grazing program to meet specific wildlife and habitat management objectives. Currently, habitat surveys show that most grazed habitat units are not meeting the 70 percent residual grass cover as specified in the 1986 EIS. Residual grass cover is important for several grassland-nesting birds. In addition to the grass cover, new monitoring for highly palatable, first-to-decline forbs and shrubs (sentinel plants) are declining and being eliminated due to overuse and lack of natural ecological processes. These plants are extremely important to numerous wildlife species, especially birds and pollinators. The Great Plains have evolved over time through ecological disturbances like fire and grazing. These disturbances can be described as "pulse" and "press." A pulse occurrence occurs sporadically but still occurs, whereas a press disturbance is constant (Frost 2008). Like fire, originally, ungulate grazing (herbivory) was a pulse disturbance. Before 1882, there were many years with periods of abandonment by wild ungulates where less grazing took place due to its interaction with fire. Since 1882, it has become a press (constant) disturbance because of fences and fire control. As a result, highly palatable species (particularly shrubs and forbs such as chokecherry and white prairieclover) have dramatically declined. These species evolved with, and are highly adapted to, grazing when combined with several-year periods of abandonment for recovery. Palatable shrubs require several years to grow from seed to seed-bearing maturity and are alive above ground (or vulnerable to damage from grazing) 12 months of the year. Present-day livestock grazing systems typically only rest pastures for 1 entire year or less from livestock use (with no rest from wild ungulate use). A prescriptive grazing program will allow the refuge to fulfill the intent of the Improvement Act.

AVAILABILITY of RESOURCES

Resources Involved in the Administration and Management of the Use: Refuge staff will continue to monitor permittees for violations of permit conditions and trespass. Biologists and station managers will monitor habitat conditions using current HDP and sentinel plant species.

Special Equipment, Facilities, or Improvements Necessary to Support the Use: The refuge will continue to monitor grazing activities using ground surveys and aer-

ial counts. New permanent or temporary fences will need to be constructed to apply prescriptive grazing on common pastures. Temporary water developments may be necessary to facilitate prescriptive grazing in some habitat units to meet habitat objectives.

Maintenance Costs: Maintenance costs could be reduced due to the reduction in interior fences necessary to manage the prescriptive grazing program according to the CCP. There may be additional costs with the construction and maintenance of boundary fences, which will be constructed anyway to manage livestock in common pastures.

Monitoring Costs: Refuge personnel who are involved in administering the grazing program spend approximately 25–35 percent of their time issuing permits, monitoring for trespass livestock and habitat conditions, and communicating with permittees. The refuge monitors livestock trespass via fixed wing aircraft that costs \$140 per hour with a monthly fixed cost of \$770.

Offsetting Revenues: The refuge receives approximately \$60,000 in 6860 (grazing) funds per year; however, these funds are being reduced each year due to the increase in oil and gas development on other refuges. Refuges receive a percentage of the amount of revenue that is generated from commercial activities on refuges. It is expected the revenue generated by grazing on the refuge will continue to decline over the years. These funds do not cover current expenses incurred managing current grazing program and probably will not cover the costs of implementing the prescriptive grazing program.

ANTICIPATED IMPACTS of the USE

Short-Term Impacts: Short-term impacts will include loss of vegetative cover, which could result in increased soil erosion. Highly palatable forbs and shrubs will be heavily impacted by grazing affecting a large number of wildlife species from pollinators to big game. However, the benefit will be to the wildlife species that require short cover such as prairie dogs, mountain plovers, and McCown's longspur and grazing ungulates (elk and deer) that will graze the fresh growth of grasses. Prescriptive grazing can reduce invasive species and reduce fuel in sage-grouse habitat. In weed-infested areas, grazing must be carefully managed to reduce rather than increase invasive plant establishment and spread. Ecologically based grazing prescriptions pay careful attention to positively directing plant community change, not just removing the weedy species (Sheley et al. 1996). Moving from annual grazing to prescriptive grazing could have an impact on some current permittees from an economic standpoint. Prescriptive grazing will be carried out over time and with input from current permittees to lessen potential finan-

cial impacts. Permittees that are able to meet refuge needs may benefit financially by taking advantage of increased grazing opportunities.

Long-Term Impacts: The habitats of the refuge evolved with a pulse fire–grazing interaction (pyric herbivory). As fires burned across the landscape, grazing ungulates grazed less selectively on all plant species and thus highly palatable shrubs and forbs benefited from less grazing pressure. This interaction resulted in highly resilient systems that have a great diversity of species that promote heterogeneity and ecological integrity. Restoring this historical process will promote healthy habitats that promote biodiversity and resiliency to climate change.

Cumulative Impacts: Changes in grazing management will likely reduce the availability of grazing land in the region. However, because the refuge supplies less than 1 percent of all AUMs in the region, the cumulative effect of implementing prescriptive grazing, when combined with other land management changes will be negligible.

PUBLIC REVIEW and COMMENT

Public review and comment was solicited through posting of notices at the refuge, notices in local newspapers and the Federal Register, public meetings held during the CCP process, and formal public review of this compatibility determination as part of the draft CCP and EIS for the refuge.

DETERMINATION

Prescriptive grazing is compatible.

Stipulations Necessary to Ensure Compatibility. To ensure compatibility with refuge purposes and the mission of the National Wildlife Refuge System, prescriptive grazing can occur on the refuge if the following stipulations are met:

1. Habitat management plans will be developed with specific wildlife and habitat objectives.
2. Prescriptive grazing is one of the tools used to meet these objectives.

Justification. Sharp-tailed grouse, pronghorn, sage-grouse, large ungulates, and other wildlife species need a diversity of and abundant group of plants for food and cover all year. Refuge monitoring has shown that several highly palatable forbs and shrubs are declining due to the natural fire–grazing interaction being out of balance. Prescriptive grazing and other adaptive management strategies will permit flexibility necessary for the restoration of these important plant species. Prescriptive grazing is a valuable management tool that supports refuge objectives.

Mandatory 10-Year Reevaluation Date: 2022.

D.13 DESCRIPTION of USE: Research

The refuge allows research on a variety of biological, physical, archaeological, and social issues and concerns to address refuge management information needs or other issues not related to refuge management. Studies are conducted by Federal, State, and private entities including USGS, State agencies, State and private universities, and independent researchers and contractors.

Research is allowed refugewide and is addressed on a case-by-case basis for the need and potential impacts. The exact locations of the studies will be determined by the focus of the study. Research requests will be considered during all times of the year and on a case-by-case basis. Due to the difficulty in accessing the refuge lands during the winter months, studies at that time may be more heavily scrutinized as to their biological need and benefit. The location of the study may have an impact on when the use will be conducted, especially if it is during a specific hunting season.

Researchers will be required to submit a written proposal that outlines the methods, materials, timing, and justification for proposed projects. These proposals will be reviewed by refuge staff to assess the appropriateness of the research for the refuge, environmental impacts, assure that the projects do not interfere with the other resource operations, and provide suggested modifications to the project to avoid disruptions to refuge wildlife and operations. A special use permit is issued to those whose requests are deemed valid and necessary. The refuge staff will be responsible for monitoring their use and that it is appropriate and consistent with the terms and conditions in their special use permit.

Research on the refuge is allowed as a symbiotic relationship between the refuge research needs and the need for the requesting agency and individual to complete the research. The Service encourages and supports research and management studies on refuge lands that will improve and strengthen decisions on managing natural resources. All research requests will be evaluated on the refuge need and be in the best interest of wildlife and sound biological information.

AVAILABILITY of RESOURCES

Resources Involved in the Administration and Management of the Use: The refuge currently uses the existing staff to issue special use permits and to monitor researchers. Current staff resources are deemed adequate to manage issuing permits and monitoring the researchers for compliance at the existing levels.

Special Equipment, Facilities, or Improvements Necessary to Support the Use: The research group or individual

will be responsible for supplying their own equipment necessary to complete the study.

Maintenance Costs: There are no foreseen maintenance costs with allowing research studies on the refuge.

Monitoring Costs: The current refuge staff is adequate to monitor the research completed by non-Service personnel. Research studies in access of available refuge resources will not be allowed.

Offsetting Revenues: The refuge does not charge a fee to conduct research studies on the refuge.

ANTICIPATED IMPACTS of the USE

Short-Term Impacts: Research activities have the potential to impact and disturb wildlife through observation, capture and release techniques, and banding or marking. The access of multiple research sites several times in a short period may noticeably disturb vegetation either by walking, trampling, or by the use of a motor vehicle. Efforts to capture wildlife may cause not only disturbance, but also injury or even death. The energy costs of disturbance may be appreciable in terms of disruption of feeding, displacement from preferred habitat, and the added energy expended to avoid the disturbance of the research being conducted.

Long-Term Impacts: None are anticipated for the approval of research studies on the refuge.

Cumulative Impacts: With most research taking place on the refuge during the summer, the compilation of several studies may be excessive disturbance on refuge resources. Even with this, no cumulative impacts are expected due to the ability of the refuge manager to control the location and timing of all research studies conducted. The size of the refuge is also considered to be such that the tolerance of several studies on the wildlife and habitat is high.

PUBLIC REVIEW and COMMENT

Public review and comment was solicited through posting of notices at the refuge, notices in local newspapers and the Federal Register, public meetings held during the CCP process, and formal public review of this compatibility determination as part of the draft CCP and EIS for the refuge.

DETERMINATION

Research is compatible.

Stipulations Necessary to Ensure Compatibility. To ensure compatibility with refuge purposes and the mission of the National Wildlife Refuge System, research can occur on the refuge if the following stipulations are met:

1. Before conducting investigations, researchers must obtain special use permits from the refuge

- that make specific stipulations related to when, where, and how the research will be conducted. Managers have the option to prohibit research on the refuge that does not contribute to the purpose of the refuge or the mission of the Refuge System.
2. Researchers must possess all applicable State and Federal permits for the capture and possession of protected species, and for conducting all other regulated activities.
 3. Research activities will be monitored for compliance with permit conditions and impacts.
 4. If proposed research methods could impact or potentially impact refuge complex resources (habitat or wildlife), it must be shown that the research is necessary (i.e., critical to survival of a species, will enhance restoration activities of native species, will help in control of invasive species or provide valuable information that will guide future complex activities), and the researcher must identify the issues in advance of the impact.
 5. Researchers must clearly mark posts, equipment platforms, fencing material, and other equipment left unattended so it does not pose a hazard. Such items shall be removed as soon as practicable on completion of the research.
 6. Cultural and archaeological surveys will be coordinated with the Regional Historical Preservation Officer and the appropriate State Historic Preservation Officer to assure compliance with the Archaeological Resource Protection Act.
 7. All research activities will be performed in accordance with stipulations in this determination and in specific special use permits.
 8. Researchers will submit a final report concerning refuge research to the refuge manager.
- Justification.** Research is compatible with the mission of the Service and the purpose of the refuge. Research studies on the refuge can be used to manage trust resource responsibilities of the Service by providing information on a sound scientific basis. Research conducted on biological, physical, archaeological and social components of the refuge provide a means to analyze management actions, impacts from internal and outside forces, and ongoing natural processes within the refuge ecosystems. Research provides scientific evidence used to make management decisions and ensure the refuge is managed as intended during establishment by Congress.
- Negative short-term impacts caused during the research activities will be minimized with the stipulations above and are not considered significant in nature. Conducting research studies on the refuge will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purpose for which the refuge was established.
- Mandatory 10-Year Reevaluation Date: 2022.**

D.14 COMPATIBILITY DETERMINATION APPROVAL for the ABOVE USES

SIGNATURE

CONCURRENCE

 16 Feb 2012  2/16/12

Richard Potts
Project Leader
Charles M. Russell National Wildlife Refuge Complex
Lewistown, Montana

Date

Richard A. Coleman, Ph.D.
Assistant Regional Director
National Wildlife Refuge System
U.S. Fish and Wildlife Service
Mountain-Prairie Region
Lakewood, Colorado

Date

Appendix E

Key Legislation and Policy

This appendix briefly describes the guidance for the National Wildlife Refuge System and other policies and key legislation that guide the management of Charles M. Russell National Wildlife Refuge and the UL Bend National Wildlife Refuge.

E.1 NATIONAL WILDLIFE REFUGE SYSTEM

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

—National Wildlife Refuge System Improvement Act of 1997

Goals

- A. Conserve a diversity of fish, wildlife, and plants and their habitats, including species that are endangered or threatened with becoming endangered.
- B. Develop and maintain a network of habitats for migratory birds, anadromous and interjurisdictional fish, and marine mammal populations that is strategically distributed and carefully managed to meet important life history needs of these species across their ranges.
- C. Conserve those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or underrepresented in existing protection efforts.
- D. Provide and enhance opportunities to participate in compatible wildlife-dependent recreation (hunting, fish, wildlife observation and photography, and environmental education and interpretation).
- E. Foster understanding and instill appreciation of the diversity and interconnectedness of fish, wildlife, and plants and their habitats.

Guiding Principles

There are four guiding principles for management and public use of the Refuge System established by Executive Order 12996 (1996):

- **Public Use**—The Refuge System provides important opportunities for compatible wildlife-dependent recreational activities involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation.
- **Habitat**—Fish and wildlife will not prosper without quality habitat, and without fish and wildlife, traditional uses of refuges cannot be sustained. The Refuge System will continue to conserve and enhance the quality and diversity of fish and wildlife habitat within refuges.
- **Partnerships**—America’s sportsmen and women were the first partners who insisted on protecting valuable wildlife habitat within wildlife refuges. Conservation partnerships with other Federal agencies, State agencies, tribes, organizations, industry, and the public can make significant contributions to the growth and management of the Refuge System.
- **Public Involvement**—The public should be given a full and open opportunity to participate in decisions about acquisition and management of national wildlife refuges.

E.2 OTHER LEGAL and POLICY GUIDANCE

Management actions on national wildlife refuges are constrained by many mandates including laws and Executive orders. The more common regulations that affect refuge management are listed below.

American Indian Religious Freedom Act (1978): Directs agencies to consult with native traditional religious leaders to determine appropriate policy changes necessary to protect and preserve Native American religious cultural rights and practices.

Americans with Disabilities Act (1992): Prohibits discrimination in public accommodations and services.

Antiquities Act (1906): Authorizes the scientific investigation of antiquities on Federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.

Archaeological and Historic Preservation Act (1974): Directs the preservation of historic and archaeological data in Federal construction projects.

Archaeological Resources Protection Act (1979), as amended: Protects materials of archaeological interest from unauthorized removal or destruction and requires Federal managers to develop plans and schedules to locate archaeological resources.

Architectural Barriers Act (1968): Requires federally owned, leased, or funded buildings and facilities to be accessible to persons with disabilities.

Bald and Golden Eagle Protection Act (1940): Provides for the protection of the bald eagle (the national emblem) and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds.

Bankhead–Jones Farm Tenant Act (1937): Some early refuges and hatcheries were established under the authority of this Act that required the Secretary of Agriculture to develop a program of land conservation and use.

Clean Air Act (1970, amended 1990): Restricts the amount of pollutants that can be emitted into the air. Designated wilderness areas including UL Bend National Wildlife Refuge have the highest standards (class I) for pollution and visibility and air quality is monitored at the refuge.

Clean Water Act (1977): Requires consultation with the U.S. Army Corps of Engineers (404 permits) for major wetland modifications.

Data Quality Act (2001): Requires Government agencies to ensure and maximize the quality, objectivity, utility, and dissemination of information by Federal agencies.

Emergency Wetlands Resources Act (1986): Promotes wetland conservation for the public benefit to help fulfill international obligations in various migratory bird treaties and conventions. The act authorizes buying wetlands with Land and Water Conservation Fund monies.

Endangered Species Act (1973): Requires Federal agencies to carry out programs for the conservation of endangered and threatened species.

Enhancement Act (2000): Public Law 106–54 authorized the Secretary of Army, working with the Secretary of Interior, to identify cabin sites suitable for conveyance to current lessees. The funds received will be used for acquiring other lands with greater wildlife and other public value for the refuge.

Executive Order 7509 (1936): Establishes the Fort Peck Game Range for the conservation and development of natural wildlife resources and for the protection and improvement of public grazing lands and natural forage resources. In 1963, it was renamed the

Charles M. Russell National Wildlife Range (Public Land Order 2951).

Executive Order 11988 (1977): Requires Federal agencies to provide leadership and take action to reduce the risk of flood loss, minimize the impact of floods on human safety, and preserve the natural and beneficial values served by the floodplains.

Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System (1996): Defines the mission, purpose, and priority public uses of the National Wildlife Refuge System. It also presents four principles to guide management of the Refuge System.

Executive Order 13007, Indian Sacred Sites (1996): Directs Federal land management and other agencies to accommodate access to and ceremonial uses of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites and, where appropriate, maintain the confidentiality of sacred sites.

Executive Order 13352, Cooperative Conservation (2004): Directs Federal agencies to implement laws relating to the environment and natural resources in a manner that promotes cooperative conservation with an emphasis on appropriate inclusion of local participation in Federal decisionmaking in accordance with respective agency missions and policies.

Executive Order 13443, Facilitation of Hunting Heritage and Wildlife Conservation (2007): Directs Federal land management and other agencies to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

Federal Noxious Weed Act (1990): Requires the use of integrated management systems to control or contain undesirable plant species and an interdisciplinary approach with the cooperation of other Federal and State agencies.

Federal Records Act (1950): Requires the preservation of evidence of the Government's organization, functions, policies, decisions, operations, and activities, as well as basic historical and other information.

Fish and Wildlife Coordination Act (1958): Allows the U.S. Fish and Wildlife Service to enter into agreements with private landowners for wildlife management purposes.

Game Range Act (1976): Public Law 94–223 transferred the management of all game ranges to the sole authority of National Wildlife Refuge System. This included Charles M. Russell Game Range and in 1978, the refuge was renamed Charles M. Russell National Wildlife Refuge (Public Land Order 5635).

Migratory Bird Conservation Act (1929): Establishes procedures for acquisition by purchase, rental, or gifts

of areas approved by the Migratory Bird Conservation Commission.

Migratory Bird Hunting and Conservation Stamp Act (1934): Authorizes the opening of part of a refuge to waterfowl hunting.

Migratory Bird Treaty Act (1918): Designates the protection of migratory birds as a Federal responsibility, and enables the setting of seasons and other regulations including the closing of areas, Federal or non-Federal, to the hunting of migratory birds.

Native American Policy (1994): Articulates the general principles that guide the Service's government-to-government relationship to Native American governments in the conservation of fish and wildlife resources.

National Environmental Policy Act (1969): Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate this act with other planning requirements, and prepare appropriate documents to facilitate better environmental decisionmaking. [From the 40 CFR 1500.]

National Historic Preservation Act (1966), as amended: Establishes as policy that the Federal Government is to provide leadership in the preservation of the Nation's prehistoric and historical resources.

National Trails System Act (1968): Established a national trails system including provisions for national historic trails that follow as closely as possible the original trails or routes of travel of national historic significance.

National Wildlife Refuge System Administration Act (1966): Defines the National Wildlife Refuge System and authorizes the Secretary of the Interior to permit any use of a refuge, provided such use is compatible with the major purposes for which the refuge was established.

National Wildlife Refuge System Improvement Act of 1997: Sets the mission and administrative policy for all refuges in the National Wildlife Refuge System; mandates comprehensive conservation planning for all units of the Refuge System.

Native American Graves Protection and Repatriation Act (1990): Requires Federal agencies and museums to inventory, determine ownership of, and repatriate cultural items under their control or possession.

Paleontological Resources Preservation Act of 2009: Requires the Secretary of Interior and Agriculture to manage and protect paleontological resources on Federal land using scientific principles and expertise.

Public Land Order (4588): Establishment of UL Bend National Wildlife Refuge and revocation of Executive Order 7509 on these lands.

Public Law (94–557) of 1976: Designation of wilderness areas within the National Wildlife Refuge System including parts of UL Bend National Wildlife Refuge.

Refuge Recreation Act (1962): Allows the use of refuges for recreation when such uses are compatible with the refuge's primary purposes and when sufficient money is available to manage the uses.

Rehabilitation Act (1973): Requires programmatic accessibility in addition to physical accessibility for all facilities and programs funded by the Federal Government to ensure that any person can participate in any program.

Rivers and Harbors Act (1899): Section 10 of this act requires the authorization of U.S. Army Corps of Engineers before any work in, on, over, or under navigable waters of the United States.

Volunteer and Community Partnership Enhancement Act (1998): Encourages the use of volunteers to help in the management of refuges within the Refuge System; facilitates partnerships between the Refuge System and non-Federal entities to promote public awareness of the resources of the Refuge System and public participation in the conservation of the resources; and encourages donations and other contributions.

Wild and Scenic Rivers Act (1968): Set aside certain rivers in the Nation to be preserved in free-flowing condition among other provisions. This included portions along the western boundary of the Refuge, which is part of the Upper Missouri National Wild and Scenic River most of which flows through the Upper Missouri Breaks National Monument (BLM). The act was modified in 1976 by Public Law 94–486 to apply the scenic designation to the river and its bed for the part that flows through the refuge.

Wilderness Act (1964): The act (Public Law 88–577) [16 U.S.C. 1131–36] defines wilderness as “A wilderness, in contrast with those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain.” Approximately 20,819 acres within UL Bend National Wildlife Refuge are designated as wilderness, and approximately 176,140 acres within Charles M. Russell Refuge are proposed for inclusion in the National Wilderness Preservation System, and is managed as if were designated wilderness.

Appendix F

Wilderness Review and Summary

The Service has reviewed and updated existing lands within Charles M. Russell National Wildlife Refuge for current wilderness potential, as guided by the Wilderness Stewardship Policy (FWS 2008c), which provides an overview and foundation for implementing the Wilderness Act and the National Wildlife Refuge System Administration Act of 1966, as amended by the Improvement Act.

F.1 HISTORY of WILDERNESS at the CHARLES M. RUSSELL NATIONAL WILDLIFE REFUGE

With the passage of The Wilderness Act of September 3, 1964, (Public Law 88–577), the Secretary of Interior was required to review every roadless area of 5,000 acres or more and every roadless island, regardless of size, within the National Wildlife Refuge System within 10 years after the effective date of the act, and report to the President of the United States his recommendations as to the suitability or unsuitability of each such area or island for preservation as wilderness. See table A for a timeline of wilderness decisions and actions that affected the refuge.

Table A. Timeline for wilderness on the Charles M. Russell and UL Bend Refuges, Montana.

<i>Date</i>	<i>Action</i>
September 13, 1964	The Wilderness Act of 1964 is enacted and all agencies are given 10 years to provide recommendations for wilderness designations. (Public Law 88–577).
May 3, 1974	Directors of the Bureau of Sport Fisheries and Wildlife and BLM release a draft environmental impact statement for 13 proposed wilderness units within Charles M. Russell National Wildlife Refuge.
May 20–29, 1974	Public hearings are held in four Montana locations (Malta, Miles City, Billings, and Jordan) and Denver, Colorado, to ascertain public views on the desirability to include Charles M. Russell Refuge in the National Wilderness Preservation System. Public hearings results in the removal of three previously recommended units (Lost Creek, Sage Creek, and Snow Creek) and the addition of four (East Beauchamp, East Hell Creek, Wagon Coulee, and West Beauchamp) bringing the total number of recommended wilderness units to 15.
August 28, 1974	Assistant Secretary of the Interior officially forwards Charles M. Russell Refuge wilderness recommendations to the President of the United States.

Table A. Timeline for wilderness on the Charles M. Russell and UL Bend Refuges, Montana.

<i>Date</i>	<i>Action</i>
December 4, 1974	President Gerald R. Ford transmits proposals for 37 additions to the National Wilderness Preservation System (including Charles M. Russell Refuge’s 15 units) to Congress. This act transitions the 15 Charles M. Russell Refuge units from wilderness study areas (WSA) to “proposed wilderness.” From this point forward, all 15 units are to be managed as wilderness, per the tenets of The Wilderness Act of 1964. (House Document 94–403)
October 19, 1976	UL Bend Wilderness designated in part of UL Bend National Wildlife Refuge with wilderness areas totaling 20,890 acres. (Public Law 94–557)
October 31, 1983	28 acres of designated wilderness within UL Bend Refuge removed from the National Wilderness Preservation System to allow for fishing access. (Public Law 98–140)
July 29, 2002	All refuge roads on proposed wilderness areas closed per US DOI memo entitled, “Charles M. Russell Road Policy Challenged.”

On May 3, 1974, the Directors of the Bureau of Sport Fisheries and Wildlife (the Service) and BLM released a draft environmental impact Statement for 13 proposed wilderness units within Charles M. Russell National Wildlife Refuge. Five separate public hearings were then held on the proposals in Malta, Miles City, Billings, Denver, and Jordan between May 20 and May 29, 1974. The comment period was extended until June 28, 1974, to allow for more written comments on the proposed wilderness units. A total of 283 individuals attended the five hearings with 101 statements read into the record. The public hearings resulted in the addition of two more Charles M. Russell Refuge units as viable wilderness, bringing the total recommended wilderness areas to 15 with a combined acreage of 155,288 acres.

On December 4, 1974, President Gerald Ford, via House Document No. 93-403 recommended that the selected 155,288 acres of the Charles M. Russell National Wildlife Refuge keep their pristine character through protection as proposed wilderness units (Note: The proposal that went to Congress identified 155,388 acres, but the actual acreage was 155,288 acres and is considered to be legal acreage). The 155,288 acres was divided among 15 units (identified in table B in section F.3 below).

With advances in technology, the Service has since refined all of the proposed wilderness units and entered them into GIS. Through the minimization of errors and correction of boundaries, the acreage the Service recognizes today as proposed wilderness units is closer to 158,619 acres.

Section "F.2, Current Proposed Wilderness" provides a complete description of each area currently managed as proposed wilderness. As directed by Congress, the Service is required to manage all proposed wilderness units to maintain their wilderness character based on these qualities: an untrammelled and natural state, a lack of development, and the capacity for solitude or primitive and unconfined recreation.

F.2 CURRENT PROPOSED WILDERNESS

The management direction map (figure 41 in chapter 4) and the wilderness map (figure A) in this appendix show the locations of proposed wilderness units. The wilderness character of all designated and proposed wilderness areas within Charles M. Russell Refuge will be reevaluated through the creation of a wilderness stewardship plan following finalization of the CCP.

The next section describes the basic geography and topography of the 15 existing proposed wilderness units.

1. East Seven Blackfoot—11,744 acres

BLM's wilderness study area surrounds the southern boundary of East Seven Blackfoot. This unit, like the Billy Creek Unit and West Seven Blackfoot Unit, is extremely rugged with high ridges and numerous side drainages and coulees. Slaymaker Ridge is the most notable physical feature, running north and south in the middle of the proposed wilderness unit. Vegetation types include limited forested areas, grassy benches, and sagebrush and greasewood flats. Much of the land is barren due to the soils, slope, and topography.

2. Mickey Butte—16,893 acres

Mickey Butte is situated on the east side of the UL Bend Refuge, contiguous with the UL Bend Wilderness. This unit is characterized by high bluffs on the northwest side yielding to steep, rugged coulees draining the area to the east and southeast. The coulees are relatively short as they rise to the bluffs. Forested areas become more sparse in this area, compared to the western part of the refuge, with grasses, sagebrush, and greasewood increasing in percentage of ground cover.

3. Burnt Lodge—21,576 acres

Burnt Lodge is one of the most rugged and scenic areas within the Missouri River Breaks. The area varies from rolling Bear Paw shale hills in the west to the extremely rugged eastern part, which is an extension of the Larb Hills. Scattered patches of ponderosa pine and juniper dominate the north slopes and high bench lands. Grasses, sagebrush, and greasewood predominate in the area west of Killed Woman Creek. The northern boundary of this unit abuts a BLM wilderness study area.

4. Billy Creek—10,916 acres

Billy Creek is extremely rugged with short, steep-sided drainages. Much of the area is inaccessible to livestock with dominant grass, sagebrush, and greasewood vegetation. Forested areas are isolated and occur only where soil, slope, and aspects are conducive to their growth.

5. West Seven Blackfoot—6,456 acres

A BLM wilderness study area surrounds the southern boundary of West Seven Blackfoot. The unit is similar to the East Seven Blackfoot. A long, high ridge running west to east and paralleling the reservoir dominates the unit. Vegetation is similar to adjacent proposed wilderness units, with increased forest cover.

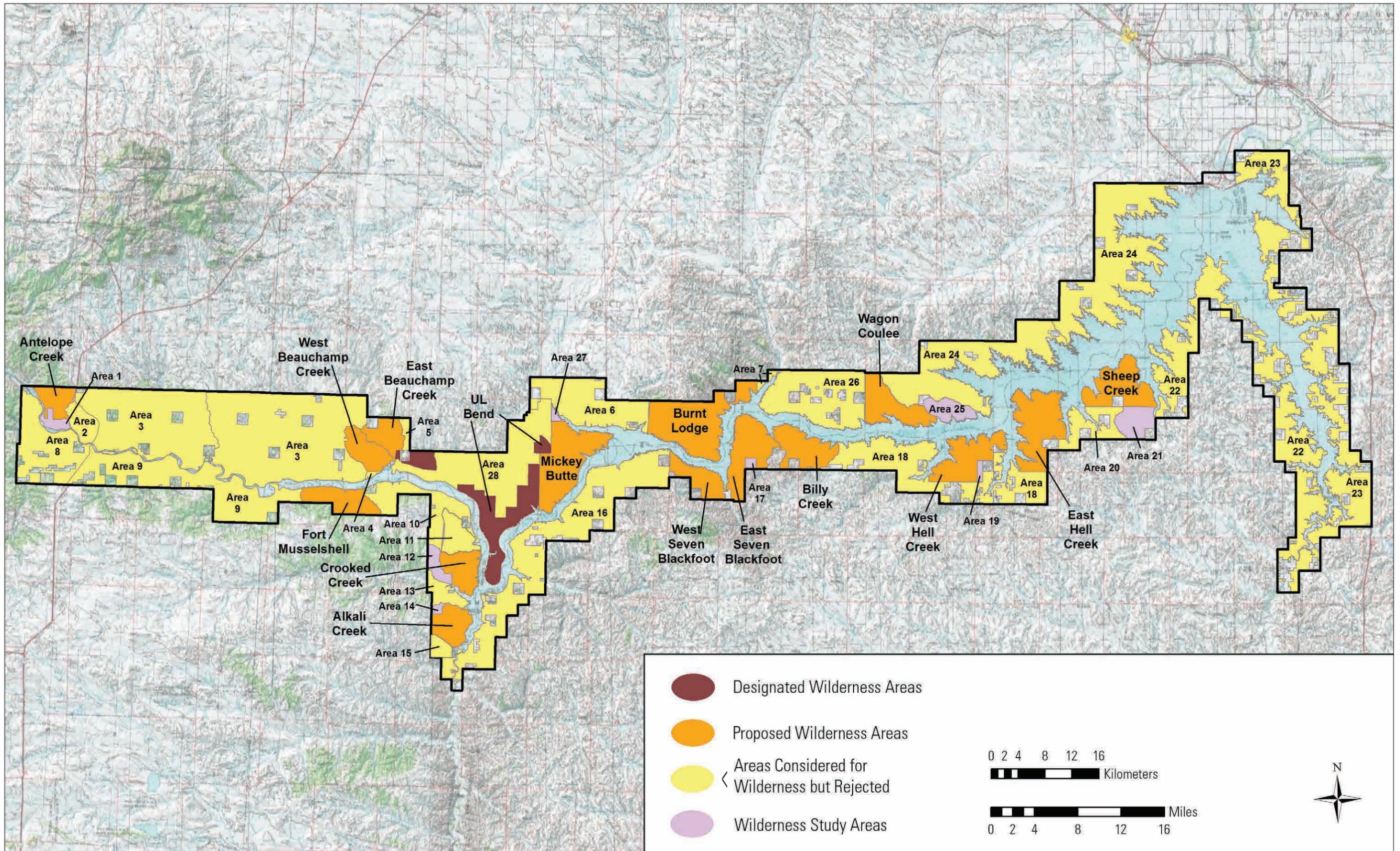


Figure A. Map of designated wilderness, proposed wilderness units (areas), and wilderness study areas for the Charles M. Russell and UL Bend Refuges, Montana.

6. Antelope Creek—5,062 acres

Antelope Creek is forested with long and geologically well-developed drainages. The bordering ridges are steep and relatively narrow-crested. It is located in the very northwest corner of the refuge contiguous to the Upper Missouri River National Monument WSA administered by BLM.

7. West Hell Creek—11,896 acres

West Hell Creek provides a physical transition between the badlands to the east and the Missouri River Breaks to the west. Forest cover is more plentiful in this unit than in the area east of Hell Creek, but the landscape is still dominated by grass, sagebrush, and other shrubs.

8. Fort Musselshell Unit—8,303 acres

Fort Musselshell contains major drainages that run parallel to Fort Peck Reservoir, in contrast to the perpendicular drainages in most areas. The slopes are well vegetated with conifers, grass, sagebrush, and other shrubs.

9. Sheep Creek—11,784 acres

Sheep Creek is situated between Cracker Creek Bay and Gilbert Creek Bay west of the Sage Creek Proposed Wilderness. The topography reflects inconsistent erosion. Grass with some sagebrush and other shrubs dominate the landscape. Trees are virtually absent.

10. West Beauchamp Creek—6,736 acres

West Beauchamp Creek comprises three short coulees between ridges that start from CK Ridge and proceed in a southeasterly direction, ending at the Missouri River. These coulees are characterized by scattered stands of ponderosa pine and juniper, and ridge tops of sagebrush shrub mixed with western and bluebunch-wheatgrass grassland.

11. Wagon Coulee—10,480 acres

Wagon Coulee contains the most rugged parts of the south-facing aspect of Harper's Ridge. It includes the lower 2 miles of the Cabin Coulee drainage and an approximately 2-mile section of the middle reaches of Carpenter Creek. The coulees within the unit contain healthy stands of ponderosa pine with ridge tops consisting of primarily grass and scattered sage.

12. Alkali Creek—6,592 acres

Alkali Creek is characterized by short drainages, which produce a jumbled appearance. Slopes are for-

ested and, due to the northern exposure, well vegetated with grasses, sagebrush, and other shrubs.

13. Crooked Creek—6,842 acres

Crooked Creek drainages are relatively short with well-forested side slopes. Away from the reservoir, the forest is interspersed with small grassy parklands.

14. East Hell Creek—14,744 acres

East Hell Creek is physically similar to the West Hell Creek proposed wilderness unit. Landscapes include grassy, flat ridge tops or mesas, gentle rolling breaks, and numerous steep drainages and canyons nearer the lake. Vegetation is typical of the Missouri River Breaks with a mix of forested areas and juniper patches, grasslands, and sagebrush flats.

15. East Beauchamp Creek—5,264 acres

East Beauchamp Creek comprises the lower reaches of the Beauchamp Creek drainage, which is a 20-mile-long watershed. A wide, intermittent drainage within the East Beauchamp unit has the potential for excellent riparian habitat. Secondary side coulees are characterized by ponderosa pine and juniper.

F.3 WILDERNESS INVENTORY

There are three phases to the wilderness review process: (1) inventory, (2) study, and (3) recommendation. Areas that meet the minimum criteria for wilderness are identified in the inventory phase. These areas are called wilderness study areas (WSAs). These areas must be roadless and meet one of the following size criteria:

- greater than 5,000 acres
- a roadless island of any size
- less than 5,000 acres but of sufficient size to be practicably managed as wilderness

A wilderness study area must also be natural and provide opportunities for solitude or primitive recreation.

Table B reflects the evaluation of existing wilderness and nonwilderness units within Charles M. Russell Refuge against the criteria for inclusion in the National Wilderness Preservation System. (Refer to the final CCP and EIS for the evaluation of wilderness under all alternatives.)

Table B. Wilderness inventory for the Charles M. Russell and UL Bend Refuges, Montana.

Evaluation criteria (“yes” or “no” for meeting criteria, with comments)

(1) At least 5,000 acres of land	(2) Affected primarily by forces of nature, with the imprint of human work substantially unnoticeable	(3a) Outstanding opportunities for solitude (3b) Outstanding opportunities for primitive and unconfined recreation	(4) Ecological, geological, or other features of scientific, educational, or historical value	<i>QUALIFIES as a wilderness study area (meets criteria 1, 2, and 3a or 3b)</i>
AREA 1 • NORTH: Antelope Creek proposed wilderness • SOUTH, WEST: Missouri River				
(1) No 1,836 acres	(2) Yes No bisecting roads.	(3a) Yes, (3b) Yes Bounded by the Mis- souri River and Ante- lope Creek proposed wilderness, connect- ing to BLM Upper Missouri River Breaks National Monument WSA. Opportunities for land and water recreation (Missouri River).	(4) Yes River edge is impor- tant habitat for spiny softshell turtle and the American white pelican.	YES
AREA 2 • NORTH, WEST: Antelope Creek proposed wilderness, inventory unit 1 • SOUTH: Missouri River • EAST: Highway 191				
(1) No 4,606 acres	(2) No Eastern boundary is Highway 191 along with State-maintained power lines. Refuge road 305 within this unit.	(3a) No, (3b) Yes Proximity to State highway, auto tour route, and developed Kipp Recreation Area reduces solitude. Opportunities for land and water recreation (Missouri River).	(4) No	NO
AREA 3 • NORTH: Refuge boundary • SOUTH: Missouri River • WEST: Highway 191 • EAST: Refuge boundary, State section, refuge road 201, West Beauchamp proposed wilderness				
(1) Yes 108,397 acres	(2) No Contains the auto tour route visited by 10,000 vehicles each year and the Slippery Ann elk-viewing area. Parts of road 201, main artery on the north side of the refuge, pass through unit. Contains four State sections and three pri- vately owned tracts.	(3a) No, (3b) No Auto tour route and Slippery Ann viewing area results in signifi- cant vehicular traffic. Recreation opportuni- ties are disrupted by roads and year-round closure of the Slip- pery Ann area.	(4) Yes Important elk breed- ing habitat.	NO

Table B. Wilderness inventory for the Charles M. Russell and UL Bend Refuges, Montana.*Evaluation criteria (“yes” or “no” for meeting criteria, with comments)*

(1) At least 5,000 acres of land	(2) Affected primarily by forces of nature, with the imprint of human work substantially unnoticeable	(3a) Outstanding opportunities for solitude (3b) Outstanding opportunities for primitive and unconfined recreation	(4) Ecological, geological, or other features of scientific, educational, or historical value	<i>QUALIFIES as a wilderness study area (meets criteria 1, 2, and 3a or 3b)</i>
AREA 4 • NORTH, EAST: West Beauchamp Creek proposed wilderness; WEST: Refuge roads 201 and 302 • SOUTH: Missouri River				
(1) No 359 acres	(2) Yes Bordered by roads 201 and 302, but does not contain any bisecting roads.	(3a) No, (3b) Yes Too small to offer sol- itude. Adjacency to Missouri River provides water recreation access.	(4) No	NO
AREA 5 • NORTH, EAST: Refuge boundary • WEST: East Beauchamp proposed wilderness • SOUTH: State section				
(1) No 1,348 acres	(2) No No roads present, but provides vehicu- lar access to the State lease south of unit.	(3a) No, (3b) No Dominated by a steep, eroded coulee.	(4) No	NO
AREA 6 • NORTH, WEST: Refuge boundary • SOUTH: UL Bend National Wildlife Refuge, Missouri River • EAST: Burnt Lodge proposed wilderness				
(1) Yes 21,061 acres	(2) No Contains the Four- chette Creek Recre- ation Area. Intersected by five refuge roads. Contains three State parcels.	(3a) No, (3b) No Recreation area vis- ited by hunters and recreationists year- round. Installations and development at recre- ation areas preclude primitive recreation.	(4) No	NO
AREA 7 • NORTH: Refuge boundary • WEST: Burnt Lodge proposed wilderness • SOUTH, EAST: Timber Creek, Missouri River				
(1) No 833 acres	(2) No Road 339 bisects the northern half of unit and provides access to Timber Creek Bay.	(3a) No, (3b) No A road disrupts soli- tude. The small size limits recreation opportu- nities.	(4) No	NO

Table B. Wilderness inventory for the Charles M. Russell and UL Bend Refuges, Montana.

Evaluation criteria (“yes” or “no” for meeting criteria, with comments)

(1) At least 5,000 acres of land	(2) Affected primarily by forces of nature, with the imprint of human work substantially unnoticeable	(3a) Outstanding opportunities for solitude (3b) Outstanding opportunities for primitive and unconfined recreation	(4) Ecological, geological, or other features of scientific, educational, or historical value	<i>QUALIFIES as a wilderness study area (meets criteria 1, 2, and 3a or 3b)</i>
AREA 8 • NORTH: Missouri River • WEST, SOUTH: Refuge boundary • EAST: Highway 191				
(1) Yes 18,913 acres	(2) No Contains privately owned land, two State sections, and four ref- uge roads. Along the Highway 191 corridor.	(3a) No, (3b) No Private inholdings and trafficked roads preclude solitude. Mosaic of roads and inholdings disrupt opportunities for unconfined recreation.	(4) No	NO
AREA 9 • NORTH: Missouri River West, Highway 191 • SOUTH: Refuge boundary • EAST: Fort Musselshell proposed wilderness				
(1) Yes 32,929 acres	(2) No Along the Highway 191 corridor. Contains Sand Creek Field Station and administrative area, multiple privately owned tracts, and three State sections.	(3a) No, (3b) No Contains the major east–west refuge road on the south side of the Missouri River and the Sand Creek Field Station. Contains significantly developed areas such as the Sand Creek Field Station.	(4) No	NO
AREA 10 • NORTH, EAST: Missouri River • SOUTH: Refuge road 315, Wilderness Inventory Unit C • WEST, SOUTH: Refuge boundary				
(1) Yes 12,560 acres	(2) No Borders private inhold- ings, State lands, and several refuge roads.	(3a) No, (3b) No Contains road 315, which borders private lands and State lands leased by the refuge and provides recre- ational access. Several roads and the narrow refuge prop- erty along the Mis- souri River confines recreation.	(4) No	NO
AREA 11 • NORTH, EAST: Refuge road 315, Missouri River • WEST: Refuge road 838 • SOUTH: Crooked Creek proposed wilderness				
(1) Yes 5,568 acres	(2) Yes No interior roads. Bordered by refuge roads 311, 315, and 838.	(3a) Yes, (3b) Yes Bordering roads allow for hunting access and wildlife observation.	(4) Yes Important sage- grouse habitat.	NO

Table B. Wilderness inventory for the Charles M. Russell and UL Bend Refuges, Montana.*Evaluation criteria (“yes” or “no” for meeting criteria, with comments)*

(1) At least 5,000 acres of land	(2) Affected primarily by forces of nature, with the imprint of human work substantially unnoticeable	(3a) Outstanding opportunities for solitude (3b) Outstanding opportunities for primitive and unconfined recreation	(4) Ecological, geological, or other features of scientific, educational, or historical value	<i>QUALIFIES as a wilderness study area (meets criteria 1, 2, and 3a or 3b)</i>
AREA 12 • NORTH: Refuge road 311 • SOUTH: Refuge road 411, Missouri River • EAST: Crooked Creek proposed wilderness • WEST: Refuge boundary				
(1) No 2,826 acres	(2) Yes No interior roads. Bordered by roads 311, 377, and 411.	(3a) No, (3b) Yes Surrounded by refuge roads on two sides. Close to Crooked Creek Recreation Area. Bordering roads allow for hunting access and wildlife observation.	(4) No	YES
AREA 13 • NORTH: Crooked Creek drainage, refuge road 411 • WEST: Refuge boundary • SOUTH: Refuge road 103 to intersection with Crooked Creek				
(1) No 4,046 acres	(2) No Contains the Crooked Creek Recreation Area managed by USACE.	(3a) No, (3b) No Contains USACE facilities. Development at Crooked Creek Rec- reation Area precludes primitive recreation.	(4) No	NO
AREA 14 • NORTH: County road, Crooked Creek Road • SOUTH, EAST: Alkali Creek proposed wilderness • WEST: Refuge boundary				
(1) No 640 acres	(2) Yes Contains no roads. Bordered on the north by refuge road 103.	(3a) No, (3b) No Traffic on Crooked Creek Road is visible from the unit.	(4) No	YES
AREA 15 • NORTH: Alkali Creek proposed wilderness • SOUTH, WEST: Refuge boundary				
(1) No 2,240 acres	(2) Yes No established roads in or next to the unit.	(3a) Yes, (3b) Yes Only accessible via foot.	(4) No	YES

Table B. Wilderness inventory for the Charles M. Russell and UL Bend Refuges, Montana.

Evaluation criteria (“yes” or “no” for meeting criteria, with comments)

(1) At least 5,000 acres of land	(2) Affected primarily by forces of nature, with the imprint of human work substantially unnoticeable	(3a) Outstanding opportunities for solitude (3b) Outstanding opportunities for primitive and unconfined recreation	(4) Ecological, geological, or other features of scientific, educational, or historical value	<i>QUALIFIES as a wilderness study area (meets criteria 1, 2, and 3a or 3b)</i>
AREA 16 • NORTH: Missouri River • SOUTH, WEST: Refuge boundary • EAST: West Seven Blackfoot proposed wilderness				
(1) No 50,074 acres	(2) No Multiple, privately owned parcels, roads (refuge and county), and the Devils Creek Recreation Area.	(3a) No, (3b) No Substantial private traffic and public traf- fic on county route 245. Unit is a mosaic bro- ken up by refuge and county roads. Significant private and refuge installations and development.	(4) Yes Pronghorn migration route across Missouri River.	NO
AREA 17 • NORTH, EAST, WEST: East Seven Blackfoot proposed wilderness • SOUTH: Refuge boundary				
(1) No 640 acres	(2) Yes No established roads.	(3a) Yes, (3b) Yes Surrounded on all sides by East Seven Blackfoot proposed wilderness and BLM Seven Blackfoot WSA.	(4) No	YES
AREA 18 • NORTH: Missouri River, West Hell Creek proposed wilderness, Hell Creek Bay, East Hell Creek proposed wilderness • SOUTH, EAST: Refuge boundary • WEST: Billy Creek proposed wilderness				
(1) Yes 32,359 acres	(2) No Contains the Hell Creek Recreation Area, which has a campground, marina, boat ramp, and multi- ple private inholdings.	(3a) No, (3b) No County road provides public access to the Hell Creek Recreation area and near Round Butte. A mosaic of private and refuge lands. Contains refuge developments at Hell Creek Recreation Area.	(4) No	NO
AREA 19 • NORTH, WEST: West Hell Creek proposed wilderness • EAST: State section				
(1) Yes 641 acres	(2) Yes No established roads.	(3a) Yes, (3b) Yes Contiguous on two sides with West Hell Creek proposed wil- derness.	(4) No	YES

Table B. Wilderness inventory for the Charles M. Russell and UL Bend Refuges, Montana.*Evaluation criteria (“yes” or “no” for meeting criteria, with comments)*

(1) At least 5,000 acres of land	(2) Affected primarily by forces of nature, with the imprint of human work substantially unnoticeable	(3a) Outstanding opportunities for solitude (3b) Outstanding opportunities for primitive and unconfined recreation	(4) Ecological, geological, or other features of scientific, educational, or historical value	<i>QUALIFIES as a wilderness study area (meets criteria 1, 2, and 3a or 3b)</i>
AREA 20 • NORTH: Fort Peck Reservoir, Sheep Creek proposed wilderness, refuge road 357 • EAST: Refuge road 357 • SOUTH: Refuge boundary; West: Township line R38E				
(1) Yes 8,225 acres	(2) No Contains two private inholdings, one State section, and five refuge roads.	(3a) No, (3b) No Mosaic of roads and private and State lands with associated traffic.	(4) No	NO
AREA 21 • NORTH: Sheep Creek proposed wilderness • SOUTH, EAST: Refuge boundary • WEST: Refuge roads 356 and 357				
(1) Yes 5,726 acres	(2) Yes Only one adjacent road: refuge road 356/357.	(3a) Yes, (3b) Yes Adjacent roads provide hunting access and water recreation access via Gilbert Creek Bay.	(4) No	YES
AREA 22 • NORTH: Fort Peck Reservoir, Big Dry Arm • WEST: West Gilbert Creek drainage • SOUTH: Refuge boundary • EAST: Fort Peck Reservoir, Big Dry Arm, Big Dry Creek				
(1) Yes 48,835 acres	(2) No Contains multiple roads and private inholdings. Inholdings and roads break up the unit, so there is not a single, contiguous 5,000-acre block. Includes Rock Creek Recreation Area. Consists of multiple, privately owned cabin sites.	(3a) No, (3b) No Primitive nature of unit is broken up by many transecting roads.	(4) Yes Area contains significant paleontological resources.	NO
AREA 23 • NORTH, SOUTH, EAST: Refuge boundary • WEST: Big Dry Arm of the Fort Peck Reservoir				
(1) Yes 57,446 acres	(2) No Several USACE recreation areas and multiple State sections. Includes more than a dozen refuge roads. Contains Fort Peck Dam spillway.	(3a) No, (3b) No Includes three recreation areas with developed structures. Riddled with roads and developed structures.	(4) No	NO

Table B. Wilderness inventory for the Charles M. Russell and UL Bend Refuges, Montana.

Evaluation criteria (“yes” or “no” for meeting criteria, with comments)

(1) At least 5,000 acres of land	(2) Affected primarily by forces of nature, with the imprint of human work substantially unnoticeable	(3a) Outstanding opportunities for solitude (3b) Outstanding opportunities for primitive and unconfined recreation	(4) Ecological, geological, or other features of scientific, educational, or historical value	<i>QUALIFIES as a wilderness study area (meets criteria 1, 2, and 3a or 3b)</i>
AREA 24 • NORTH: Refuge boundary, refuge road 331 • SOUTH: Fort Peck Reservoir • WEST: Refuge road 327, Wagon Coulee proposed wilderness • EAST: Duck Creek Road				
(1) Yes 82,160 acres	(2) No Contains four partial or full State sections, multiple private in- holdings, and refuge roads. Includes the Pine Recreation Area.	(3a) No, (3b) No Many refuge roads and structures.	(4) No	NO
AREA 25 • NORTH: Refuge road 327 • SOUTH, EAST: Missouri River • WEST: Wagon Coulee proposed wilderness				
(1) No 4,843 acres	(2) Yes No interior roads or installed structures except a navigational marker on the shore- line.	(3a) Yes, (3b) Yes Limited access on adjacent refuge road 327.	(4) No	YES
AREA 26 • NORTH: Refuge boundary • EAST: Wagon Coulee proposed wilderness • SOUTH: Fort Peck Reservoir • WEST: Timber Creek Bay				
(1) Yes 23,560 acres	(2) No Contains Bone Trail Boat Ramp and multi- ple private inholdings.	(3a) No, (3b) No Provides vehicular access to Fort Peck Reservoir.	(4) No	NO
AREA 27 • NORTH, EAST: Fort Peck Lake • SOUTH: Mickey Butte proposed wilderness				
(1) No 550 acres	(2) Yes No roads adjacent or within area.	(3a) Yes, (3b) Yes No roads adjacent or within area.	(4) No	YES
AREA 28 • UL BEND NATIONAL WILDLIFE REFUGE: all land currently not part of the UL Bend Wilderness				
(1) Not known	(2) No A network of roads crosses the center of UL Bend Refuge.	(3a) No, (3b) No Popular access to fish- ing and hunting. Roads disrupt oppor- tunities for unconfined recreation.	(4) Yes	NO

*Wilderness inventory numbers in this table reference labeled areas on figure A.

F.4 WILDERNESS STUDY

The wilderness inventory identified nine areas within eight proposed wilderness units on the Charles M. Russell and UL Bend Refuges that possess the required wilderness character for potential inclusion in the National Wilderness Preservation System as defined by The Wilderness Act of 1964. All areas are next to existing proposed wilderness areas on the refuge. Each of these areas was further evaluated through the refuge planning process to determine their suitability for designation, management, and preservation as wilderness. This evaluation considered the following:

- quality of wilderness values
- evaluation of resource values, public uses, and associated management concerns
- capability for management as wilderness

All recommended wilderness study areas resulting from this review assume the name of the adjacent proposed wilderness area. For example, the area abutting Antelope Creek proposed wilderness is known as the Antelope Creek WSA.

Evaluation of Wilderness Values

BLM currently manages several wilderness study areas next to the refuge (see the management direction map, figure 41, in chapter 4). These areas were taken into consideration in reviewing refuge lands that contain wilderness character and potential areas that could be suited for wilderness proposal and designation. In three general areas along the refuge boundary, there are either BLM wilderness study areas or the Upper Missouri River Breaks National Monument. These protected areas provide crucial unobstructed corridors for wildlife migration in central Montana.

Naturalness. All of the recommended wilderness study areas generally appear to have been affected primarily by nature, with the imprint of human uses and activities substantially unnoticeable. The recommended wilderness study areas are free from private inholdings and interior roads and are next to existing, proposed Charles M. Russell Refuge wilderness areas.

Several of the recommended wilderness study areas exhibit excellent, natural, active, riparian systems such as Antelope Creek WSA and West Beauchamp Creek WSA.

Outstanding Opportunities for Solitude and Primitive Recreation. All of the recommended, wilderness study areas offer outstanding opportunities for both solitude and primitive recreation. Although several are less than 5,000 acres, all wilderness study areas are contiguous with already existing proposed wilder-

ness areas in Charles M. Russell Refuge and serve to further enhance the size of existing areas available for solitude and primitive recreation.

The following areas are not bounded by refuge roads or the refuge boundary and, therefore, will provide particularly quality opportunities for solitude and primitive recreation: East Seven Blackfoot WSA, Mickey Butte WSA, and West Hell Creek WSA.

Quality of Supplemental Values. Some of the recommended wilderness study areas provide important habitat for federally warranted and State-listed plant and animal species such as greater sage-grouse, ferruginous hawk, American white pelican, spiny softshell turtle, and northern leopard frog.

Evaluation of Manageability and Other Resource Values and Uses. Each of the recommended wilderness study areas on the refuge can be managed to preserve their wilderness character in perpetuity, recognizing that a “minimum requirement” approach is required. There are no valid, existing private rights included in any recommended wilderness study areas.

Currently, game carts are allowed in existing proposed Charles M. Russell Refuge wilderness units, and this provision will be common to all newly recommended wilderness study areas. The UL Bend Wilderness will still prohibit the use of game carts.

None of the current or expected refuge management activities and public uses will diminish the wilderness character. These include hunting, scientific research, resource monitoring, commercial services such as guided wildlife hunting, environmental education, and low-impact recreational activities. There are no plans to construct permanent facilities or structures to accommodate these uses.

In summary, wilderness designation and management of the wilderness study areas is fully compatible with refuge management under this CCP, and none of the resource values identified above will be foregone or adversely affected as a result of designation.

F.5 MANAGEMENT DIRECTION

The Service evaluated four alternatives in the final CCP and EIS for managing wilderness on the refuge; alternative D was selected in the record of decision (refer to appendix A). The resulting CCP wilderness recommendations are described below, and all adhere to the overarching CCP goal for wilderness:

Conserve, improve, and promote the wilderness quality and associated natural processes of designated, proposed, and wilderness study areas within Charles M. Russell National Wildlife Refuge for all generations.

The Service will expand or adjust eight proposed wilderness units by recommending nine adjacent wilderness study areas be considered for inclusion in the National Wilderness Preservation System. A net gain of 19,942 acres will allow more efficient management of large landscapes to address the overall emphasis on natural ecological processes with minimal management to promote biological diversity, biological integrity, and environmental health.

Table C lists the recommended wilderness study areas, which are shown on the management direction map, figure 41, in chapter 4. These areas will be designated as proposed wilderness units following transmission to the United States President (per 610 FW 4.23). An act of Congress is required for all proposed wilderness units to become designated wilderness.

Table C. Wilderness study areas recommended in the CCP for the Charles M. Russell and UL Bend Refuges, Montana.

<i>Wilderness study area unit*</i>	<i>Unit name</i>	<i>Acres</i>
1 (A)	Antelope Creek	1,836
12 (D)	Crooked Creek 2	2,826
14 (E)	Alkali Creek 1	640
15 (F)	Alkali Creek 2	2,240
17 (G)	East Seven Blackfoot	640
19 (H)	West Hell Creek	641
21 (I)	Sheep Creek	5,726
25 (J)	Wagon Coulee	4,843
27 (K)	Mickey Butte	550
		Total 19,942

*Wilderness study area unit numbers in this table reference the labeled areas in figure A and in figure 41 in chapter 4.

Two potential wilderness study areas were not recommended in the record of decision:

- Crooked Creek 1 WSA was not recommended to allow the most management options for (1) wildlife-dependent recreational use and (2) the use of prescribed fire and livestock grazing in this area's habitat unit.
- West Beauchamp WSA is bordered by heavily recreated refuge road 302. To maintain access for wildlife-dependent recreation, this area was excluded.

F.6 DEFINITIONS

Several definitions are used in this wilderness review.

Wilderness Definition and Criteria. The definition of wilderness is in section 2(c) of the Wilderness Act:

“A wilderness, in contrast with those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and that (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historic value.”

Designated Wilderness. An area designated in legislation and administered as part of the National Wilderness Preservation System.

Proposed Wilderness. An area of the Refuge System that the Secretary of the Interior (Secretary) has recommended to the President for inclusion in the National Wilderness Preservation System. The President then transmits the wilderness proposal to Congress. Once the Secretary transmits the recommendation to the President, the Service considers the area proposed wilderness and will manage it as designated wilderness.

Recommended Wilderness. An area of the Refuge System that the Director of the Service has recommended to the Secretary through the Assistant Secretary for Fish and Wildlife and Parks for inclusion in the National Wilderness Preservation System.

Wilderness Review. The inventory, study, and decisionmaking process the Service uses to determine whether to recommend Refuge System lands and waters for wilderness designation.

Wilderness Study Area. A wilderness study area is an area the Service is considering for wilderness designation. The Service identifies and establishes wilderness study areas through the inventory component of a wilderness review. The study areas include all areas that are still undergoing the review process.

Wilderness Values. Wilderness values are biophysical (ecosystems, scenery, and natural processes), psychological (opportunity for solitude or primitive and

unconfined recreation), symbolic (national and natural remnants of American cultural and evolutionary heritage), and spiritual (sense of connection with nature and values beyond one's self).

Appendix G

List of Plant and Animal Species

This appendix contains the common and scientific names of plants, amphibians, reptiles, fish, birds, and mammals of the Charles M. Russell National Wildlife Refuge and the UL Bend National Wildlife Refuge.

SENTINEL PLANT SPECIES

Sentinel plants are those species that vanish first when the ecological processes that occur within an ecosystem are out of balance. The following sentinel plant species occur on the upland plains and draws and north slopes on the Charles M. Russell National Wildlife Refuge and UL Bend National Wildlife Refuge. The list is not inclusive of all possible species, or custom to a specific locale, and are intended to be adaptive to new information obtained through management or research.

The “fire sentinel” plants listed below are fire-intolerant species. Unlike the sentinel shrubs, trees, and warm-season forbs that are currently declining, the fire sentinels are abundant on the refuge. However, fire sentinels are important species to monitor because of their significance to wildlife and ecological processes.

SHRUBS and TREES

rubber rabbitbrush, *Chrysothamnus nauseosus* spp. *nauseosus*
green rubber rabbitbrush, *Chrysothamnus nauseosus* spp. *graveolens*
saltbush, *Atriplex aptera*
winterfat, *Krascheninnikovia lanata*
silver buffaloberry, *Shepherdia argentea*
chokecherry, *Prunus virginiana*
boxelder, *Acer negundo*
green ash, *Fraxinus pennsylvanica*
plains cottonwood, *Populus deltoides*
redosier dogwood, *Cornus stolonifera*
golden current, *Ribes aureum*
quaking aspen, *Populus tremuloides*
peachleaf willow, *Salix amygdaloides*

WARM-SEASON FORBS

purple coneflower, *Echinacea angustifolia*
stiff sunflower, *Helianthus pauciflorus*
dotted gayfeather, *Liatris punctata*
white prairieclover, *Dalea candida*
purple prairieclover, *Dalea purpurea*
Maximilian sunflower, *Helianthus maximiliani*

FIRE SENTINELS

big sagebrush, *Artemisia tridentata tridentata*
Rocky Mountain juniper, *Juniperus scopulorum*
ponderosa pine, *Pinus ponderosa*
Douglas-fir, *Pseudotsuga toxifolia*

FOCAL BIRD SPECIES

On the refuge, the following focal bird species are considered most sensitive to or limited by certain ecological processes (such as fire or nest predation) or habitat attributes (such as patch size or snags). Some of the sentinel species listed above are important for focal birds and are being used to help guide management activities.

UPLAND

long-billed curlew, *Numenius americanus*
Sprague's pipit, *Antus spragueii*
Baird's sparrow, *Ammodramus bairdii*
brown creeper, *Certhia americana*
sharp-tailed grouse, *Tympanuchus phasianellus*
greater sage-grouse, *Centrocercus urophasianus*

RIVER BOTTOM

ovenbird, *Seiurus aurocapillus*
Cordilleran flycatcher, *Empidonax occidentalis*
black-billed cuckoo, *Coccyzus erythrophthalmus*
western wood-pewee, *Contopus sordidulus*

RIPARIAN AREA and WETLAND

red-eyed vireo, *Vireo olivaceus*
Brewer's blackbird, *Euphagus cyanocephalus*
veery, *Catharus fuscescens*

PLANT LIST

<i>Scientific name</i>	<i>Common name</i>
Aceraceae	Maple family
<i>Acer negundo</i>	boxelder
Agavaceae	Century-plant family
<i>Yucca glauca</i>	soapweed yucca
Alismataceae	Water plantain family
<i>Alisma gramineum</i>	narrowleaf water plantain
<i>A. triviale</i>	northern water plantain
<i>Sagittaria cuneata</i>	arumleaf arrowhead
<i>S. latifolia</i>	bulltongue arrowhead
Amaranthaceae	Amaranth family
<i>Amaranthus albus</i>	prostrate pigweed
<i>A. arenicola</i>	sandhill amaranth
<i>A. blitoides</i>	mat amaranth
<i>A. californicus</i>	California amaranth
<i>A. retroflexus</i>	redroot amaranth
Anacardiaceae	Sumac family
<i>Rhus trilobata</i>	skunkbush
<i>Toxicodendron rydbergii</i>	western poison ivy
Apaceae	Carrot family
<i>Cymopterus acaulis</i>	plains spring parsley
<i>Heracleum sphondylium</i>	eltrot
<i>Lomatium foeniculaceum</i>	dessert biscuitroot
<i>Musineon divaricatum</i>	wild parsley
<i>Osmorhiza longistylis</i>	longstyle sweetroot
<i>Sium suave</i>	hemlock waterparsnip
Apocynaceae	Dogbane family
<i>Apocynum cannabinum</i>	Indianhemp
Asclepiadaceae	Milkweed family
<i>Asclepias speciosa</i>	showy milkweed
<i>A. verticillata</i>	whorled milkweed
Asteraceae	Aster family
<i>Achillea millefolium</i>	common yarrow
<i>Acroptilon repens</i>	hardheads
<i>Agoseris glauca</i>	pale agoseris
<i>Ambrosia artemisiifolia</i>	annual ragweed
<i>Antennaria dimorpha</i>	low pussytoes
<i>A. microphylla</i>	littleleaf pussytoes
<i>A. neglecta</i>	field pussytoes
<i>A. parvifolia</i>	small-leaf pussytoes
<i>A. rosea</i>	rosy pussytoes
<i>Arctium lappa</i>	greater burdock
<i>Arnica sororia</i>	twin arnica
<i>Artemisia absinthium</i>	absinthium
<i>A. biennis</i>	biennial wormwood
<i>A. campestris</i>	field sagewort
<i>A. cana</i>	silver sagebrush
<i>A. dracunculus</i>	tarragon
<i>A. frigida</i>	prairie sagewort
<i>A. longifolia</i>	longleaf wormwood
<i>A. ludoviciana</i>	white sagebrush
<i>A. tridentate tridentata</i>	big sagebrush
<i>Aster brachyactis</i>	aster brachyactis
<i>A. falcatus</i>	white prairie aster

Scientific name	Common name
<i>Bidens cernua</i>	nodding beggartick
<i>B. frondosa</i>	devil's beggartick
<i>Brickellia eupatoroides</i>	false boneset
<i>Centaurea stoebe</i>	spotted knapweed
<i>Chaenactis douglasii</i>	Douglas' dustymaiden
<i>Chrysothamnus viscidiflorus</i>	yellow rabbitbrush
<i>Cirsium arvense</i>	Canadian thistle
<i>C. flodmanii</i>	Flodman's thistle
<i>C. undulatum</i>	wavyleaf thistle
<i>C. vulgare</i>	bull thistle
<i>Conzya canadensis</i>	Canadian horseweed
<i>Crepis atribarba</i>	largeflower hawksweed
<i>C. occidentalis</i>	largeflower hawksweed
<i>C. runcinata</i>	fiddleleaf hawksweed
<i>Cyclachaena xanthifolia</i>	giant sumpweed
<i>Dyssodia papposa</i>	field marigold
<i>Echinacea angustifolia</i>	blacksamson echinaceae
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>glabrata</i>	rubber rabbitbrush
<i>E. nauseosa</i> ssp. <i>nauseosa</i> var. <i>nauseosa</i>	rubber rabbitbrush
<i>Erigeron caespitosus</i>	tufted fleabane
<i>E. compositus</i>	cutleaf daisy
<i>E. corymbosus</i>	longleaf fleabane
<i>E. ochroleucus</i>	buff fleabane
<i>E. pumilus</i>	shaggy fleabane
<i>E. strigosus</i>	prairie fleabane
<i>Gallardia aristata</i>	common gallardia
<i>Gnaphalium palustre</i>	western marsh cudweed
<i>Grindelia squarrosa</i>	curlycup gumweed
<i>Gutierrezia sarothrae</i>	broom snakeweed
<i>Helenium autumnale</i>	common sneezeweed
<i>Helianthus annuus</i>	common sunflower
<i>H. maximiliani</i>	Maximilian sunflower
<i>H. pauciflorous</i>	stiff sunflower
<i>H. petiolaris</i>	prairie sunflower
<i>Heterotheca villosa</i>	hairy false golden aster
<i>Hieracium umbellatum</i>	narrowleaf hawkweed
<i>Hymenopappus polycephalus</i>	manyhead hymenopappus
<i>Hymenoxys richardsonii</i>	pingue rubberweed
<i>Iva axillaris</i>	poverty weed
<i>Lactuca tatarica</i>	blue lettuce
<i>Latuca punctata</i>	dotted blazing star
<i>Lygodesmia juncea</i>	rush skeletonplant
<i>Machaeranthera canescens</i>	hoary tansyaster
<i>M.grindeloides</i>	rayless tansyaster
<i>M. pinnatifida</i>	lacy tansyaster
<i>M. tanacetifolia</i>	tansyleaf tansyaster
<i>Microseris nutans</i>	nodding microceris
<i>Nothocalais cuspidata</i>	sharppoint prairie-dandelion
<i>Packera cana</i>	wolly groundsel
<i>Picradeniopsis oppositifolia</i>	opposite leaf bahia
<i>Ratibida columnifera</i>	upright prairie coneflower
<i>Senecio integerrimus</i>	lambstongue ragwort
<i>S. serra</i>	tall ragwort
<i>Solidago canadensis</i>	Canada goldenrod
<i>S. missouriensis</i>	Missouri goldenrod

Scientific name	Common name
<i>S. mollis</i>	velvety goldenrod
<i>S. rigida</i>	stiff goldenrod
<i>Sonchus arvensis</i> spp. <i>uliginosus</i>	moist sowthistle
<i>S. oleraceus</i>	common sawthistle
<i>Stenotus acaulis</i>	stemless mock goldenweed
<i>Stephanomeria runcinata</i>	desert wirelettuce
<i>Symphytotrichum ericoides</i> var. <i>pansum</i>	manyflowered aster
<i>S. laeve</i>	smooth blue aster
<i>Taraxacum laevigatum</i>	rock dandelion
<i>T. officinale</i>	common dandelion
<i>Townsendia exscupa</i>	stemless Townsend daisy
<i>Townsendia hookeri</i>	Hooker's Townsend daisy
<i>Tragopogon dubius</i>	yellow salsify
<i>Xanthium strumarium</i>	rough cocklebur
Boraginaceae	Borage family
<i>Cryptantha celosioides</i>	butte candle
<i>Cryptantha spiculifera</i>	Snake River cryptantha
<i>Hackelia deflexa</i>	nodding stickseed
<i>Lappula redowskii</i>	flatspine stickseed
<i>L. squarrosa</i>	European stickseed
<i>Lithospermum incisum</i>	narrowleaf stoneseed
<i>Plagiobothrys leptocladus</i>	finebranched popcorn flower
Brassicaceae	Mustard family
<i>Alyssum desertorum</i>	desert madwort
<i>Arabis hirsuta</i>	hairy rockcress
<i>A. holboellii</i>	Holboell's rockcress
<i>Armoracia rusticans</i>	horseradish
<i>Camelina microcarpa</i>	littlepod false flax
<i>Cardaria draba</i>	whitetop
<i>Chorispora tenella</i>	crossflower
<i>Conringia orientalis</i>	hare's ear mustard
<i>Descurainia richardsonii</i>	mountain tansy mustard
<i>Draba albertina</i>	slender draba
<i>D. nemorosa</i>	woodland draba
<i>D. reptans</i>	Carolina draba
<i>Erysimum asperum</i>	western wallflower
<i>E. inconspicuum</i>	shy wallflower
<i>E. cheiranthoides</i> L.	wormseed wallflower
<i>Hesperis matronalis</i>	dames rocket
<i>Lepidium densiflorum</i>	common pepperweed
<i>L. perfoliatum</i>	clasping pepperweed
<i>Lesquerella alpina</i>	alpine bladderpod
<i>L. ludoviciana</i>	foothill bladderpod
<i>Physaria didymocarpa</i>	common twinpod
<i>Rorippa sinuata</i>	spreading yellowcress
<i>Sisymbrium altissimum</i>	tall tumbleweed mustard
<i>Thelypodium paniculatum</i>	northwestern thelypody
<i>Thlaspi arvense</i>	field pennycress
Callitricheae	Water-starwort family
<i>Callitriche hermaphroditica</i>	northern water-starwort
Campanulaceae	Bellflower family
<i>Campanula rotundifolia</i>	bluebell bellflower
<i>Triodanis leptocarpa</i>	slimpod Venus looking glass
Capparidaceae	Caper family
<i>Cleome serrulata</i>	Rocky Mountain beeplant

Scientific name	Common name
<i>Polanisia dodecandra</i> spp. <i>trachysperma</i>	sandyseed clammyweed
Caprifoliaceae	Honeysuckle family
<i>Symphoricarpos albus</i>	common snowberry
<i>S. occidentalis</i>	western snowberry
Caryophyllaceae	Pink family
<i>Arenaria lateriflora</i>	bluntleaf sandwort
<i>Cerastium arvense</i>	field chickweed
<i>C. nutans</i>	nodding chickweed
<i>Paronychia sessiliflora</i>	creeping nailwort
<i>Silene latifolia</i>	bladder campion
<i>S. menziesii</i>	Menzies' campion
<i>S. oregana</i>	Oregon silene
Cactaceae	Cactus family
<i>Coryphantha missouriensis</i>	Missouri pincushion
<i>C. vivipara</i>	purple pincushion
<i>Opuntia fragilis</i>	brittle prickly pear
<i>O. poluacantha</i>	plains prickly pear
Chenopodiaceae	Goosefoot family
<i>Atriplex argentea</i>	silverscale saltbush
<i>A. canescens</i>	fourwing saltbush
<i>A. confertifolia</i>	shadescale saltbush
<i>A. gardneri</i>	Gardner's saltbush
<i>A. patula</i>	spear saltbush
<i>A. powellii</i>	Powell's saltbush
<i>A. rosea</i>	tumbling saltbush
<i>Bassia scoparia</i>	burning bush
<i>Chenopodium album</i>	lambsquarter
<i>C. atrovirens</i>	pinyon goosefoot
<i>C. desiccatum</i>	aridland goosefoot
<i>C. fremontii</i>	Fremont's goosefoot
<i>C. glaucum</i>	oakleaf goosefoot
<i>C. leptophyllum</i>	narrowleaf goosefoot
<i>C. pratericola</i>	desert goosefoot
<i>C. rubrum</i>	red goosefoot
<i>C. subglabrum</i>	smooth goosefoot
<i>Endolepis diocicia</i>	Suckley's endolepis
<i>Krascheninnikovia lanata</i>	winterfat
<i>Monolepis nuttalliana</i>	Nuttall's povertyweed
<i>Salicornia rubra</i>	red swapfire
<i>Salsola tragus</i>	prickly Russian thistle
<i>Sarcobatus vermiculatus</i>	greasewood
<i>Suaeda calceoliformis</i>	Pursh seepweed
<i>Suaeda moquinii</i>	Mojave seablite
Commelinaceae	Spiderwort family
<i>Tradescantia occidentalis</i>	prairie spiderwort
Convolvulaceae	Morning glory family
<i>Calystegia sepium</i>	hedge false bindweed
<i>Convolvulus arvensis</i>	field bindweed
<i>Cornaceae</i>	dogwood
<i>Cornus siricea</i> spp. <i>siricea</i>	redosier dogwood
Cupressaceae	Cypress family
<i>Juniperus communis</i>	common juniper
<i>J. horizontalis</i>	creeping juniper
<i>J. scopulorum</i>	Rocky Mountain juniper
<i>J. scopulorum</i> × <i>horizontalis</i>	hybrid of creeping and Rocky Mountain junipers

Scientific name	Common name
Cyperaceae	Sedge family
<i>Carex brevior</i>	shortbreak sedge
<i>C. douglasii</i>	Douglas sedge
<i>C. duriusula</i>	needleleaf
<i>C. filifolia</i>	threadleaf sedge
<i>C. hoodii</i>	Hood's sedge
<i>C. lanuginosa</i>	American willyfruit sedge
<i>C. pensylvanica</i>	Pennsylvania sedge
<i>C. rossii</i> Boott.	Ross' sedge
<i>C. sprengelii</i>	Sprengel's sedge
<i>C. vulpinoidea</i>	fox sedge
<i>C. xerantica</i>	whitescale sedge
<i>Eleocharis acicularis</i>	needle spikerush
<i>E. palustris</i>	common spikerush
<i>Schoenoplectus acutus</i>	hardstem bulrush
<i>S. americanus</i>	chairmaker's bulrush
<i>S. maritimus</i>	cosmopolitan bulrush
<i>S. tabernaemontani</i>	softstem bulrush
Dryopteridaceae	Wood fern family
<i>Cystopteris fragilis</i>	brittle bladder fern
<i>Woodsia oregana</i>	Oregon cliff fern
Elaeagnaceae	Oleaster family
<i>Elaeagnus angustifolia</i>	Russian olive
<i>E. communtata</i>	silverberry
<i>Shepherdia argentea</i>	silver buffaloberry
Elatinaceae	Waterwort family
<i>Elatine triandra</i>	threestamen waterwort
Equisetaceae	Horsetail family
<i>Equisetum arvense</i>	field horsetails
<i>E. hyemale</i>	scouringrush horsetails
<i>E. laevigatum</i>	smooth horsetail
<i>E. variegatum</i>	variegated scouringrush
Euphorbiaceae	Spurge family
<i>Euphorbia brachycera</i>	horned spurge
<i>Euphorbia esula</i>	leafy spurge
<i>Euphorbia glyptosperma</i>	ribseed sandmat
<i>Euphorbia serpyllifolia</i>	thymeleaf sandmat
<i>Euphorbia spathulata</i>	water spurge
Fabaceae	Legume family
<i>Astragalus agrestis</i>	purple vetch
<i>A. bisulcatus</i>	two grooved milkvetch
<i>A. canadensis</i>	Candian milkvetch
<i>A. crassicarpus</i>	groundplum milkvetch
<i>A. flexuosus</i>	flexile milkvetch
<i>A. geyeri</i>	Geyer's milkvetch
<i>A. gilviflorus</i>	plains milkvetch
<i>A. gracilis</i>	slender milkvetch
<i>A. grummondii</i>	Drummonds milkvetch
<i>A. kentrophyta</i>	spiny milkvetch
<i>A. laxmanni</i> var. <i>robustior</i>	prairie milkvetch
<i>A. lentiginosus</i>	freckled milkvetch
<i>A. lotiflorus</i>	lotus milkvetch
<i>A. purshii</i>	woolypod milkvetch
<i>A. spatulatus</i>	tufted milkvetch
<i>Caragana arborescens</i>	Siberian peashrub

Scientific name	Common name
<i>Dalea candida</i>	white prairie clover
<i>D. purpurea</i>	purple prairie clover
<i>Glycyrrhiza lepidota</i>	American licorice
<i>Lupinus argenteus</i>	silvery lupine
<i>L. pusillus</i>	rusty lupine
<i>Medicago lupulina</i>	black medrich
<i>M. sativa</i>	alfalfa
<i>Melilotus officinalis</i>	yellow sweetclover
<i>Oxytropis besseyi</i>	Bessey's locoweed
<i>O. lambertii</i>	purple locoweed
<i>O. monticola</i>	yellow flower locoweed
<i>O. sericea</i>	white locoweed
<i>Pedimelum argophyllum</i>	silverleaf breadroot
<i>P. esculentum</i>	large indian breadroot
<i>P. lanceolatum</i>	lemon scurfpea
<i>P. tenuiflorum</i>	slimflower scurfpea
<i>Thermopsis rhombifolia</i>	prairie thermopsis
<i>Trifolium hybridum</i>	alsike hybridum
<i>Trifolium repens</i>	white clover
<i>Vicia americana</i>	American vetch
Geraniaceae	Geranium family
<i>Geranium carolinianum</i>	Carolina geranium
Grossulariaceae	Currant family
<i>Ribes americanum</i>	American black currant
<i>R. aureum</i>	golden currant
<i>R. cereum</i>	wax currant
<i>R. setosum</i>	inland gooseberry
<i>R. viscosissimum</i>	sticky currant
Haloragidaceae	Water milfoil family
<i>Myriophyllum spicatum</i>	Eurasian water milfoil
<i>Hydrophyllaceae</i>	waterleaf
<i>Ellisia nyctelea</i>	Aunt Lucy
<i>Nemophila breviflora</i>	basin nemophila
<i>Phacelia linearis</i>	threadleaf phacelia
<i>P. thermalis</i>	heated phacelic
Iridaceae	Iris family
<i>Sisyrinchium montanum</i>	strict blue-eyed grass
Juncaceae	Rush family
<i>Juncus balticus</i>	Baltic rush
<i>J. bufonius</i>	toad rush
<i>J. interior</i>	inland rush
<i>J. tenuis</i>	Poverty rush
<i>J. torreyi</i>	Torrey's rush
Juncaginaceae	Arrowgrass family
<i>Triglochin concinnum</i>	slender arrowgrass
Lamiaceae	Mint family
<i>Dracocephalum parviflorum</i>	American dragonhead
<i>Hedeona drummondii</i>	Drummond's false pennyroyal
<i>Hedeona hispida</i>	false penny royal
<i>Lycopus asper</i>	rough bungleweed
<i>Mentha arvensis</i>	wild mint
<i>Monarda fistulosa</i>	wild bermont (beebulm)
<i>Nepeta cataria</i>	catnip
Lemnaceae	Duckweed family
<i>Lemna minor</i>	common duckweed

<i>Scientific name</i>	<i>Common name</i>
Liliaceae	Lily family
<i>Allium textile</i>	textile onion
<i>Asparagus officinalis</i>	garden asparagus
<i>Calochortus nuttallii</i>	sego lily
<i>Fritillaria pudica</i>	yellow fritillary
<i>Maianthemum stellatum</i>	starry false lily of the valley
<i>Prosartes trachycarpa</i>	rough fruit fairybells
<i>Smilax herbacea</i>	smooth carrionflower
<i>Zigadenus venenosus</i>	meadow deathcamas
Linaceae	Flax family
<i>Linum lewisii</i>	Lewis flax
<i>L. rigidum</i>	stiffstem flax
Loasaceae	Loasa family
<i>Mentzelia albicaulis</i>	whitestem blazingstar
<i>M. decapetala</i>	ten petal blazingstar
<i>M. laevicaulis</i>	smooth stemmed blazingstar
Malvaceae	Mallow family
<i>Malva parviflora</i>	cheeseweed mallow
<i>Sphaeralcea coccinea</i>	scarlet gold mallow
Najadaceae	Waternymph family
<i>Najas guadalupensis</i>	southern waternymph
Nyctaginaceae	Four o'clock family
<i>Mirabilis linearis</i>	narrowleaf four o'clock
Oleaceae	Olive family
<i>Fraxinus pennsylvanica</i>	green ash
Onagraceae	Evening primrose family
<i>Calylophus serrulatus</i>	yellow sundrops
<i>Epilobium angustifolium</i>	fireweed
<i>E. ciliatum</i>	fringed willow herb
<i>E. pbrachycarpum</i>	tall annual willowherb
<i>E. pygmaeum</i>	smooth spike primrose
<i>Gaura coccinea</i>	scarlet beeblossom
<i>Oenothera albicaulis</i>	whitest evening primrose
<i>O. biennis</i>	common evening primrose
<i>O. cespitosa</i>	gumbo evening primrose
<i>O. flava</i>	yellow evening primrose
<i>O. nuttallii</i>	Nuttall's evening primrose
<i>O. villosa</i>	hairy evening primrose
Orbanchaceae	Broomrape family
<i>Orobanche fasciculata</i>	clustered broomrape
<i>O. ludoviciana</i>	Louisiana broomrape
Pinaceae	Pine family
<i>Pinus flexis</i>	limber pine
<i>Pinus ponderosa</i>	ponderosa pine
<i>Pseudotsuga menziesii</i>	Douglas-fir
Plantaginaceae	Plantain family
<i>Plantago aristata</i>	largebracted plantain
<i>P. elongata</i>	prairie plantain
<i>P. lanceolata</i>	narrow leaf plantain
<i>P. major</i>	common plantain
<i>P. patagonica</i>	hairy plantain (Indian wheat)
Poaceae	Grass family
<i>Achnatherum hymenoides</i>	indian ricegrass
<i>Agropyron cristatum</i>	crested wheatgrass
<i>Agrostis sabra</i>	rough bentgrass

<i>Scientific name</i>	<i>Common name</i>
<i>Agrostis stolonifera</i>	creeping bentgrass
<i>Andropogon hallii</i>	sand bluestem
<i>Avena sativa</i>	common oat
<i>Beckmannia syzigachne</i>	American sloughgrass
<i>Bouteloua dactyloides</i>	buffalo grass
<i>B. gracilis</i>	blue grama
<i>Bromus arvensis</i>	field brome (Japanese brome)
<i>B. carinatus</i>	California brome
<i>B. ciliatus</i>	fringed brome
<i>B. commutatus</i>	bald brome
<i>B. inermis</i>	smooth brome
<i>B. inermis</i> spp. <i>pumpellianus</i>	Pumpelly's brome
<i>B. tectorum</i>	cheatgrass
<i>Calamagrostis canadensis</i>	bluejoint
<i>C. montanensis</i>	plains reedgrass
<i>Calamovilfa longifolia</i>	prairie sandreed
<i>Dactylis glomerata</i>	orchardgrass
<i>Danthonia unispicata</i>	onespike danthonia
<i>Distichlis stricta</i>	saltgrass
<i>Echinochloa crus-galli</i>	barnyard grass
<i>Elymus canadensis</i>	Canada wildrye
<i>E. elymoides</i>	squirreltail
<i>E. lanceolatus</i>	thickspike wheatgrass
<i>E. repens</i>	quackgrass
<i>E. trachycaulum</i>	slender wheatgrass
<i>Eragrostis cilianensis</i>	stinkgrass
<i>E. pectinacea</i>	tufted lovegrass
<i>Festuca rubra</i>	red fescue
<i>Glyceria striata</i>	fowl mannagrass
<i>Hesperostipa comatga</i>	needle and thread
<i>Hordeum jubatum</i>	foxtail barley
<i>H. pusillum</i>	little barley
<i>Koeleria macrantha</i>	prairie Junegrass
<i>Leymus triticoides</i>	heartless wildrye
<i>Muhlenbergia asperifolia</i>	scratchgrass
<i>M. cuspidata</i>	plains muhly
<i>Munroa squarrosa</i>	false buffalo grass
<i>Nassella viridula</i>	green needlegrass
<i>Panicum cappillare</i>	witchgrass
<i>Pascopyrum smithii</i>	western wheatgrass
<i>Phalaris arundinaceae</i>	reed canarygrass
<i>Phleum pratense</i>	timothy
<i>Piptatherum micrantha</i>	littleseed ricegrass
<i>Poa annua</i>	annual bluegrass
<i>P. arida</i>	plains bluegrass
<i>P. bulbosa</i>	bulbous bluegrass
<i>P. compressa</i>	Canada bluegrass
<i>P. cusickii</i>	Cusick's bluegrass
<i>P. palustris</i>	fowl bluegrass
<i>P. pratensis</i>	Kentucky bluegrass
<i>P. secunda</i>	Sandberg bluegrass
<i>Polypogon monspeliensis</i>	annual rabbit's foot grass
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass
<i>Puccinellia nuttalliana</i>	Nuttall's alkali grass
<i>Schedonnardus paniculatus</i>	tumble grass

Scientific name	Common name
<i>Schizachyrium scoparium</i>	little bluestem
<i>Setaria viridis</i>	green bristlegrass
<i>Spartina gracilis</i>	alkali cordgrass
<i>Sporobolus airoides</i>	alkali sacaton
<i>S. cryptandrus</i>	sand dropseed
<i>Thinopyrum intermedium</i>	intermediate wheatgrass
<i>Torreyochloa pallida</i>	pale false mannagrass
<i>Triticum aestivum</i>	common wheat
<i>Vulpia octoflora</i>	sixweeks fescue
Polemoniaceae	Phlox family
<i>Collomia linearis</i>	tiny trumpet
<i>Microsteris gracilis</i>	slender phlox
<i>Phlox alyssifolia</i>	alyssumleaf phlox
<i>P. hoodii</i>	spiny phlox
Polygalaceae	Milkwort family
<i>Polygala alba</i>	white milkwort
<i>P. verticillata</i>	whorled milkwort
Polygonaceae	buckwheat
<i>Eriogonum annuum</i>	annual buckwheat
<i>E. cernuum</i>	nodding buckwheat
<i>E. flavum</i>	alpine golden buckwheat
<i>E. ovalifolium</i>	cusion buckwheat
<i>E. pauciflorum</i>	few flower buckwheat
<i>Polygonum aviculare</i>	prostate knotweed
<i>P. convolvulus</i>	black bindweed
<i>P. erectum</i>	erect knotweed
<i>P. lapathifolium</i>	curlytop knotweed
<i>P. punctatum</i>	dotted smartweed
<i>P. ramosissimum</i>	bushy knotweed
<i>Rumex acetosella</i>	common sheep sorrel
<i>R. aquaticus</i>	western dock
<i>R. crispus</i>	curly dock
<i>R. maritimus</i>	golden dock
<i>R. salicifolius</i>	willow dock
<i>R. venosus</i>	veiny dock
Portulacaceae	Purslane family
<i>Claytonia perfoliata</i>	miner's lettuce
<i>Portulaca oleracea</i>	little hogweed
Potamogetonaceae	Pondweed family
<i>Potamogeton diversifolius</i>	waterthread pondweed
<i>P. foliosus</i>	leafy pondweed
<i>P. praelongus</i>	whitesteam pondweed
<i>P. pusillus</i>	small pondweed
<i>Stuckenia pectinat</i>	sago pondweed
Primulaceae	Primrose family
<i>Androsace filiformis</i>	filiformis rockjasmine
<i>A. occidentalis</i>	western rockjasmine
Ranunculaceae	Buttercup family
<i>Anemone cylindrica</i>	candle anemone
<i>A. multifida</i>	Pacific anemone
<i>Clematis ligusticifolia</i>	western white clematis
<i>Delphinium bicolor</i>	little larkspur
<i>Pulsatilla patenes</i>	cutleaf anemone
<i>Ranunculus aquatilis</i>	white water crowfoot
<i>R. cymbalaria</i>	alkali buttercup

Scientific name	Common name
<i>R. glaberrimus</i>	sagebrush buttercup
<i>R. macounii</i>	Macoun's buttercup
<i>R. sceleratus</i>	cursed buttercup
<i>Thalictrum venulosum</i>	veiny meadow-rue
Rosaceae	Rose family
<i>Amelanchier alnifolia</i>	Saskatoon serviceberry
<i>Crataegus chrysoarpa</i>	fineberry hawthorn
<i>Fragaria virginiana</i>	Virginia strawberry
<i>Geum aleppicum</i>	yellow avens
<i>G. triflorum</i>	prairie smoke
<i>Potentilla anserina</i>	silverweed cinquefoil
<i>P. arguta</i>	tall cinquefoil
<i>P. biennis</i>	biennial cinquefoil
<i>P. gracilis</i>	slender cinquefoil
<i>P. paradoxa</i>	paradox cinquefoil
<i>P. pensylvanica</i>	Pennsylvania cinquefoil
<i>Prunus virginiana</i>	chokecherry
<i>Rosa acicularis</i> spp. <i>sayi</i>	prickly rose
<i>R. arkansana</i>	prairie rose
<i>R. woodsii</i>	Woods' rose
Rubiaceae	Bedstraw family
<i>Galium aparine</i>	stickywilly (catchweed bedstraw)
<i>G. boreale</i>	northern bedstraw
<i>G. trifidum</i>	threepetal bedstraw
Salicaceae	Willow family
<i>Populus deltoides</i>	eastern cottonwood
<i>P. tremuloides</i>	quaking aspen
<i>P. balsamifera</i>	balsam poplar
<i>Salix amygdaloides</i>	peachleaf willow
<i>S. bebbiana</i>	Bebb willow
<i>S. exigua</i>	narrowleaf willow
<i>S. fragilis</i>	crack willow
<i>S. lasiandra</i>	Pacific willow
<i>S. lutea</i>	yellow willow
Santalaceae	Sandalwood family
<i>Comandra umbellata</i>	bastard toadflax
Saxifragaceae	Saxifrag family
<i>Heuchera parvifolia</i>	littleleaf alumroot
Scrophulariaceae	Figwort family
<i>Bacopa rotundifolia</i>	disk waterhyssop
<i>Besseyia wyomingensis</i>	Wyoming besseyia
<i>Castilleja sessiliflora</i>	downy paintedcup
<i>Collinsia parviflora</i>	maiden blue eyed Mary
<i>Limosella aquatica</i>	water mudwort
<i>Orthocarpus leteus</i>	yellow owl's clover
<i>Penstemon albidus</i>	white penstemon
<i>P. nitidus</i>	waxleaf penstemon
<i>Veronica anagallis-aquatica</i>	water speedwell
<i>V. pergrina</i>	neckweed
Selaginellaceae	Spikemoss family
<i>Selaginella densa</i>	lesser spikemoss
Solanaceae	Potato family
<i>Solanum rostratum</i>	buffalo nightshade
<i>S. triflorum</i>	cutleaf nightshade

<i>Scientific name</i>	<i>Common name</i>
Tamaricaceae <i>Tamarix chinensis</i>	Tamarisk family five stamen tamarisk (saltcedar)
Typhaceae <i>Typha latifolia</i>	Cattail family broadleaf cattail
Urticeae <i>Parietaria pensylvanica</i> <i>Urtica dioica</i>	Nettle family Pennsylvania stinging nettle
Verbenaceae <i>Verbena bracteata</i>	Verbena family bigbract verbena
Violaceae <i>Viola adunca</i> <i>V. canadensis</i> <i>V. nephrophylla</i> <i>V. nuttallii</i>	Violet family hooked-sur violet Canadian white violet northern bog violet smooth stemmed blazing star
Vitaceae <i>Parthenocissus inserta</i> <i>Zannichelliaceae</i> <i>Zigadenus venenosus</i>	Grape family Virginia creeper horned pondweed family meadow deathcamas

ANIMAL LIST

BUTTERFLIES

Source: Butterflies and Moths of North America 2011.

<i>Scientific name</i>	<i>Common name</i>
Nymphalidae	Brush-footed butterflies
Limnitiidae	Admirals and relatives
<i>Limnitis arthemis</i>	red-spotted purple
<i>L. archippus</i>	viceroy
<i>L. weidemeyerii</i>	Weidemeyer's admiral
<i>L. arthemis arthemis</i>	white admiral
Heliconiinae	Longwings
<i>Speyeria aphrodite</i>	Aphrodite fritillary
<i>S. callippe</i>	callippe fritillary
<i>S. coronis</i>	coronis fritillary
<i>S. edwardsii</i>	Edwards' fritillary
<i>S. egleis</i>	great basin fritillary
<i>S. cybele</i>	great spangled fritillary
<i>S. hydaspes</i>	hydaspes fritillary
<i>S. mormonia</i>	Mormon fritillary
<i>S. hesperis</i>	northwestern fritillary
<i>S. zerene</i>	Zerene fritillary
<i>Boloria bellona</i>	meadow fritillary
<i>B. selene</i>	silver-bordered fritillary
<i>Euptoieta claudia</i>	variegated fritillary
Nymphalinae	True brush-foots
<i>Nymphalis vaualbum</i>	Compton tortoiseshell
<i>N. antiopa</i>	mourning cloak
<i>Euphydryas editha</i>	Edith's checkerspot
<i>E. gillettii</i>	Gillette's checkerspot
<i>E. chalcedona</i>	variable checkerspot
<i>Phycoides pulchellus</i>	field crescent
<i>P. cocyta</i>	northern crescent

Scientific name	Common name
<i>P. pallid</i>	pale crescent
<i>P. tharos</i>	pearl crescent
<i>P. batesii</i>	tawny crescent
<i>Chlosyne gorgone</i>	Gorgone checkerspot
<i>C. palla</i>	northern checkerspot
<i>C. acastus</i>	sagebrush checkerspot
<i>Polygonia progne</i>	gray comma
<i>P. faunus</i>	green comma
<i>P. gracilis</i>	hoary comma
<i>P. satyrus</i>	satyr comma
<i>Aglais milberti</i>	Milbert's tortoiseshell
<i>Vanessa cardui</i>	painted lady
<i>V. atalanta</i>	red admiral
<i>V. annabella</i>	west coast lady
Riodinidae	Metalmarks
<i>Apodemia mormo</i>	Mormon metalmark
Parnassiinae	Parnassians
<i>Parnassian smintheus</i>	Rocky Mountain parnassian
Papilioninae	Swallowtails
<i>Papilio zelicaon</i>	anise swallowtail
<i>P. canadensis</i>	Canadian tiger swallowtail
<i>P. machaon</i>	Old World swallowtail
<i>P. eurymedon</i>	pale swallowtail
<i>P. multicaudata</i>	two-tailed swallowtail
<i>P. rutulus</i>	western tiger swallowtail

AMPHIBIANS and REPTILES

Ambystomatidae	Mole salamanders
<i>Ambystoma tigrinum</i>	tiger salamander
Hylidae	Chorus frogs
<i>Pseudacris triseriata</i>	western chorus frog
Ranidae	True frogs
<i>Rana pipiens</i>	northern leopard frog
Bufo	True toads
<i>Bufo woodhousei</i>	Woodhouse's toad
<i>B. cognatus</i>	Great Plains toad
Scaphiopodidae	Spadefoots
<i>Scaphiopus bombifrons</i>	plains spadefoot
Chelydridae	Snapping turtles
<i>Chelydra serpentina</i>	snapping turtle
Emydidae	Pond turtles
<i>Chrysemys picta</i>	painted turtle
Trionychidae	Softshell turtles
<i>Trionyx spiniferus</i>	spiny softshell
Colubridae	Colubrid snakes
<i>Coluber constrictor</i>	racer
<i>Thamnophis elegans</i>	terrestrial garter snake
<i>T. radix</i>	plains garter snake
<i>T. sirtalis</i>	common garter snake
<i>Lampropeltis triangulum</i>	milk snake
<i>Pituophis catenifer</i>	gopher snake or bullsnake
<i>Heterodon nasicus</i>	western hog-nosed snake
Viperidae	Vipers
<i>Crotalus viridis</i>	prairie rattlesnake

Scientific name	Common name
FISHES	
<i>Source: Bramblett and Zale 1999.</i>	
Acipenseridae	Sturgeons
<i>Scaphirhynchus albus</i> (N)	pallid sturgeon
<i>S. platyrhynchus</i> (N)	shovelnose sturgeon
Polyodontidae	Paddlefishes
<i>Polyodon spathula</i>	paddlefish
Lepisosteidae	Gars
<i>Lepisosteus platostomus</i>	shortnose gar
Hiodontidae	Mooneyes
<i>Hiodon alosoides</i>	goldeneye
Salmonidae	Trout
<i>Oncorhynchus mykiss</i>	rainbow trout
<i>Salmo trutta</i>	brown trout
<i>Salvelinus namaycush</i>	lake trout
<i>Coregonus artedii</i>	cisco
Cyprinidae	Minnows
<i>Hybognathus hankinsoni</i>	brassy minnow
<i>H. placitus</i>	plains minnow
<i>H. argyritis</i>	western silvery minnow
<i>Cyprinus carpio</i>	common carp
<i>Notropis atherinoides</i>	emerald shiner
<i>Pimephales promelas</i>	fathead minnow
<i>Hybopsis gracilis</i>	flathead chub
<i>Couesius plumbeus</i>	lake chub
<i>Rhynchichthys cataractae</i>	longnose dace
<i>Phoxinus eos</i>	northern redbelly dace
<i>P. eos</i> × <i>P. neogaeus</i>	northern redbelly dace × finescale dace
<i>Notropis hudsonius</i>	spottail shiner
<i>N. ludibundus</i>	sand shiner
<i>Semotilus atromaculatus</i>	creek chub
<i>Macrhybopsis gelida</i>	sturgeon chub
<i>M. meeki</i>	sicklefin chub
Castostomidae	Suckers
<i>Catostomus catostomus</i>	longnose sucker
<i>C. commersoni</i>	white sucker
<i>Carpoides carpio</i>	river carpsucker
<i>Cycleptus elongate</i>	blue sucker
<i>Ictiobus bubalus</i>	smallmouth buffalo
<i>I. cyprinellus</i>	bigmouth buffalo
<i>Moxostoma macrolepidotum</i>	shorthead redhorse
Ictaluridae	Bullheads and catfishes
<i>Ictalurus melas</i>	black bullhead
<i>I. punctatus</i>	channel catfish
<i>Noturus flavus</i>	stonecat
Esocidae	Pikes and pickerels
<i>Esox lucius</i>	northern pike
Gadidae	Burbot
<i>Lota lota</i>	burbot
Gasterosteidae	Sticklebacks
<i>Culaea inconstans</i>	brook stickleback
Centrarchidae	Sunfishes
<i>Pomoxis nigromaculatus</i>	black crappie
<i>P. annularis</i>	white crappie

Scientific name	Common name
<i>Lepomis cyanellus</i>	green sunfish
<i>L. macrochirus</i>	bluegill
<i>Micropterus salmoides</i>	largemouth bass
Percidae	Perches
<i>Etheostoma exile</i>	Iowa darter
<i>Stizostedion canadense</i>	sauger
<i>S. vitreum</i>	walleye
<i>Perca flavescens</i>	yellow perch
Sciaenidae	Drums
<i>Aplodinotus grunniens</i>	freshwater drum
Fundulidae	Killfishes
<i>Fundulus zebrinus</i>	plains killfish

BIRDS

Of the bird species recorded, there are the following:

- 5 introduced species
- 1 extinct species
- 2 extirpated species
- 125 breeding species
- 2 federally endangered species
- 2 federally threatened species

The order of birds below follows the American Ornithologists' Union checklist of Northern American birds (2000).

* indicates a documented breeding record

indicates a migratory nongamebird species of management concern in the United States (FWS 1995)

Gaviidae	Loons
<i>Gavia immer</i>	common loon#
<i>G. stellata</i>	red-throated loon
<i>G. pacifica</i>	Pacific loon
<i>G. adamsii</i>	yellow-billed loon
Podicipedidae	Grebes
<i>Podilymbus podiceps</i>	pied-billed grebe*
<i>Podiceps auritus</i>	horned grebe*
<i>P. grisegena</i>	red-necked grebe
<i>P. nigricollis</i>	eared grebe*
<i>Aechmophorus occidentalis</i>	western grebe*
<i>A. clarkia</i>	Clark's grebe*
Pelicanidae	Pelicans
<i>Pelecanus erythrorhynchos</i>	American white pelican*
Phalacrocoracidae	Cormorants
<i>Phalacrocorax auritus</i>	double-crested cormorant*
Ardeidae	Bitterns, herons, and egrets
<i>Botaurus lentiginosus</i>	American bittern*#
<i>Ardea herodias</i>	great blue heron*
<i>A. alba</i>	great egret
<i>Egretta thula</i>	snowy egret
<i>Nycticorax nycticorax</i>	black-crowned night-heron
Threskiornithidae	Ibises and spoonbills
<i>Plegadis chihi</i>	white-faced ibis
Cathartidae	New World vultures
<i>Cathartes aura</i>	turkey vulture
Anatidae	Swans, geese, and ducks
<i>Anser albifrons</i>	greater white-fronted goose
<i>Chen caerulescens</i>	snow goose
<i>C. rossii</i>	Ross' goose

<i>Scientific name</i>	<i>Common name</i>
<i>Branta canadensis</i>	Canada goose*
<i>Cygnus columbianus</i>	tundra swan
<i>Aix sponsa</i>	wood duck
<i>Anas strepera</i>	gadwall*
<i>A. americana</i>	American wigeon*
<i>A. rubripes</i>	American black duck
<i>A. platyrhynchos</i>	mallard*
<i>A. discors</i>	blue-winged teal*
<i>A. cyanoptera</i>	cinnamon teal*
<i>A. clypeata</i>	northern shoveler*
<i>A. acuta</i>	northern pintail*
<i>A. crecca</i>	green-winged teal*
<i>Aythya valisineria</i>	canvasback*
<i>A. americana</i>	redhead*
<i>A. collaris</i>	ring-necked duck*
<i>A. affinis</i>	lesser scaup*
<i>Melanitta fusca</i>	white-winged scoter
<i>Clangula hyemalis</i>	long-tailed duck
<i>Bucephala albeola</i>	bufflehead*
<i>B. clangula</i>	common goldeneye
<i>B. islandica</i>	Barrow's goldeneye
<i>Lophodytes cucullatus</i>	hooded merganser
<i>Mergus merganser</i>	common merganser
<i>M. serrator</i>	red-breasted merganser
<i>Oxyura jamaicensis</i>	ruddy duck*
Accipitridae	Osprey, kites, hawks, and eagles
<i>Pandion halliaetus</i>	osprey
<i>Haliaeetus leucocephalus</i>	bald eagle (threatened)
<i>Circus cyaneus</i>	northern harrier
<i>Accipiter striatus</i>	sharp-shinned hawk
<i>A. cooperii</i>	Cooper's hawk
<i>A. gentilis</i>	northern goshawk
<i>Buteo platypterus</i>	broad-winged hawk
<i>B. swainsoni</i>	Swainson's hawk
<i>B. jamaicensis</i>	red-tailed hawk*
<i>B. regalis</i>	ferruginous hawk
<i>B. lagopus</i>	rough-legged hawk
<i>Aquila chrysaetos</i>	golden eagle*
Falconidae	Falcons and caracaras
<i>Falco sparverius</i>	American kestrel
<i>F. columbarius</i>	merlin
<i>F. rusticolus</i>	gyrfalcon
<i>F. peregrinus</i>	peregrine falcon
<i>F. mexicanus</i>	prairie falcon
Phasianidae	Gallinaceous birds
<i>Perdix perdix</i>	gray partridge (introduced)
<i>Phasianus colchicus</i>	ring-necked pheasant (introduced)
<i>Centrocercus urophasianus</i>	greater sage-grouse
<i>Tympanuchus phasianellus</i>	sharp-tailed grouse
<i>Meleagris gallopavo</i>	wild turkey
Rallidae	Rails
<i>Rallus limicola</i>	Virginia rail
<i>Porzana carolina</i>	sora
<i>Fulica americana</i>	American coot

<i>Scientific name</i>	<i>Common name</i>
Gruidae	Cranes
<i>Grus canadensis</i>	sandhill crane
Charadriidae	Plovers
<i>Pluvialis squatarola</i>	black-bellied plover
<i>P. dominica</i>	American golden-plover
<i>Charadrius semipalmatus</i>	semipalmated plover
<i>C. melodus</i>	piping plover (threatened)
<i>C. vociferous</i>	killdeer
<i>C. montanus</i>	mountain plover
Recurvirostridae	Stilts and avocets
<i>Himantopus mexicanus</i>	black-necked stilt
<i>Recurvirostra americana</i>	American avocet
Scolopacidae	Sandpipers and phalaropes
<i>Tringa melanoleuca</i>	greater yellowlegs
<i>T. flavipes</i>	lesser yellowlegs
<i>T. solitaria</i>	solitary sandpiper
<i>Actitis macularius</i>	spotted sandpiper
<i>Catoptrophorus semipalmatus</i>	willet
<i>Artramia longicauda</i>	upland sandpiper
<i>Numenius borealis</i>	Eskimo curlew (extirpated)
<i>N. phaeopus</i>	whimbrel
<i>N. americanus</i>	long-billed curlew
<i>Limosa fedoa</i>	marbled godwit
<i>Arenaria interpres</i>	ruddy turnstone
<i>Calidris alba</i>	sanderling
<i>C. pusilla</i>	semipalmated sandpiper
<i>C. mauri</i>	western sandpiper
<i>C. minutilla</i>	least sandpiper
<i>C. fuscicollis</i>	white-rumped sandpiper
<i>C. bairdii</i>	Baird's sandpiper
<i>C. melanotos</i>	pectoral sandpiper
<i>C. alpine</i>	dunlin
<i>C. himantopus</i>	stilt sandpiper
<i>Limnodromus scolopaceus</i>	long-billed dowitcher
<i>Phalaropus tricolor</i>	Wilson's phalarope
<i>P. lobatus</i>	red-necked phalarope
<i>Tryngites subruficollis</i>	buff-breasted sandpiper
<i>Gallinago delicata</i>	Wilson's snipe
Laridae	Gulls, terns, and jaegers
<i>Larus pipixcan</i>	Franklin's gull
<i>L. philadelphia</i>	Bonaparte's gull
<i>L. delawarensis</i>	ring-billed gull
<i>L. californicus</i>	California gull
<i>L. thayeri</i>	Thayer's gull
<i>L. hyperboreus</i>	glaucous gull
<i>L. canus</i>	mew gull
<i>L. argentatus</i>	herring gull
<i>L. glaucescens</i>	glaucous-winged gull
<i>L. marinus</i>	great black-backed gull
<i>Sterna caspia</i>	Caspian tern
<i>S. hirundo</i>	common tern
<i>S. forsteri</i>	Forster's tern
<i>S. antillarum</i>	least tern (endangered)
<i>Chlidonias niger</i>	black tern
<i>Xema sabini</i>	Sabine's gull

Scientific name	Common name
<i>Rissa tridactyla</i>	black-legged kittiwake
<i>Stercorarius pomarinus</i>	pomarine jaeger
Columbidae	Pigeons and doves
<i>Columba livia</i>	rock dove (introduced)
<i>C. fasciata</i>	band-tailed pigeon
<i>Zenaida macroura</i>	mourning dove
<i>Ectopistes migratorius</i>	passenger pigeon (extinct)
Cuculidae	Cuckoos and anis
<i>Coccyzus erythrophthalmus</i>	black-billed cuckoo
Strigidae	Owls
<i>Bubo virginianus</i>	great horned owl
<i>Nyctea scandiaca</i>	snowy owl
<i>Surnia ulula</i>	northern hawk-owl
<i>Athene cunicularia</i>	burrowing owl
<i>Asio otus</i>	long-eared owl
<i>A. flammeus</i>	short-eared owl
<i>Glaucidium gnoma</i>	northern pygmy-owl
<i>Aegolius acadicus</i>	northern saw-whet owl
Caprimulgidae	Goatsuckers and allies
<i>Chordeiles minor</i>	common nighthawk
<i>Phalaenoptilus nuttallii</i>	common poorwill
Apodidae	Swifts
<i>Chaetura pelagica</i>	chimney swift
<i>Aeronautes saxatalis</i>	white-throated swift
Trochilidae	Hummingbirds
<i>Archilochus colubris</i>	ruby-throated hummingbird
<i>Selasphorus rufus</i>	rufous hummingbird
Alcedinidae	Kingfishers
<i>Ceryle alcyon</i>	belted kingfisher
Picidae	Woodpeckers
<i>Melanerpes erythrocephalus</i>	red-headed woodpecker
<i>Picoides pubescens</i>	downy woodpecker
<i>P. villosus</i>	hairy woodpecker
<i>Colaptes auratus</i>	northern flicker
<i>Sphyrapicus nuchalis</i>	red-naped sapsucker
Tyrannidae	New World flycatchers
<i>Contopus sordidulus</i>	western wood-pewee
<i>Empidonax traillii</i>	willow flycatcher
<i>E. minimus</i>	least flycatcher
<i>E. oberholseri</i>	dusky flycatcher
<i>E. occidentalis</i>	Cordilleran flycatcher
<i>Sayornis saya</i>	Say's phoebe
<i>Tyrannus verticalis</i>	western kingbird
<i>T. tyrannus</i>	eastern kingbird
<i>T. vociferans</i>	Cassin's kingbird
Laniidae	Shrikes
<i>Lanius ludovicianus</i>	loggerhead shrike
<i>L. excubitor</i>	northern shrike
Vireonidae	Vireos
<i>Vireo gilvus</i>	warbling vireo
<i>V. philadelphicus</i>	Philadelphia vireo
<i>V. olivaceus</i>	red-eyed vireo
Corvidae	Crows, jays, and magpies
<i>Cyanocitta cristata</i>	blue jay
<i>Pica hudsonia</i>	black-billed magpie

Scientific name	Common name
<i>Corvus brachyrhynchos</i>	American crow
<i>C. corax</i>	common raven
<i>Gymnorhinus cyanocephalus</i>	pinyon jay
<i>Nucifraga columbiana</i>	Clark's nutcracker
Alaudidae	Larks
<i>Eremophila alpestris</i>	horned lark
Hirundinidae	Swallows
<i>Tachycineta bicolor</i>	tree swallow
<i>Stelgidopteryx serripennis</i>	northern rough-winged swallow
<i>Riparia riparia</i>	bank swallow
<i>Petrochelidon pyrrhonota</i>	cliff swallow
<i>Hirundo rustica</i>	barn swallow
<i>Tachycineta thalassina</i>	violet-green swallow
Paridae	Chickadees and titmice
<i>Poecile atricapilla</i>	black-capped chickadee*
<i>P. gambeli</i>	mountain chickadee
Sittidae	Nuthatches
<i>Sitta canadensis</i>	red-breasted nuthatch
<i>S. carolinensis</i>	white-breasted nuthatch
Certhiidae	Creepers
<i>Certhia americana</i>	brown creeper
Troglodytidae	Wrens
<i>Troglodytes aedon</i>	house wren
<i>Cistothorus palustris</i>	marsh wren
<i>Salpinctes obsoletus</i>	rock wren
Cinclidae	Dippers
<i>Cinclus mexicanus</i>	American dipper
Regulidae	Kinglets
<i>Regulus satrapa</i>	golden-crowned kinglet
<i>R. calendula</i>	ruby-crowned kinglet
Turdidae	Thrushes
<i>Sialia sialis</i>	eastern bluebird
<i>S. currocooides</i>	mountain bluebird
<i>Myadestes townsendi</i>	Townsend's solitaire
<i>Catharus fuscescens</i>	veery
<i>C. minimus</i>	gray-cheeked thrush
<i>C. ustulatus</i>	Swainson's thrush
<i>C. guttatus</i>	hermit thrush
<i>Turdus migratorius</i>	American robin
Mimidae	Mockingbirds, thrashers, and allies
<i>Dumetella carolinensis</i>	gray catbird
<i>Toxostoma rufum</i>	brown thrasher
<i>Mimus polyglottos</i>	northern mockingbird
<i>Oreoscoptes montanus</i>	sage thrasher
Sturnidae	Starlings
<i>Sturnus vulgaris</i>	European starling (introduced)
Motacillidae	Wagtails and pipits
<i>Anthus ruescens</i>	American (water) pipit
<i>A. spragueii</i>	Sprague's pipit
Bombycillidae	Waxwings
<i>Bombycilla garrulus</i>	Bohemian waxwing
<i>B. cedrorum</i>	cedar waxwing
Parulidae	New World warblers
<i>Vermivora peregrina</i>	Tennessee warbler
<i>V. celata</i>	orange-crowned warbler

Scientific name	Common name
<i>Dendroica petechia</i>	yellow warbler
<i>D. magnolia</i>	magnolia warbler
<i>D. tigrina</i>	Cape May warbler
<i>D. coronata</i>	yellow-rumped warbler
<i>D. townsendi</i>	Townsend's warbler
<i>D. palmarum</i>	palm warbler
<i>D. striata</i>	blackpoll warbler
<i>Mniotilta varia</i>	black-and-white warbler
<i>Setophaga ruticilla</i>	American redstart
<i>Seiurus aurocapillus</i>	ovenbird
<i>S. noveboracensis</i>	northern waterthrush
<i>Oporornis tolmiei</i>	MacGillivray's warbler
<i>Geothlypis trichas</i>	common yellowthroat
<i>Wilsonia pusilla</i>	Wilson's warbler
<i>W. canadensis</i>	Canada warbler
<i>Icteria virens</i>	yellow-breasted chat
Thraupidae	Tanagers
<i>Piranga ludoviciana</i>	western tanager
Emberizidae	Buntings and seedeaters
<i>Pipilo maculatus</i>	spotted towhee
<i>Spizella arborea</i>	American tree sparrow
<i>S. passerina</i>	chipping sparrow
<i>S. pallida</i>	clay-colored sparrow
<i>S. breweri</i>	Brewer's sparrow
<i>S. pusilla</i>	field sparrow
<i>Poocetes gramineus</i>	vesper sparrow
<i>Chondestes grammacus</i>	lark sparrow
<i>Calamospiza melanocorys</i>	lark bunting
<i>Passerculus sandwichensis</i>	Savannah sparrow
<i>Ammodramus savannarum</i>	grasshopper sparrow
<i>A. bairdii</i>	Baird's sparrow
<i>Melospiza melodia</i>	song sparrow
<i>M. lincolnii</i>	Lincoln's sparrow
<i>Zonotrichia alicollis</i>	white-throated sparrow
<i>Z. querula</i>	Harris' sparrow
<i>Z. leucophrys</i>	white-crowned sparrow
<i>Junco hyemalis</i>	dark-eyed junco
<i>Calcarius mccownii</i>	McCown's longspur
<i>C. lapponicus</i>	Lapland longspur
<i>C. ornatus</i>	chestnut-collared longspur
<i>Plectrophenax nivalis</i>	snow bunting
<i>Pipilo chlorurus</i>	green-tailed towhee
<i>Melospiza georiana</i>	swamp sparrow
<i>Zonotrichia atricapilla</i>	golden-crowned sparrow
Cardinalidae	Saltators, cardinals, and allies
<i>Pheucticus ludovicianus</i>	rose-breasted grosbeak
<i>P. melanocephalus</i>	black-headed grosbeak
<i>Passerina amoena</i>	lazuli bunting
<i>Cardinalis cardinalis</i>	northern cardinal
<i>Passerina cyanea</i>	indigo bunting
Icteridae	Blackbirds and orioles
<i>Dolichonyx oryzivorus</i>	bobolink*
<i>Agelaius phoeniceus</i>	red-winged blackbird*
<i>Sturnella neglecta</i>	western meadowlark*
<i>Xanthocephalus xanthocephalus</i>	yellow-headed blackbird*

Scientific name	Common name
<i>Euphagus carolinus</i>	rusty blackbird
<i>E. cyanocephalus</i>	Brewer's blackbird*
<i>Quiscalus quiscula</i>	common grackle*
<i>Molothrus ater</i>	brown-headed cowbird*
<i>Icterus spurius</i>	orchard oriole*
<i>I. galbula</i>	Baltimore oriole*
<i>I. bullockii</i>	Bullock's oriole
Fringillidae	Finches and crossbills
<i>Pinicola enucleator</i>	pine grosbeak
<i>Carduelis flammea</i>	common redpoll
<i>C. hornemanni</i>	hoary redpoll
<i>C. pinus</i>	pine siskin
<i>C. tristis</i>	American goldfinch
<i>Leucosticte tephrocotis</i>	gray-crowned rosy-finch
<i>Pinicola enucleator</i>	pine grosbeak
<i>Loxia curvirostra</i>	red crossbill
<i>L. leucoptera</i>	white-winged crossbill
<i>Coccothraustes vespertinus</i>	evening grosbeak
Passeridae	Old World sparrows
<i>Passer domesticus</i>	house sparrow (introduced)

MAMMALS

Sources: Burt and Grossenheider 1980, Hoffman and Pattie 1968, Foresman 2001, and Montana Natural Heritage Program.

Soricidae	Shrews
<i>Sorex cinereus</i>	cinereus (masked) shrew*
<i>S. merriami</i>	Merriam's shrew
<i>S. haydeni</i>	Hayden's shrew (R)
<i>S. monticolus</i>	montane shrew
Vespertilionidae	Vesper bats
<i>Myotis evotis</i>	long-eared myotis
<i>M. lucifugus</i>	little brown myotis*
<i>M. ciliolabrum</i>	western small-footed myotis
<i>M. thysanodes</i>	fringed myotis
<i>M. volans</i>	long-legged myotis
<i>Lasiurus borealis</i>	eastern red bat
<i>L. cinereus</i>	hoary bat
<i>Lasionycteris noctivagans</i>	silver-haired bat
<i>Eptesicus fuscus</i>	big brown bat
<i>Corynorhinus townsendii</i>	Townsend's big-eared bat
Leporidae	Hares and rabbits
<i>Sylvilagus nuttalli</i>	mountain cottontail
<i>S. audubonii</i>	desert cottontail
<i>Lepus townsendii</i>	white-tailed jackrabbit*#
Sciuridae	Squirrels
<i>Tamias minimus</i>	least chipmunk
<i>T. amoenus</i>	yellow-pine chipmunk
<i>T. ruficaudus</i>	red-tailed chipmunk
<i>Spermophilus richardsonii</i>	Richardson's ground squirrel*#
<i>S. tridecemlineatus</i>	thirteen-lined ground squirrel*#
<i>Cynomys ludovicianus</i>	black-tailed prairie dog
<i>Marmota flaviventris</i>	yellowbelly marmot (R)
Geomyidae	Pocket gophers
<i>Thomomys talpoides</i>	northern pocket gopher*#
Heteromyidae	Pocket mice and kangaroo rats
<i>Perognathus fasciatus</i>	olive-backed pocket mouse*#

Scientific name	Common name
<i>Dipodomys ordii</i>	Ord's kangaroo rat
Castoridae	Beavers
<i>Castor canadensis</i>	American beaver*
Muridae	Mice, voles, rats, and lemmings
<i>Reithrodontomys megalotis</i>	western harvest mouse
<i>Peromyscus leucopus</i>	white-footed mouse
<i>P. maniculatus</i>	deer mouse*#
<i>Onychomys leucogaster</i>	northern grasshopper mouse*#
<i>Neotoma cinerea</i>	bushy-tailed woodrat
<i>Mus musculus</i>	house mouse*
<i>Microtus ochrogaster</i>	prairie vole*
<i>Lemmyscus curtatus</i>	sagebrush vole*
<i>Ondatra zibethicus</i>	common muskrat*#
<i>Microtus longicaudus</i>	long-tailed vole
Dipodidae	Jumping mice
<i>Zapus princeps</i>	western jumping mouse(#?)
Erethizontidae	New World porcupines
<i>Erethizon dorsatum</i>	common porcupine*
Canidae	Wolves, coyotes, and foxes
<i>Canis latrans</i>	coyote*#
<i>C. lupus</i>	gray wolf*# (extirpated)
<i>Vulpes velox</i>	swift fox*#
<i>V. vulpes</i>	red fox*
Ursidae	Bears
<i>Ursus americanus</i>	black bear*
<i>U. arctos</i>	grizzly (brown) bear* (extirpated)
Procyonidae	Raccoons
<i>Procyon lotor</i>	raccoon*
Mustelidae	Weasels
<i>Mustela frenata</i>	long-tailed weasel*#
<i>M. nigripes</i>	black-footed ferret
<i>M. nivalis</i>	least weasel*
<i>M. vison</i>	American mink*
<i>M. ermine</i>	short-tailed weasel
<i>Gulo gulo</i>	wolverine*
<i>Taxidea taxus</i>	American badger*#
<i>Lontra canadensis</i>	northern river otter
Mephitidae	Skunks
<i>Mephitis mephitis</i>	striped skunk*#
Felidae	Cats
<i>Felis catus</i>	feral cat* (introduced)
<i>Lynx rufus</i>	bobcat*
<i>Puma concolor</i>	mountain lion
Cervidae	Deer, moose, and elk
<i>Cervus elephus</i>	Wapiti (elk)*
<i>Odocoileus hemionus</i>	mule deer*
<i>O. virginianus</i>	white-tailed deer*
<i>Alces alces</i>	moose
Antilocapridae	Pronghorn
<i>Antilocapra americana</i>	pronghorn*#
Bovidae	Bison, goats, and sheep
<i>Bos bison</i>	American bison (extirpated)
<i>B. taurus</i>	domestic cattle
<i>Ovis canadensis</i>	bighorn sheep

Appendix H

Section 7 Biological Evaluation

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Final Comprehensive Conservation Plan and Environmental Impact Statement Charles M. Russell National Wildlife Refuge; UL Bend National Wildlife Refuge

Originating Person: Bill Berg
Telephone Number: 406-535-2800 X13
Date: 3/23/12

- I. Region:** 6
II. Service Activity (Program): Refuges
III. Pertinent Species and Habitat:

A. Listed species and/or their critical habitat within the action area:

- Black-footed ferret (endangered) occurs on the refuge in about 5,000-12,000 acres of prairie dog habitat. An ongoing recovery effort is in progress.
- Least tern (endangered) nesting has been documented on islands below the dam just outside of the refuge.
- Pallid sturgeon (endangered) occurs in the Missouri River portion of the refuge. An ongoing recovery effort is in progress. Fewer than ten naturally occurring adults have been documented. Several hundred hatchery reared sub-adults have been reintroduced to the system above Fort Peck Dam.
- Piping plover (threatened) have been documented nesting on shorelines of Fort Peck Lake in the vicinity of the Big Dry Arm.
- Grizzly bear (threatened) have been documented approximately 100 miles west of the west boundary of the refuge as recently as 2010.
- Whooping crane (endangered) is a migrant in McCone, Phillips, and Valley Counties

B. Proposed species and/or proposed critical habitat within the action area: N/A

C. Candidate species within the action area: Greater sage grouse, Sprague's pipit

IV. Geographic area or station name and action: Charles M. Russell National Wildlife Refuge and UL Bend National Wildlife Refuge

V. Location: Montana

A. Ecoregion number and name: N/A

B. County and State: Phillips, Valley, McCone, Garfield, Petroleum, and Fergus Counties, Montana

VI. Description of preferred alternative: Final Comprehensive Conservation Plan and Environmental Impact Statement for Charles M. Russell National Wildlife Refuge and UL Bend National Wildlife Refuge

Alternative D-Ecological Processes Emphasis

In cooperation with partners, the Service would use natural, dynamic ecological processes and management activities in a balanced, responsible manner to restore and maintain the biological diversity, biological integrity, and environmental health of the refuge. Once natural processes are restored, a more passive approach (less human assistance) would be favored. There would be quality wildlife-dependent public uses and experiences provided. Economic uses would be limited when they are injurious to ecological processes.

VII. Determination of effects:

A. Explanation of effects of the action on species and critical habitats in Items III. A, B and C:

In general the preferred alternative would have beneficial effects for threatened and endangered species or would be neutral. Maintenance, restoration, and enhancement of special status species is a key component of restoration of natural ecological processes.

The Service has actively released and monitored ferrets at UL Bend refuge since 1994 and has worked collaborative with other partners, and these efforts would continue under the preferred alternative. Habitat management plans will include detailed prescriptions for habitat management and protocols for monitoring the status of these species.

B. Explanation of actions to be implemented to reduce adverse effects:

By 2014, the Service would evaluate and prioritize the protection of special status species, determining which species require active management and the level and type of management needed. The Service would use criteria including listing status, implementation of actions identified in recovery plans, status within Montana, population size on the refuge. Public use activities would be monitored to ensure adverse effects to special status species do not occur. Prescribed fire would be used in areas to achieve resource objectives but would not be used in areas where adverse effects to special status species occurred. These areas would be identified in the fire management plan.

VIII. Effect determination and response requested:

A. Listed species/designated critical habitat:

Determination

Response Requested

No effect/no adverse modification (Species:)

_____Concurrence

May affect, but not likely to adversely affect species/adversely modify critical habitat

(Species: black-footed ferrets)

Concurrence

May affect, and is likely to adversely affect species/adversely modify critical habitat (Species:)

Formal Consultation

B. Proposed species/proposed critical habitat: N/A

Determination Response Requested

no effect on proposed species/no adverse modification of proposed critical habitat

Concurrence

is likely to jeopardize proposed species/adversely modify proposed critical habitat

Concurrence

C. Candidate species:

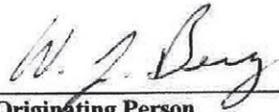
Determination Response Requested

no effect or not likely to adversely effect: Greater sage grouse, Sprague's pipit)

Concurrence

is likely to jeopardize candidate species

Conference



Signature of Originating Person

3-23-12

Date

Reviewing Ecological Services Office Evaluation (check all that apply):

A. **Concurrence**

B. **Nonconcurrence**

Explanation for non-concurrence:

B. **Formal consultation required**

List species or critical habitat unit

C. **Conference required**

List species or critical habitat unit

Name of Reviewing ES Office Helena Montana Ecological Services

R. Mark Wilson
Signature

3-26-12
Date

Revised 3/2010

Bibliography

- Adams, S.M.; Dood, A.R. 2011. Background information on issues of concern for Montana: plains bison ecology, management, and conservation. Bozeman, MT: Montana Department of Fish, Wildlife and Parks. 16 p.
- Alfonso, James M. 1991. South fork of Rock Creek riparian habitat. Rehabilitation project summary. U.S. Fish and Wildlife Service internal memo. Unpublished. On file at Charles M. Russell National Wildlife Refuge, Lewistown, MT. 7 p.
- American Bird Conservancy. 2009. Threats to birds—introduced species. <www.abcbirds.org/conservation/issues/threats/invasives.html> accessed February 2010.
- American Ornithologists' Union. 2000. American Ornithologists' Union checklist of North American birds. 7th edition (1998), 42nd supplement (2000). [Pages unknown].
- American Prairie Foundation. 2011. American Prairie Foundation annual report. <www.americanprairie.org/projectprogress/land/land-acquisition> accessed December 30, 2011.
- Ames, Charles R. 1977. Wildlife conflicts in riparian management—grazing. In: Proceedings; Importance, preservation and management of riparian habitat—a symposium; [Date of symposium unknown]; Tucson, Arizona. General Technical Report RM-43. Fort Collins, Colorado: USDA Forest Service Rocky Mountain Forest and Range Experiment Station. 49–51.
- Anderson, R.C. 1990. The historic role of fire in the North American grassland. In: Collins, S.L.; Wallace, L.L.; editors. Fire in North American tallgrass prairies. Norman, OK: University of Oklahoma Press. 8–18.
- Anderson, Stanley H. 1985. Managing our wildlife resources. Columbus, OH: Charles E. Merrill Publishing Company. 156 p.
- Atkinson, Shirley J.; Dood, Arnold R. 2006a. Montana interior least tern management plan. Bozeman, MT: Montana Department of Fish, Wildlife and Parks. 47 p.
- . 2006b. Montana piping plover management plan. Bozeman, MT: Montana Department of Fish, Wildlife and Parks. 78 p.
- Auble, G.T.; Scott, M.L. 1998. Fluvial disturbance patches and cottonwood recruitment along the upper Missouri River, Montana. *Wetlands* 18:546–56.
- Auble, G.T.; Scott, M.L.; Frazier, J.; Krause, C.; Merigliano, M. 2005. Cottonwood in the Missouri Breaks National Monument. U.S. Geological Survey, Biological Resources Discipline, Fact Sheet 2005–3132. 4 p.
- Bailey, Joseph K.; Schweitzer, Jennifer A.; Whitham, Thomas G. 2001. Salt cedar negatively affects biodiversity of aquatic macroinvertebrates. *Wetlands* 21(3):442–47.
- Ball, I.J.; Eng, Robert L.; Ball, Susan Kraft. 1995. Population density and productivity of ducks on large grassland tracts in northcentral Montana. *Wildlife Society Bulletin* 23(4):767–73.
- Battazzo, A.M. 2007. Winter survival and habitat use by female greater sage-grouse in South Phillips County, Montana 2004–2006 [master's thesis]. Missoula, MT: The University of Montana. 71 p.
- Belsky, A.J.; Matzke, A.; Uselman, S. 1999. Survey of livestock influences on stream and riparian ecosystems in the western United States. *Journal of Soil and Water Conservation* 54:419–31.
- Bender-Keigley, Janet. 2008. Landowners' guide to eastern Montana wetlands and grasslands. Montana Watercourse. <www.mtwatercourse.org/publications/Publications.htm> [access date unknown].
- Bengston, David N. 1994. Changing forest values and ecosystem management. *Society and Natural Resources* 7:515–33.
- Biggins, Dean E.; Godbey, Jerry L.; Gage, Kenneth L.; Carter, Leon G.; Montenieri, John A. 2010. Vector control improves survival of three species of prairie dogs (*Cynomys*): evidence for enzootic plague? *Vector-borne and Zoonotic Diseases* 10(1):17–26.
- Black, Scott Hoffman; Hodges, Nathan; Vaughan, Mace; Shepherd, Matthew. 2007. Pollinators in natural areas: a primer on habitat management. The Xerces Society for Invertebrate Conservation. 8 p.
- Bock, Carl E. 1993. Birds and bovines: effects of livestock grazing on birds in the West. <www.publiclandsranching.org/htmlres/wr_birds_bovines/htm> accessed August 31, 2009. 4 p.
- Bock, Carl E.; Saab, V.A.; Rich, T.D.; Dobkin, D.S. 1993. Effects of livestock grazing on neotropical migratory landbirds in western North America. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. [Pages unknown].
- Boughton, John; Peteson, Lynelle. 2007. Fort Peck: National Register eligibility of 13 archaeological sites in Phillips County, Montana. Report for the U.S. Army Corps of Engineers, Omaha, by Ethnoscience, Incorporated, Billings, MT. Contract number W(9128F-06-0185). 370 p.

- Bovee, K.; Scott, M.L. 2002. Implications of flood pulse restoration for *Populus* regeneration on the upper Missouri River. *River Research and Applications* 18:287–98.
- Bragg, T.B.; Steuter, A.A. 1995. Mixed prairie of the North American Great Plains. In: *Transactions, North American Wildlife and Natural Resource Conference*, [Date of conference unknown], [City and State of conference unknown]. [City and State published unknown]: [Publisher unknown]. 60:335–48.
- Bramblett, Robert G.; Jones-Wuellner, Melissa A.; Guy, Christopher S.; Zale, Alexander V. 2004. Annual report 2004: Montana prairie riparian native species study. Bozeman, MT: Montana Cooperative Fisheries Unit, Montana State University. 50 p.
- Bramblett, Robert G.; Zale, Alexander V. 1999. Fishery survey of the streams of the Charles M. Russell National Wildlife Refuge, Montana. Bozeman, MT: Montana Cooperative Fishery Research Unit, USGS, Montana State University. 40 p.
- . 2000. The ichthyofauna of small streams on the Charles M. Russell National Wildlife Refuge, Montana. *Intermountain Journal of Sciences* 6(2):57–67.
- Brennan, Leonard A.; Kuvlesky, William P., Jr. 2005. North American grassland birds: an unfolding conservation crisis? *Journal of Wildlife Management* 69(1):1–13.
- Briske, D.D.; Derner, J.D.; Brown, J.R. [and others]. 2008. Rotational grazing on rangelands: reconciliation of perception and experimental evidence. *Rangeland Ecology and Management* 61:3–17.
- Briske, D.D.; Fuhlendorf, S.D.; Smeins, F.E. 2005. State-and-transition models, thresholds, and rangeland health: a synthesis of ecological concepts and perspectives. *Rangeland Ecology and Management* 58:1–10.
- Brooks, Matthew L.; D'Antonio, Carla D.; Richardson, David M. [and others]. 2004. Effects of invasive alien plants on fire regimes. *BioScience* 54(7):677–88.
- Brown, Mike; Dinsmore, James J. 1986. Implications of marsh size and isolation for marsh bird management. *The Journal of Range Management*. 50(3):392–97.
- Brown, Stephen; Hickey, C.; Harrington, B.; Gill, B. 2001. *The U.S. Shorebird Conservation Plan*. 2nd edition. Manomet, MA: Manomet Center for Conservation Sciences. 64 p.
- Brumley, John. 2006. Nemont Telephone Cooperatives; 2006 Dagmar, Glentanna and Larslan Exchanges: cultural resources inventory. Prepared for Nemont Telephone Cooperative by Ethos Consultants. On file at the Montana Archaeological Society, Helena. [Pages unknown].
- Brunson, Mark; Gilbert, Lael. 2003. Recreationist responses to livestock grazing in a new national monument. *Journal of Range Management*. 56:570–76.
- Bureau of Economic Analysis. 2008. U.S. Department of Commerce, Regional Economic Information System. <www.bea.gov> accessed December 2009.
- . 2009. U.S. Department of Commerce, Regional Economic Information System. <www.bea.gov/regional/reis/default.cfm?selTable=CA25> accessed December 2009.
- [BLM] Bureau of Land Management. 2004. Bureau of Land Management national sage-grouse habitat conservation strategy. <www.blm.gov/pgdata/etc/medialib/blm/wo/Planning_and_Renewable_Resources/fish__wildlife_and.Par.9151.File.dat/Sage-Grouse_Strategy.pdf> accessed February 2012. 25 p.
- . 2008a. Fact sheet on the BLM's management of livestock grazing. <www.blm.gov/wo/st/en/prog/grazing.html> accessed December 2011.
- . 2008b. Proposed resource management plan and final environmental impact statement. Upper Missouri River Breaks National Monument. On file at Charles M. Russell National Wildlife Refuge, Lewistown, MT. 1,466 p.
- . 2008c. Record of decision and approved resource management plan: Upper Missouri River Breaks National Monument. On file at Charles M. Russell National Wildlife Refuge, Lewistown, MT. [Pages unknown].
- Burt, William H.; Grossenheider, Richard; Peterson, P. 1980. *A field guide to mammals: North America north of Mexico*. Peterson Field Guide Series 5; renewed. Boston, MA: Houghton Mifflin Harcourt. 289 p.
- Butterflies and Moths of North America. 2011. Regional checklist for Montana: Butterflies. <www.butterfliesandmoths.org> accessed December 2011.
- Callaway, Ragan M.; Walker, Lawrence R. 1997. Competition and facilitation: a synthetic approach to interactions in plant communities. *Ecology* 78(7):1,958–65.
- Candelaria, Linda M.; Wood, M. Karl. 1981. Wildlife use of stockwatering facilities. *Rangelands* 3(5):194–96.
- Carlson, Charles. 1993. Second survey of birdlife in two coulees near Bobcat Creek on the C.M. Russell National Wildlife Refuge. On file at Charles M. Russell National Wildlife Refuge, Lewistown, MT. 3 p.
- Carver, Erin; Caudill, James. 2007. Banking on nature 2006: the economic benefits to local communities of national wildlife refuge visitation. Washington, DC: U.S. Department of the Interior, Fish and Wildlife Service, Division of Economics. 382 p.
- Chaikina, Natalia A.; Ruckstuhl, Kathreen, E. 2006. The effect of cattle grazing on native ungulates: the good, the bad, and the ugly. *Rangelands* 28(3):8–14.
- Chapman, Erik W.; Ribic, Christine A. 2002. The impact of buffer strips and stream-side grazing on small mammals in southwestern Wisconsin. *Agriculture, Ecosystems and Environment* 88(1):49–59.

- Churchwell, Roy T.; Davis, Craig A.; Fuhlendorf, Samuel D.; Engle, David M. 2007. Effects of patch-burn management on dickcissel nest success in a tallgrass prairie. *The Journal of Wildlife Management* 72(7):1,596–603.
- Cid, Silvia M.; Detling, James K.; Whicker, April D.; Brizuela, Miguel A. 1991. Vegetational responses of a mixed-grass prairie site following exclusion of prairie dogs and bison. *Journal of Range Management* 44(2):100–105.
- Coe, Priscilla K.; Johnson, Bruce K.; Kern, John W.; Findholt, Scott L.; Kie, John G.; Wisdom, Michael J. March 2001. Responses of elk and mule deer to cattle in summer. *Journal of Range Management* 54:A51–A76.
- Cole, David N.; Landers, Peter B. 1996. Threats to wilderness ecosystems: impacts and research needs. *Ecological Applications* 6(1):168–84.
- Colorado Division of Wildlife. 2007. A guide to wildlife viewing and photography blinds: creating facilities to connect people with nature featuring blinds from the western United States. Denver, CO. 43 p.
- Colorado State Parks. 1998. Native plant revegetation guide for Colorado. Caring for the Land Series, volume 3. <<http://parks.state.co.us/NR/rdonlyres/00A97125-2219-4E68-A28F-6CC62300D43A/0/revegetation.pdf>> accessed February 9, 2010. 269 p.
- Connelly, J.W.; Gratson, M.W.; Reese, K.P. 1998. Sharp-tailed grouse (*Tympanuchus phasianellus*). In: Poole, A.; editor. *The Birds of North America Online*. Ithaca, NY: Cornell Lab of Ornithology. <<http://bna.birds.cornell.edu/bna/species/354>> accessed October 11, 2011.
- Connelly, J.W.; Schroeder, M.A.; Sands, A.R.; Braun, C.E. 2000. Guidelines to manage sage grouse populations and their habitats. *Wildlife Society Bulletin*. 28(4):967–85.
- Cook, Bradley J.; Ehrhart, R.C.; Hansen, Paul L.; Parker, Tom; Thompson, Bill. 1996. Riparian and wetland ecological health: evaluation of selected streams on the Charles M. Russell National Wildlife Refuge. Missoula, MT: The University of Montana, School of Forestry, Montana Forest and Conservation Experiment Station, Riparian and Wetland Research Program. 38 p.
- Cornell Lab of Ornithology. 2010. Rocky Mountain Bird Observatory bird data, 2009–2010. <<http://bna.birds.cornell.edu/bna>> accessed October 3, 2011.
- Cousins, Sara A.O.; Lindborg, Regina. 2004. Assessing changes in plant distribution patterns: indicator species versus plant functional types. *Ecological Indicators*. 4:17–27.
- Cunningham, Mary Ann; Johnson, Douglas H. 2006. Proximate and landscape factors influence grassland bird distributions. *Ecological Applications* 16(3):1,062–75.
- Cushman, Samuel A.; McKelvey, Kevin S.; Flather, Curtis H.; McGarigal, Kevin. 2008. Do forest community types provide a sufficient basis to evaluate biological diversity? *Frontiers in Ecology and the Environment* 6(1):13–17.
- Davis, Les; Stallcop, Emmett. 1965. The Keaster site (24PH401): a stratified bison kill occupation in the Missouri Breaks area of north central Montana. Memoir Number 2. Report produced by the Montana Archaeological Society. [City and State published unknown]. 27 p.
- Davis, Stephen K; Dunan, David C. 1999. Grassland song bird abundance in native and crested wheat-grass pastures of southern Saskatchewan. In: *Ecology and conservation of grassland birds of the Western Hemisphere: proceedings of a conference; October 1995; Tulsa, OK*. [City and State published unknown]: [Publisher unknown]. 19:211–18.
- Davy, Douglas. 1992. Historic properties survey of selected areas at Fort Peck Lake, Montana. Report prepared for U.S. Army Corps of Engineers by EBASCO Environmental, Sacramento, California. On file at the U.S. Army Corps of Engineers, Omaha, NE. [Pages unknown].
- Dechant, J.A.; Sondreal, M.L.; Johnson, D.H.; Igl, L.D.; Goldade, C.M.; Nenneman, M.P.; Euliss, B.R. 1998 (revised 2003). Effects of management practices on grassland birds: mountain plover. Jamestown, ND: Northern Prairie Wildlife Research Center. 15 p.
- Defenders of Wildlife. 2008. Keeping every cog and wheel: reforming and improving the National Wildlife Refuge System. Washington, DC. 30 p.
- DeLuca, T.H.; MacKenzie, M.D.; Gundale, M.J.; Holben, W.E. 2006. Wildfire-produced charcoal directly influences nitrogen cycling in ponderosa pine forests. *Soil Science Society of America Journal* 70:448–53.
- DeLuca, T.H.; Nilsson, M.C.; Zackrisson, O. 2002. Nitrogen mineralization and phenol accumulation along a fire chronosequence in northern Sweden. *Oecologia* 133(2):206–14.
- DeLuca, Thomas H; Aplet, Gregory H. 2008. Charcoal and carbon storage in forest soils of the Rocky Mountain West. *Frontiers in Ecology and the Environment* 6(1):18–24.
- DeLuca, Thomas H.; Sala, Anna. 2006. Frequent fire alters nitrogen transformations in ponderosa pine stands of the inland Northwest. *Ecology* 87(10).
- Destination Lewistown, Montana. 2009. Welcome to Lewistown, Montana. <www.destinationlewisstownmontana.com/wp/community-resources/economic-development-opportunities/> accessed December 2009.
- Dhol, Sukvinder; Horton, Jean; Jones, Robert E. 1994. 1994 Non-waterfowl evaluation of Manitoba's North American Waterfowl Management Plan. [City and State published unknown]: Manitoba Department of Natural Resources, Wildlife Branch. 12 p.

- Dickson, Tom. 2008. Drawing a line—club members participating in the sportsman user value mapping project are saying “Don’t develop where we hunt and fish.” *Montana Outdoors*. September–October 2008:28–31.
- DiTomaso, Joseph M. 2000. Invasive weeds in rangelands: species, impacts, and management. *Weed Science* 48:255–65.
- Dixon, M.D.; Johnson, W.C.; Scott, M.L.; Bowen, D. 2009. Annual report—Missouri River cottonwood study. USACE internal report. [City, State, and office on file unknown]. [Pages unknown].
- Doherty, Kevin E.; Tack, Jason D.; Evans, Jeffrey S.; Naugle, David E. 2010. Mapping breeding densities of greater sage-grouse: a tool for range-wide conservation planning. Prepared for Bureau of Land Management. <www.blm.gov/pgdata/etc/medialib/blm/wo/Communications_Directorate/public_affairs.Par.46599.File.tmp/GRSG%20Rangewide%20Breeding%20Density.pdf> accessed October 2011. 30 p.
- Donaldson, G.M.; Hyslop, C.; Morrison, R.I.G.; Dickson, H.L.; Davidson, I. 2000. Canadian shorebird conservation plan. Ottawa, ON: Canadian Wildlife Service. 34 p.
- Douglass, K.S.; Hamann, S.J.; Joslin, G. 1999. Vegetation, soils, and water. Pages 9.1–9.11 In: Joslin, G.; Youmans, H.; coordinators. *Effects of recreation on Rocky Mountain wildlife: a review for Montana*. [City and State published unknown]: Montana Chapter of The Wildlife Society, Committee on Effects of Recreation on Wildlife. 307 p.
- Douglass, Richard J. 1984. The use of rodents in monitoring ecological impacts of oil shale development in the Piceance Basin, Colorado. In: Comer, R.L.; editor. *Issues and technology in the management of impacted western wildlife*. Boulder, CO: Thorne Ecological Institute. 70–75.
- Douglass, Rick; Hughes, Kevin. 2003. Montana Tech 2002 Hantavirus longitudinal study: summary of data collected from the Charles M. Russell National Wildlife Refuge. Montana Tech University. On file at Charles M. Russell National Wildlife Refuge, Butte, MT. 13 p.
- Dryer, Mark P.; Sandvol, Alan J. 1993. Pallid sturgeon (*Scaphirhynchus albus*) recovery plan. Prepared for Department of the Interior, Fish and Wildlife Service, Region 6, by the Pallid Sturgeon Recovery Team. On file at Fish and Wildlife Service, Region 6, Lakewood, CO. 64 p.
- Duff, D. A. 1983. Livestock grazing impacts on aquatic habitat in Big Creek, Utah. In: *Proceedings of the Workshop on Livestock and Wildlife—Fisheries Relationships in the Great Basin*; [Date of workshop unknown]; Sparks, NV. Special Publication 33901. Berkeley, CA: USDA Forest Service, Pacific Southwest Forest and Range Experiment Station. 129–42.
- Duffield, J.; Neher, C. 2002. *The Prairie Foundation: socioeconomic impacts on Valley and Phillips Counties*. Prepared for The Prairie Foundation by Bioeconomics, Inc. [City, State, and office on file unknown]. [Pages unknown].
- Duffy, A.M., Jr. 2000. Cowbird brood parasitism on a little-used host, the yellow-headed blackbird. In: Smith, J.N.M.; Cook, T.L.; Robinson, S.K.; Rothstein, S.I.; Sealy, S.G.; editors. *Ecology and management of cowbirds and their hosts: studies in the conservation of North American passerine birds*. Austin, TX: University of Texas Press. 115–19.
- Dullum, Jo Ann L.D.; Foresman, Kerry R.; Matchett, Marc R. 2005. Efficacy of translocations for restoring populations of black-tailed prairie dogs. *Wildlife Society Bulletin* 33(3):842–50.
- Ecological Solutions Group, LLC. 2009. Internal report on lotic wetland health assessment survey, Charles M. Russell National Wildlife Refuge. On file at Charles M. Russell National Wildlife Refuge, Lewistown, MT. 8 p.
- . 2011. U.S. Lotic wetland inventory form user manual. <www.ecologicalsolutionsgroup.com/Documents/PDFforms/UserManuals/USALoticInventoryManual.pdf> accessed December 2011. 29 p.
- Economic Research Service. 2009. U.S. Department of Agriculture, commodity costs and returns. <www.ers.usda.gov/Data/CostsAndReturns/TestPick.htm#historic2> accessed December 2011.
- Egan, A.F.; Luloff, A.E. 2000. The exurbanization of America’s forests: research in rural social sciences. *Journal of Forestry* 98(3):26–30.
- Ehrhart, Robert C.; Hansen, Paul L. 1997. Effective cattle management in riparian zones: a field survey and literature review. *Montana BLM Riparian Technical Bulletin Number 3*. Billings, MT: Bureau of Land Management, Montana State Office. 47 p.
- Ellison, Lincoln. 1960. Influence of grazing on plant succession of rangelands. *Botanical Review* 26(1):1–78.
- Environmental Protection Agency. 1998. Interim air quality policy on wildland and prescribed fires. <www.epa.gov/ttn/oarpg/t1/memoranda/firefnl.pdf> accessed July 12, 2011. 38 p.
- Fairfield, George M. 1968. Chestnut-collared longspur. In: *Life histories of North American cardinals, grosbeaks, buntings, towhees, finches, sparrows, and allies*. [City and State published unknown]: [Publisher unknown]. 1,635–52.
- Fandrich, Blain; Peterson, Lynelle. 2005. A traditional cultural property study Fort Peck Lake, Montana. Report produced for U.S. Army Corps of Engineers, Omaha, by Ethnoscience, Incorporated, Billings, MT. [City, State, and office on file unknown]. [Pages unknown].
- FaunaWest Wildlife Consultants. 1996. An analysis of riparian habitat on the Charles M. Rus-

- sell National Wildlife Refuge in relation to birds and small mammals. Report prepared for Charles M. Russell National Wildlife Refuge. On file at Charles M. Russell National Wildlife Refuge, Boulder, MT. [Pages unknown].
- Fernandez-Cornejo, J. 2007. Off-farm income, technology adoption, and farm economic performance. Economic Research Service, U.S. Department of Agriculture, Economic Research Report Number 36. <www.ers.usda.gov/publications/err36/err36.pdf> accessed September 24, 2008.
- Fischman, Robert L. 2005. The significance of national wildlife refuges in the development of U.S. Conservation Policy. *Journal of Land Use* 21(1). 22 p.
- Fitch, L.; Adams, B.W. 1998. Can cows and fish co-exist? *Canadian Journal of Plant Sciences*. 78:191–98.
- Fleischner, Thomas L. 1994. Ecological costs of livestock grazing in western North America. *Conservation Biology* 8(3):629–44.
- Foreman, Richard T.T.; Alexander, Lauren E. 1998. Roads and their major ecological effect. *Annual Review of Ecology and Systematics*. 29:207–31 (C2).
- Foresman, Kerry R. 2001. The wild mammals of Montana. Special Publication 12. The American Society of Mammalogists. 278 p.
- Frank, D.A.; McNaughton, S.J. 1991. Stability increases with diversity in plant communities: empirical evidence from the 1988 Yellowstone drought. *Oikos* 1(3):360–62.
- Freese, C.; Montanye D.; Dabrowska, K. 2009. New directions for the prairie economy: connecting conservation and rural development in the northern Great Plains. World Wildlife Fund, August. [Pages unknown].
- Frost, Cecil. 1998. Presettlement fire frequency regimes of the United States: a first approximation. In: Pruden, Teresa L.; Brennan, Leonard A.; editors. *Fire in ecosystem management: shifting the paradigm from suppression to prescription*. Tall Timbers Fire Ecology Conference Proceeding, Number 20; [Date of conference unknown]; [City and State of conference unknown]. Tallahassee, FL: Tall Timbers Research Station. 70–81.
- . 2008. Natural fire regimes and pre-European settlement vegetation of the Charles M. Russell National Wildlife Refuge. Report prepared for Charles M. Russell National Wildlife Refuge. On file at Charles M. Russell National Wildlife Refuge, Lewistown, MT. 87 p.
- Fuhlendorf, Samuel D.; Engle, David M. 2001. Restoring heterogeneity on rangelands: ecosystem management based on evolutionary grazing patterns. *Bioscience* 51(8):625–32.
- . 2004. Application of the fire-grazing interaction to restore a shifting mosaic on tallgrass prairie. *Journal of Applied Ecology* 41:604–14.
- Fuhlendorf, Samuel D.; Engle, David M.; Kerby, Jay; Hamilton, Robert. 2008. Pyric herbivory: rewilding landscapes through the recoupling of fire and grazing. *Conservation Biology* 23(3):588–98.
- Fuhlendorf, Samuel D.; Harrell, Wade C.; Engle, David M. [and others] 2006. Should heterogeneity be the basis for conservation? Grassland bird response to fire and grazing. *Ecological Applications* 16(5):1,706–16.
- Gaines, M.S.; Diffendorfer, J.E.; Tamarin, R.H.; Whittam, T.S. 1997. The effect of habitat fragmentation on the genetic structure of small mammal populations. *Journal of Heredity* 88:294–304.
- Gardner, William M. 1996. Missouri River pallid sturgeon inventory. Report F-78-R-2. Helena, MT: Montana Department of Fish, Wildlife and Parks. 25 p.
- . 2003. Statewide fisheries investigations. Middle Missouri River fisheries evaluations. Project Number F-113-R5. [City on file unknown], MT: Montana Department of Fish, Wildlife and Parks. 58 p.
- General Accounting Office. 1989. Report to Congressional requesters: national wildlife refuges—continuing problems with incompatible uses call for bold action. <<http://archive.gao.gov/d26t7/139500.pdf>> accessed September 2011. 88 p.
- Gerrity, Paul C.; Guy, C.S.; Christopher, S.; Gardner, William M. 2008. Habitat use of juvenile pallid sturgeon and shovelnose sturgeon with implications for water-level management in a downstream reservoir. *North American Journal of Fisheries Management* 28:832–43.
- Gerrity, P. C.; Guy, C. S.; Gardner, W. M. 2006. Juvenile pallid sturgeon are piscivorous: a call for conserving native cyprinids. *Transactions of the American Fisheries Society* 135:604–09.
- Gibson, R.S.; Bosch, O.J.H. 1996. Indicator species for the interpretation of vegetation condition in the St. Bathans area, Central Otago, New Zealand. *New Zealand Journal of Ecology* 20(2):163–72.
- Gould, William. 1998. Sturgeon chub. American Fisheries Society Web site. [URL unknown] [access date unknown].
- Grace, James B.; Smith, M.D.; Grace, S.L.; Collins, S.L.; Stohlgren, T.J. 2001. Interactions between fire and invasive plants in temperate grasslands of North America. In: Gallery, K.E.M.; Wilson, T.P.; editors. *Proceedings of the invasive species workshop: the role of fire in the control and spread of invasive species*. Fire Conference 2000: the first national conference on fire ecology, prevention and management; [Date of conference unknown]; [City and State of conference unknown]. Miscellaneous Publication Number 11. Tallahassee, FL: Tall Timbers Research Station. 40–65.
- Graetz, Rick; Graetz, Suzanne. 2003. CMR—Montana's Charles M. Russell National Wildlife Ref-

- uge; National Wildlife Refuge System Centennial 1903–2003. Booklet prepared by Northern Rockies Publishing. On file at refuge headquarters, Lewistown, MT. 32 p.
- Green, M.T.; Lowther, P.E.; Jones, S.L.; Davis, S.K.; Dale, B.C. 2002. Baird's sparrow (*Ammodramus bairdii*). In: Poole, A.; Gill, F.; editors. *The Birds of North America*, Number 638. Philadelphia, PA: The Birds of North America, Inc. <www.allaboutbirds.org/guide/Bairds_Sparrow/lifehistory> accessed September 2011.
- Grisak, Grant. 1998. Sicklefin chub. Montana Cooperative Fisheries Research Unit. American Fisheries Society Web site. [URL unknown] [access date unknown].
- Gruell, George E. 1983. Fire and vegetative trends in the northern Rockies: interpretations from 1871–1982 photographs. General Technical Report INT-158. Ogden, UT: USDA Forest Service, Intermountain Research Station. 117 p.
- Gruenert, J.C. 1999. Second job entrepreneurs. *Occupational Outlook Quarterly*, Fall. [Pages unknown].
- Guliano, William M.; Homyack, Joshua D. 2004. Short-term grazing exclusion effects on riparian small mammal communities. *Journal of Range Management* 57:346–50.
- Gunderson, Lance C. 2000. Ecological resilience—in theory and application. *Annual Review of Ecological Systems* 31:425–39.
- Gunderson, Lance H.; Holling, C.S.; editors. 2002. *Panarchy: understanding transformations in human and natural systems*. Washington, DC: Island Press. 507 p.
- Hamann, B.; Johnston, H.; McClelland, P.; Johnson, S.; Kelly, L.; Gobielle, J. 1999. *Birds*. In: Joslin, G.; Youmans, H.; coordinators. *Effects of recreation on Rocky Mountain wildlife: a review for Montana*. [City published unknown], MT: Montana Chapter of The Wildlife Society, Committee on Effects of Recreation on Wildlife. 3.1–3.34.
- Hansen, L.J.; Biringer, J.L.; Hoffman, J.R.; editors. 2003. *Buying time: a user's manual for building resistance and resilience to climate change in natural systems*. <www.panda.org/about_our_earth/all_publications/?8678/BUYING-TIME-A-Users-Manual-for-Building-Resistance-and-Resilience-to-Climate-Change-in-Natural-Systems> accessed March 17, 2010. 246 p.
- Hansen, Paul. 1989. Inventory classification and management of riparian sites in the Upper Missouri National Wild and Scenic River. Missoula, MT: The University of Montana, School of Forestry, Montana Riparian Association. [Pages unknown].
- Hansen, Paul; Cook, Brad; Ehrhart, Robert; Thompson, Bill. 1993. The development of a riparian and wetland ecological health evaluation form for Charles M. Russell National Wildlife Refuge—its applicability for Montana. Presented at the 1993 Annual Montana Riparian and Wetland Association Workshop; [Date of workshop unknown]; [City and State of workshop unknown]. Montana Riparian–Wetland Association draft report. Missoula, MT: The University of Montana, School of Forestry, Montana Forest and Conservation Experiment Station. 147 p.
- Hansen, Paul; Pfister, Robert; Boggs, Keith; Cook, Brad; Joy, John; Hinckley, Dan. 1995. Classification and management of Montana's riparian and wetland sites. Missoula, MT: The University of Montana, School of Forestry, Montana Forestry and Conservation Experiment Station, Montana Riparian and Wetland Association. 646 p.
- Hansen, Paul L. 1992. Developing a riparian–wetland grazing management plan. Missoula, MT: The University of Montana, School of Forestry, Montana Forestry and Conservation Experiment Station, Montana Riparian and Wetland Association. 10 p.
- Hansen, Paul L.; Thompson, William H.; Ehrhart, Robert C.; Hinckley, Dan K.; Haglan, Bill; Rice, Karen. 2000. Development of methodologies to evaluate the health of riparian and wetland area. In: Thurston, Vance; editor. *Proceedings of the Fifth International Symposium of Fish Physiology, Toxicology, and Water Quality*; November 10–13, 1998; Hong Kong, China. EPA/6000/R-00/015. Washington, DC: U.S. Environmental Protection Agency, Office of Research and Development. 300 p.
- Hansen, P.L.; Chadde, S.W.; Pfister, R.D. 1988. Riparian dominance types of Montana. *Miscellaneous Publication Number 49*. Missoula, MT: The University of Montana, School of Forestry, Montana Forest and Conservation Experiment Station. [Pages unknown].
- Harmon, Will; editor. 1999. *Best management practices for grazing Montana*. Helena, MT: Environmental Protection Agency R6 and Department of Natural Resources and Conservation. 28 p.
- Havlick, David G. 2002. *No place distant: roads and motorized recreation on America's public lands*. Washington, DC: Island Press. 297 p.
- Heller, Nicole E.; Zavaleta, E.S. 2009. Biodiversity management in the face of climate change: a review of 22 years of recommendations. *Biological Conservation* 142:14–32.
- Hendricks, Paul. 1999. Amphibian and reptile surveys on Montana refuges. Report for U.S. Fish and Wildlife Service: Montana Field Office, Charles M. Russell National Wildlife Refuge, and Medicine Lake National Wildlife Refuge. Helena, MT: Montana Natural Heritage Program. 27 p.
- Hendricks, Paul; Maxell, B.A.; Lenard, S. 2006. Land mollusk surveys on USFS Northern Region lands. Report for USDA Forest Service, Northern Region by Montana Natural Heritage Program, Helena, MT. 11 p.

- Hendricks, Paul S.; Currier, Lenard C.; Johnson, J. 2005. Bat use of highway bridges in south-central Montana. Report for Montana Department of Transportation by Montana Natural Heritage Program, Helena, MT. 31 p.
- Hendricks, P.S.; Currier, Lenard, C.; Maxell, B. 2007. Filling the distribution gaps for small mammals in Montana. Report for Bureau of Land Management, Montana State Office by Montana Natural Heritage Program, Helena, MT. 17 p.
- Higgins, K.F. 1986. Interpretation and compendium of historical fire accounts in the northern Great Plains. U.S. Fish and Wildlife Service, Resource Publication 161. [Pages unknown].
- Hoff, K.v.S.; Blaustein, A.R.; McDiarmid, R.W.; Altig, R. 1999. Behavior—interactions and their consequences. In: McDiarmid, R.W.; Altig, R.; editors. Tadpoles—the biology of anuran larvae. Chicago, IL: University of Chicago Press. 215–39.
- Hoffman, Robert S.; Pattie, Donald L. 1968. A guide to Montana animals: identification, habitat, distribution, and abundance. Missoula, MT: The University of Montana. 133 p.
- Hoffmann, Robert S.; Wright, Phillip L.; Newby, Fletcher E. 1969. Distribution of some mammals in Montana. I. Mammals other than bats. *Journal of Mammalogy* 50(3):579–604.
- Hoitsma Ecological, Inc. 2006. Telegraph Creek riparian habitat restoration project: phase III, final report and recommendations. Prepared for U.S. Fish and Wildlife Service, World Wildlife Fund, and American Prairie Foundation. On file at Charles M. Russell National Wildlife Refuge, Lewistown, MT. 43 p.
- Holling, C.S. 1973. Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics* 4:1–23.
- Hollow, O'Brien; Chadwick, Amy; Hansen, Paul L. 2001. Lower Musselshell River study. Environmental Protection Agency/Montana Department of Environmental Quality 319 grant project, June 1999–May 2001. Missoula, MT: The University of Montana, School of Forestry, Riparian and Wetland Research Program. [Pages unknown].
- Holloway, Gillian L.; Barclay, Robert M.R. 2000. Importance of prairie riparian zones to bats in southeastern Alberta. *Ecoscience* 7(2):115–22.
- Holmes, Brian E.; Foresman, Kerry R.; Matchett, Marc R. 2006. No evidence of persistent *Yersinia pestis* infection at prairie dog colonies in north-central Montana. *Journal of Wildlife Diseases* 42:164–69.
- Hoogland, John L. 1995. The black-tailed prairie dog: social life of a burrowing mammal. Wildlife behavior and ecology. Chicago, IL: University of Chicago Press. 562 p.
- Howe, Henry F. 1994. Managing species diversity in tallgrass prairie: assumptions and implications. *Conservation Biology* 8(3):691–704.
- Howe, Marshall; Bart, J.; Brown, S.; [and others]; editors. 2000. A comprehensive monitoring program for North American shorebirds. Manomet Center for Conservation Sciences. <www.Manomet.org/USSCP/files.htm> [access date unknown].
- Hubbard, John P. 1977. Importance of riparian ecosystems—biotic considerations. In: Importance, preservation and management of riparian habitat: a symposium. [Date of symposium unknown]; Tucson, AZ. General Technical Report RM–43. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 49–51.
- Hurteau, M.; North, M. 2009. Fuel treatment effects on tree-based forest carbon storage and emissions under modeled wildfire scenarios. *Frontiers in Ecology and the Environment* 7(8):409–14.
- Johnson, Douglas H. 2001. Habitat fragmentation effects on birds in grasslands and wetlands: a critique of our knowledge. *Great Plains Research* 11(2):211–13. Northern Prairie Wildlife Research Center Online. <www.npwrc.usgs.gov/resource/birds/habfrag/index.htm> accessed January 15, 2010.
- Johnson, Douglas H.; Igl, Lawrence D. 2001. Area requirements of grassland birds: a regional perspective. *The Auk* 118:24–34.
- Johnson, J. 2004. The state of the land—analysis of land use change in Montana and the three regions. <www.mt.gov> accessed October 2009.
- Johnson, Laura C.; Wallace, George N.; Mitchell, John E. 1997. Visitor perception of livestock grazing in five U.S. wilderness areas, a preliminary assessment. *International Journal of Wilderness* 3(2):14–20.
- Johnson, R. Roy; Haight, Lois T.; Simpson, James M. 1977. Endangered species vs. endangered habitats—a concept. In: Importance, preservation and management of riparian habitat: a symposium; [Date of symposium unknown]; Tucson, AZ. General Technical Report RM–43. [Pages unknown].
- Joslin, G.; Youmans, H.; coordinators. 1999. Effects of recreation on Rocky Mountain wildlife: a review for Montana. Committee on Effects of Recreation on Wildlife. [City unknown], MT: Montana Chapter of The Wildlife Society. 307 p.
- Kantrud, H.A.; Higgins, K.F. 1992. Nest and nest site characteristics of some ground-nesting non-passerine birds of northern grasslands. *Prairie Naturalist* 24:67–84.
- Karl, Thomas R.; Melillo, Jerry M.; Peterson, Thomas; editors. 2009. Global climate change impacts in the United States. U.S. Global Change Research Program. Cambridge University Press. <www.globalchange.gov> [access date unknown]. 196 p.
- Kauffman, J. Boone; Beschta, R.L.; Otting, N.; Lytjen, D. 1997. An ecological perspective of riparian and stream restoration in the western United States. *Fisheries* 22(5):12–24.

- Kauffman, J. Boone; Krueger, W.C. 1984. Livestock impacts on riparian ecosystems and streamside management implications. *Journal of Range Management* 37(5):430–38.
- Keane, R.E.; Arno, S.F.; Brown, J.K. 1990. Simulating cumulative fire effects in ponderosa pine/Douglas-fir forests. *Ecology* 71(1):189–203.
- Kemmimck, E. 2002. Our way of life special report: we are three. *Montana Standard*. November 17. <www.mtstandard.com/articles/2002/11/17/special-reports/export47716.txt> accessed July 18, 2008.
- Kennedy, Theodore A.; Naeem, Shahid; Howe, Katherine M.; Knops, Johannes M.H.; Tilman, David; Reich, Peter. 2002. Biodiversity as a barrier to ecological invasion. *Nature* 417:636–38.
- Kerkvliet, J. 2008. An economic profile of Montana in 2008. *The Wilderness Society*, November. 62 p.
- Knopf, Fritz L. 1994. Avian assemblages on altered grasslands. *Studies in Avian Biology* 15:247–57.
- Knowles, Craig; Campbell, Bruce R. 1982. Distribution of elk and cattle in a rest-rotation grazing system. In: Peek, J.M.; Dalke, P.D.; editors. *Proceedings of the wildlife-livestock relationships symposium*; [Date of symposium unknown]; [City and State of symposium unknown]. Moscow, ID: University of Idaho; Forestry, Wildlife and Range Experimental Station. 47–60.
- Knowles, Craig J. 1985. Observations on prairie dog dispersal in Montana. *Prairie Naturalist* 17(1):33–40.
- Knowles, Craig; Knowles, Pamela. 1994. Bird species composition and abundance in two riparian areas with differing grazing histories on the Charles M. Russell National Wildlife Refuge. On file at Charles M. Russell National Wildlife Refuge, Boulder, MT. 26 p.
- Knowles, Craig J.; Knowles, Pamela R. 1995. Presettlement wildlife and habitat of Montana: an overview. Jamestown, ND: Northern Prairie Wildlife Research Center Online. <www.npwrc.usgs.gov/resource/habitat/presettl/index.htm> (Version 16JUL97) [access date unknown].
- Knowles, Craig J.; Knowles, P.R. 1994. A review of black-tailed prairie dog literature in relation to rangelands administered by the Custer National Forest. On file at Charles M. Russell National Wildlife Refuge, Boulder, MT. 98 p.
- Knowles, Pamela R. 1981. Habitat selection, home range size, and movements of bobcats in north-central Montana [master's thesis]. Missoula, MT: The University of Montana. 62 p.
- Koontz, Lynne; Sexton, Natalie; Ishizaki, Asuka; Ritten, John. 2010. Regional economic impacts of current and proposed management alternatives for Charles M. Russell National Wildlife Refuge. U.S. Geological Survey Open-File Report 2012–1014. Fort Collins, CO: U.S. Geological Survey. 41 p.
- Kotliar, Natasha B. 2000. Application of the new key-stone-species concept to prairie dogs: how well does it work? *Conservation Biology* 14(6):1,715–21.
- Krausman, Paul R.; Rosenstock, Steven S.; Cain, James W., 3rd. 2006. *Developed waters for wildlife: science, perception, values and controversy*. *Wildlife Society Bulletin* 34(3):563–69.
- Krueger, D.J. 1993. Effects of land use practices on western riparian ecosystems. Pages 321–30. In: Finch, D.M.; Stangel, P.W.; editors. *Status and management of neotropical migratory birds*. General Technical Report RM–229. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 422 p.
- Lambeck, R.J. 1997. Focal species: a multi-species umbrella for nature conservation. *Conservation Biology*. 11(4):849–56.
- Lambert, J. Daniel; Hodgman, Thomas P.; Laurent, Edward J.; [and others]. 2009. *The Northeast bird monitoring handbook*. The Plains, VA: American Bird Conservancy. 32 p.
- Landsberg, Jill; Crowley, Gabriel. 2004. Monitoring rangeland biodiversity: plants as indicators. *Austral Ecology* 29:59–77.
- Larson, Diane L.; Anderson, Patrick J.; Newton, Wesley. 2001. Alien plant invasion in mixed-grass prairie: effects of vegetation type and anthropogenic disturbance. *Ecological Applications* 11(1):128–41.
- Lausen, Cori L.; Barclay, Robert M.R. 2002. Roosting behavior and roost selection of female big brown bats (*Eptesicus fuscus*) roosting in rock crevices in southeastern Alberta. *Canadian Journal of Zoology* 80(6):1,069–76.
- Leonard, Steve; Kinch, Gene; Elsbernd, Van; [and others]. 1997. *Riparian area management: grazing management for riparian-wetland areas*. Technical Reference 1737–14. Denver, CO: U.S. Department of the Interior, Bureau of Land Management, Natural Applied Resource Sciences Center. 40 p.
- Leopold, Aldo; Sows, Lyle K.; Spencer, David L. 1947. A survey of over-populated deer ranges in the United States. *Journal of Wildlife Management* 11(2):162–77.
- Leopold, A.S.; Cain, S.A.; Cottam, C.M.; Gabrielson, I.N.; Kimball, T.L. 1963. *Wildlife management in the national parks: the Leopold report*. Advisory board on wildlife management appointed by Secretary of the Interior Udall. <www.nps.gov/history/history/online_books/leopold/leopold.htm> accessed March 2010.
- Lesica, Peter; Miles, Scott. 2004. Ecological strategies for managing tamarisk on the C.M. Russell National Wildlife Refuge, Montana, USA. *Biological Conservation* 119(4):535–43.
- Leung, Yu-Fai; Marion, Jeffery L. 2000. Recreation impacts and management in wilderness: a state-

- of-knowledge review. USDA Forest Service Proceedings RMRS-P-15-Vol-5. Ogden, UT. 26 p.
- Licht, Daniel S.; Millsbaugh, Joshua J.; Kunkel, Kyran, E. [and others]. 2010. Using small populations of wolves for ecosystem restoration and stewardship. *Bioscience* 60(2):147–53.
- Liljeblad, Adam; Borrie, William T. 2006. Trust in wildland fire and fuel management systems. *International Journal of Wilderness* 12(1):39–43.
- Lindmeier, John P. 1960. Plover, rail and godwit nesting on study area in Mahanomen County, Minnesota. *The Flicker* 32(1):5–9.
- Loflin, Brant. 2008. Site form for site 24PH1015. On file at Montana Historical Society, Helena, MT.
- Logan, Brian D. 2001. Avian community composition and nesting productivity relative to cattle grazing in north-central Montana. Tempe, AZ: University of Arizona. 66 p.
- Lokemoen, John T. 1973. Waterfowl production on stock-watering ponds in the northern Plains. *Journal of Range Management* 26(3):179–84.
- Louv, Richard. 2005. Last child in the woods: saving our children from nature deficit disorder. Chapel Hill, NC: Aloquin. 323 p.
- Luna, Carmen. 2002. Bowdoin National Wildlife Refuge: site description, what species, research and management activities, information relating to WHSRN, locally involved communities, bibliography. On file at Bowdoin National Wildlife Refuge, Malta, MT. 11 p.
- Lyon, L.J.; Telfer, E.S. 2009. Direct effects of fire and immediate animal responses. In: *Forest Encyclopedia Network*. <www.forestencyclopedia.net/p/p700/view> accessed February 2010.
- Mack, Gene D.; Flake, Lester D. 1980. Habitat relationships of waterfowl broods on South Dakota stock ponds. *Journal of Wildlife Management* 44(3):695–700.
- Mackey, Dennis. 1992. Planting shrubs and trees along the South Fork of Rock Creek. U.S. Fish and Wildlife Service internal memo. Unpublished. On file at Charles M. Russell National Wildlife Refuge, Lewistown, MT.
- Mackie, Richard J. 1970. Range ecology and relations of mule deer, elk, and cattle in the Missouri River Breaks, Montana. *Wildlife Monographs* 20:3–79.
- Mader, Eric; Shepard, Matthew; Vaughn, Mace; Black, Scott Hoffman. 2011. Attracting native pollinators: the Xerces Society guide to conserving North American bees and butterflies and their habitat. [City published unknown], MA: Storey Publishing. 384 p.
- Maestas, J.D.; Knight, R.L.; Gilgert, W.C. 2001. Biodiversity and land-use change in the American Mountain West. *The Geographical Review*, 91(3):509–24.
- Maher, William, J. 1974. Ecology of pomarine, parasitic and long-tailed jaegers in northern Alaska. *Pacific Coast Avifauna* 37. 157 p.
- Malone, Michael; Roeder, Richard; Lang, William. 1976. Montana, a history of two centuries. Seattle, WA: University of Washington Press. [Pages unknown].
- Manfredo, Michael J.; editor. 2002. Wildlife viewing: a management handbook. Chapter 5. In: Manfredo, Michael J.; Pierce, Cynthia; Vaske, Jerry J.; Whittaker, Doug. An experience-based approach to planning and management for wildlife-viewing recreation. Corvallis, OR: Oregon State University Press. 70–91.
- Markitecture. 2007. A disciplined approach to developing agritourism and marketing the consumer opportunities: initial research findings. Prepared for The Rural Landscape Institute. <http://rurallandscapesinstitute.org/market_research_02_02_07.pdf> [access date unknown]. 136 p.
- Matchett, M.R.; Biggins, D.E.; Carlson, V.; Powell, B.; Roche, T. 2010. Enzootic plague reduces black-footed ferret (*Mustela nigripes*) survival in Montana. *Journal of Vector-borne Zoonotic Diseases* (10)1. 10 p.
- Maxell, Bryce; Hokit, Grant. 1999. Amphibians and reptiles. In: Joslin, G.; Youmans, J.; coordinators. Effects of recreation on Rocky Mountain wildlife: a review for Montana. [City and State published unknown]: Montana Chapter of The Wildlife Society, Committee on Effects of Recreation on Wildlife. 2:1–29.
- Meehan, William R.; Platts, William S. 1978. Live-stock grazing and the aquatic environment. *Journal of Soil and Water Conservation*. 33(6):274–78.
- Merrell, D.J. 1970. Migration and gene dispersal in *Rana pipiens*. *American Zoologist* 10:47–52.
- Merrell, D.J. 1977. Life history of the leopard frog, *Rana pipiens*, in Minnesota. Occasional Paper Number 15. Minneapolis, MN: University of Minnesota, Bell Museum of Natural History. [Pages unknown].
- Milchunas, D.G.; Noy-Meir, I. 2002. Grazing refuges: external avoidance of herbivory and plant diversity. *Oikos*. 99:113–30.
- Miles, Scott. 1996. Rock Creek and Siparyann Creek woody riparian vegetation and cross section monitoring. U.S. Fish and Wildlife Service and Bureau of Land Management. On file at Charles M. Russell National Wildlife Refuge, Missoula, MT. 272 p.
- Miller, Scott; Knight, Richard. 1998. Influence of recreational trails on breeding bird communities. <http://www.bouldercolorado.gov/files/openspace/pdf_gis/IndependentResearchReports/4428_Miller_Scott_Influence.pdf> accessed February 2010.
- Mills, L. Scott. 2007. Conservation of wildlife populations: demography, genetics, and management. Malden, MA: Blackwell Publishing Company. [Pages unknown].
- Minnesota IMPLAN Group, Inc. 2007. IMPLAN data files. <www.implan.com> [access date unknown].

- Mitchell, John E.; Wallace, George N.; Wells, Marcella D. 1996. Visitor perceptions about cattle grazing on national forest land. *Journal of Range Management*. 49:81–86.
- Moehrensclager, A.; Moehrensclager, C. 2001. Census of swift fox (*Vulpes velox*) in Canada and northern Montana: 2000–2001. *Alberta Species at Risk Report Number 24*. Edmonton, AB: Alberta Sustainable Resource Development, Fish and Wildlife Division. 21 p.
- Montana Audubon. 2008. Montana important bird areas for greater sage-grouse. <www.mtaudubon.org/birds/documents/sage-grouse_IBA_NominationPacket2.pdf> accessed December 2011. 22 p.
- Montana Department of Commerce. 2008. Census and economic resources. <<http://commerce.mt.gov/censusresources.asp>> accessed December 2009.
- Montana Department of Environmental Quality. 2001. Lower Musselshell TMDL planning area decision document. [City unknown], MT. 15 p.
- . Clean Water Act Information Center. 2011. Montana's water quality assessment database. <<http://cwaic.mt.gov/query.aspx>> accessed October 3, 2011.
- [MFWP] Montana Department of Fish, Wildlife and Parks. 2001. Adaptive harvest management: mule deer population objectives, hunting regulation strategies, special management districts, monitoring program, population modeling, deer management policies. Helena, MT: Montana Department of Fish, Wildlife and Parks. 667 p.
- . 2002a. Helena, Montana: Fort Peck Reservoir fisheries management plan 2002–2012. <<http://fwp.mt.gov/content/getItem.aspx?id=31385>> accessed October 30, 2009. 21 p.
- . 2002b. Conservation plan for black-tailed and white-tailed prairie dogs in Montana. Montana prairie dog working group January 2002. <<http://fwp.mt.gov/fwpDoc.html?id=31186>> accessed August 2010. 51 p.
- . 2004. Montana statewide elk management plan. <<http://fwp.mt.gov/hunting/elkplan.html>> accessed November 27, 2009. 404 p.
- . 2005a. Montana comprehensive fish and wildlife conservation strategy 2005. Helena, MT. <<http://fwp.mt.gov/specieshabitat/strategy/default.html>> accessed September 21, 2009. 658 p.
- . 2005b. Montana management plan and conservation strategies for sage grouse in Montana: final. Montana Sage Grouse Work Group. <<http://fwpiis.mt.gov/content/getItem.aspx?id=31187>> accessed October 2011. 200 p.
- . 2005–2006. Statewide fisheries investigations: Middle Missouri River fisheries evaluations. Project Number F–113–R7 and R8. [City, State, and office on file unknown]. 65 p.
- . 2006a. A guide to building and managing private fish ponds in Montana. <<http://fwp.mt.gov/content/getItem.aspx?id=19293>> accessed October 30, 2009. 34 p.
- . 2006b. Final Fish, Wildlife and Parks region 6 prairie dog abundance and distribution objectives plan. Region 6 Prairie Dog Advisory Board. On file at Charles M. Russell National Wildlife Refuge, Lewistown, MT. 20 p.
- . 2008a. The road ahead: strategic plans. <<http://fwp.mt.gov/doingBusiness/insidefwp/aboutUs.html>> accessed October 21, 2009.
- . 2008b. Montana statewide comprehensive outdoor recreation plan, 2008 to 2012. Helena, MT. 155 p.
- . 2009a. Bighorn sheep conservation strategy. <<http://fwp.mt.gov/wildlife/conservation/bighorn.html>> accessed October 15, 2009.
- . 2009b. Harvest and hunting reports. <<http://fwp.mt.gov/hunting/planahunt/harvestReports.html>> [access date unknown].
- . 2009c. Paddlefishing. <http://fwp.mt.gov/fishingmontana/brochure_paddlefish.html> accessed October 22, 2009.
- . 2009d. Pallid sturgeon recovery program for the Upper Missouri River. [City unknown], MT. 2 p.
- . 2009e. Recreation and tourism. <<http://fwp.mt.gov/doingBusiness/reference/montanaChallenge/reports/tourism.html>> accessed January 1, 2010.
- . 2011. FWP fact sheet: Congress delists Montana wolf population. <<http://fwp.mt.gov/fwpDoc.html?id=50145>> accessed February 2012. 3 p.
- Montana Department of Labor and Industry. 2009. State and county economic fliers. <www.ourfuture.org/cgi/databrowsing/?PAGEID=4&SUBID=273> accessed December 2009.
- [DNRC] Montana Department of Natural Resources and Conservation. 2007. Oil and Gas Conservation Division annual review 2007. Volume 51. <www.boge.dnrc.mt.gov/AR_2007.pdf> [access date unknown]. 87 p.
- . 2011. Water Rights Bureau. <http://dnrc.mt.gov/wrd/water_rts> accessed July 2011.
- [MIAG] Montana/Idaho Airshed Group. 2010. Montana/Idaho airshed operating guide. <<http://smokemu.org/docs/20100601OpsGuide.pdf>> accessed July 12, 2011. 56 p.
- Montana Natural Heritage Program. 2008. Species of concern. <<http://nhp.nris.mt.gov/SpeciesOfConcern/Concern/Default.aspx>> [access date unknown].
- Montana Natural Heritage Program and Montana Department of Fish, Wildlife and Parks. 2009. Montana animal species of concern. Helena, MT. 17 p.
- Montana Partners in Flight. 2000. Draft Montana bird conservation plan, version 1.0. <www.partnersinflight.org/bcps/plan/pl_mt_10.pdf> [access date unknown]. 288 p.
- Montana Steering Committee Intermountain West Joint Venture. 2005. Coordinated implementation plan for bird conservation in western Montana.

- <<http://iwjv.org/Images/MTPlan2005.pdf>> [access date unknown]. 58 p.
- More, Thomas A.; Averill, J.R.; Stevens, T.H. 1996. Values and economics in environmental management: a perspective and critique. *Journal of Environmental Management* 48:397–406.
- Moulton, Gary E. 2002. The definitive journals of Lewis and Clark. <<http://lewisandclarkjournals.unl.edu/index.html>> accessed October 6, 2009. 3,404 p.
- Moynahan, B.J. 2004. Landscape-scale factors affecting population dynamics of greater sage-grouse (*Centrocercus urophasianus*) in north-central Montana, 2001–2004 [Ph.D. dissertation]. Missoula, MT: The University of Montana. [Pages unknown].
- Moynahan, B.J.; Lindberg, M.S.; Rotella, J.J.; Thomas, J.W. 2006a. Factors affecting nest survival of greater sage-grouse in north-central Montana. *Journal of Wildlife Management* 71(6):1,773–83.
- Moynahan, B.J.; Lindberg, C.; Thomas, J.W. 2006b. Factors contributing to process variance in annual survival of female greater sage-grouse in north-central Montana. *Ecological Applications* 16(44):1,529–38.
- mt.gov (Montana's Official State Web site). 2008a. Montana animal field guide species ranking status. <<http://fieldguide.mt.gov/statusCodes.aspx>> accessed September 19, 2008.
- . 2008b. Montana field guide. Baird's sparrow: *Ammodramus bairdii*. <http://FieldGuide.mt.gov/detail_ABPBXA0010.aspx> accessed September 19, 2008.
- . 2008c. Montana field guide. Brewer's sparrow: *Spizella breweri*. <http://fieldguide.mt.gov/detail_ABPBX94040.aspx> accessed September 19, 2008.
- . 2008d. Montana field guide. Burrowing owl: *Athenecunicularia*. <http://FieldGuide.mt.gov/detail_ABNSB10010.aspx> accessed September 19, 2008.
- . 2008e. Montana field guide. Lark bunting: *Calamospiza melanocorys*. <http://FieldGuide.mt.gov/detail_ABPBX98010.aspx> accessed September 19, 2008.
- . 2010. Montana field guide. Greater sage-grouse: *Centrocercus urophasianus*. <http://FieldGuide.mt.gov/detail_ABNLC12010.aspx> accessed January 26, 2010.
- Murie, O.J. 1935. Report on the Fort Peck migratory bird refuge. Report on file at Charles M. Russell National Wildlife Refuge, Lewistown, MT. [Pages unknown].
- Murphy, Robert. 2008. Fire is for the birds in northern mixed-grass prairie. *Fire Science Brief* 9:1–6 <www.firescience.gov> [access date unknown].
- Myers, L.H. 1981. Grazing on stream riparian habitats in southwestern Montana. *Proceedings of the Montana Chapter of The Wildlife Society*, Great Falls, MT. [Pages unknown].
- Mysterud, Atle. 2006. The concept of overgrazing and its role in management of large herbivores. *Wildlife Biology* 12:129–41.
- National Audubon Society. 2009. Important bird areas. <<http://iba.audubon.org/iba/profileReport.do?siteId=2934&navSite=search&pagerOffset=0&page=1>> [access date unknown].
- National Park Service. 2008. Glacier National Park factsheet. <www.nps.gov/glac/parknews/fact-sheet.htm> accessed January 2010.
- National Wildfire Coordinating Group. 2001. Fire effects guide. NFES 2394. <www.nwccg.gov/pms/RxFire/FEG.pdf> accessed October 2011. 313 p.
- . 2011. Glossary of wildland fire terminology. <www.nwccg.gov/pms/pubs/glossary/w.htm> accessed December 2011.
- National Wildlife Federation. 2010. Fact sheet: grazing retirement auction on the C.M. Russell National Wildlife Refuge. <www.nwf-wcr.org/PDFs/NWF-CMR-FactSheet.pdf> accessed February 22, 2010.
- . 2011. CMR grazing allotment map. <www.nwf-wcr.org/PDFs/WCR-MAP-CMR-Russell-Retirements-FINAL.pdf> accessed October 2011.
- [NRCS] Natural Resource Conservation Service. 1999. Grassland Birds. Fish and Wildlife Habitat Management Leaflet Number 8. [City and State published unknown]. USDA Natural Resource Conservation Service. [Pages unknown].
- . 2003 edition. Grazing Lands Technology Institute: national range and pasture handbook. <<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17734.wba>> accessed October 23, 2009.
- . 2005a. Montana native plants for pollinator-friendly plantings. <<ftp://ftp-fc.sc.egov.usda.gov/MT/www/technical/plants/pollinator.pdf>> accessed October 2011. 8 p.
- . 2005b. Farm pond ecosystem. 2005. Fish and Wildlife Habitat Management Leaflet Number 29. [City and State published unknown]. [Pages unknown].
- . 2009. Ecological site descriptions. <www.mt.nrcs.usda.gov> accessed October 2009.
- The Nature Conservancy. 2007. Prairie birds in peril: Nature Conservancy launches major effort to protect prairie bird habitat. <www.nature.org/wherework/northamerica/states/montana/news/news620.html> [access date unknown].
- NatureServe. 2008. NatureServe Explorer: an online encyclopedia of life. Version 7.0 Arlington, VA. <www.natureserve.org/explorer> accessed September 19, 2008.
- Naugle, David E.; Aldridge, Cameron L.; Walker, Brett L. [and others]. 2004. West Nile virus: pending crisis for greater sage-grouse. *Ecology Letters* 7:704–13.

- Naugle, David E.; Aldridge, Cameron L.; Walker, Brett L. [and others]. 2005. West Nile virus and sage-grouse: what more have we learned? *Wildlife Society Bulletin* 33(2):616–23.
- Nearly, Daniel G.; Ryan, Kevin C.; DeBano, Leonard F.; editors. 2005 (revised 2008). *Wildland fire in ecosystems: effects of fire on soils and water*. General Technical Report RMRS–GTR–42, volume 4. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station. 250 p.
- Needham, Robert G. 1978. Northeastern Montana fisheries investigation. Montana Department of Fish and Game Fisheries Division. Project Number F–11–R–25, Job Number I–a. On file at Charles M. Russell National Wildlife Refuge, Lewistown, MT. 12 p.
- Needham, Robert G.; Gilge, Kent W. 1980. *Northeast Montana fisheries study: inventory and survey of waters of the project area*. Helena, MT: Montana Department of Fish, Wildlife and Parks. [Pages unknown].
- Neppl, Travis. 1997. Riparian and wetland ecological health evaluations for Duck Creek and Brown Pass Coulee, Charles M. Russell National Wildlife Refuge. On file at Charles M. Russell National Wildlife Refuge, Lewistown, MT. 15 p.
- Nolt, D. 2008. Revamping the Charles M. Russell Wildlife Refuge conservation plan. *New West Bozeman*. February 22.
- Norberg, Jon; Cumming, Graeme S.; editors. 2008. *Complexity theory for a sustainable future*. [City and State published]: Columbia University Press. 315 p.
- Norman C. Wheeler and Associates. 2008. Newsletter. <www.ncwheeler.com> accessed October 2008.
- North American Bird Conservation Initiative, U.S. Committee. 2009. *The state of the birds, United States of America, 2009*. Washington, DC: U.S. Department of the Interior. 36 p.
- [NRCG] Northern Rockies Coordinating Group. 2008. *Appropriate management response summary for the northern Rockies*. <www.wildfirelessons.net/documents/Northern_Rockies_AMR_Strategy.pdf> accessed September 2008. 13 p.
- Noss, Reed F. 1991. Sustainability and wilderness. *Conservation Biology* 5(1):120–22.
- NPA Data Services, Inc. 2007. 2007 Regional economic projections series. [City unknown], MT: Montana Department of Commerce, Census and Economic Information Center. [Pages unknown].
- Ohmart, Robert D. 1996. Historical and present impacts of livestock grazing on fish and wildlife resource in western riparian habitats. In: Krausman, P.R.; editor. *Denver, CO: Rangeland Wildlife Society for Range Management*. 245–79.
- Olson, D.; Lindall, S. 2000. *IMPLAN professional*. Version 2.0. Stillwater, MN: MIG, Inc.
- Olson, R.; Hansen, J.; Whitson, T.; Johnson, K. 1994. Tebuthiuron to enhance rangeland diversity. *Rangelands* 16(5):197–201.
- Oring, Lew; Harrington, J.W.; Brown, S.; Hickey, C.; editors. 2000. *National shorebird research needs: a proposal for a national research program and example high priority research topics*. Manomet Center for Conservation Sciences. <www.Manomet.org/USSCP/files.htm> [access date unknown].
- Oschell, C.; Nickerson, N. 2006a. Niche News: Missouri River country traveler characteristics. <www.itrr.umt.edu/NicheNews06/MissouriRiverCountryChar.pdf> accessed December 2009.
- . 2006b. Niche News: Russell country traveler characteristics. <www.itrr.umt.edu/NicheNews06/RussellCountryChar.pdf> accessed December 2009.
- Owens, R.A.; Myres, M.T. 1973. Effects of agriculture upon populations of native passerine birds of an Alberta fescue grassland. *Canadian Journal of Zoology* 51:697–713.
- Paige, Christine. 2008. *A landowner's guide to wildlife friendly fences*. Helena, MT: Montana Department of Fish, Wildlife and Parks, Landowner/Wildlife Resource Program. 44 p.
- Park, John A. 1998. Site form for 24GF419. Produced by the Bureau of Land Management, Lewistown, MT. On file with the Montana Historical Society, Helena, MT.
- Parker, Thomas G.; Hansen, Paul L. 1996. Riparian and wetland ecological health evaluation of East Slippery Ann habitat unit (#2) and Germaine Coulee habitat unit (#55), Charles M. Russell National Wildlife Refuge. Contract completion report for U.S. Fish and Wildlife Service, Cooperative Agreement Number 14–48–0006–95–939, Modification Number 2. Missoula, MT: The University of Montana, School of Forestry, Montana Forest and Conservation Experiment Station, Riparian and Wetland Research Program. 96 p.
- Parrett, Charles; Johnson, D.R. 2004. *Methods for estimating flood frequency in Montana based on data through water year 1998*: U.S. Geological Survey Water-Resources Investigations Report 03–4308. Helena, MT. 101 p.
- Parrett, Charles; Omang, R.J.; Hull, J.A. 1983. Mean annual runoff and peak flow estimates based on channel geometry of streams in northeastern and western Montana: U.S. Geological Survey Water-Resources Investigations Report 83–4046. Helena, MT. 53 p.
- Partners in Flight. 2010. What is Partners in Flight (PIF)? Revised November 10, 2010. <www.partnersinflight.org/description.cfm> accessed December 2011.
- Pauli, Jonathan N.; Buskirk, Steven W. 2007. Risk-disturbance overrides density dependence in a hunted colonial rodent, the black tailed prairie

- dog *Cynomys ludovicianus*. *Journal of Applied Ecology* 44:1,219–30.
- Pearce, Cheryl M.; Smith, Derald G. 2003. Salt cedar: distribution, abundance and dispersal mechanisms, northern Montana, USA. *Wetlands* 23(2):215–28.
- Pearman, Myrna. 2005. Mountain bluebird trail monitoring guide. Red Deer, AB: Red Deer River Naturalists. [Pages unknown].
- Pilliod, D.S.; Wind, Elke; editors. 2008. Habitat management guidelines for amphibians and reptiles of the northwestern United States and western Canada. *Partners in Amphibian and Reptile Conservation Technical Publication HMG-4*. Birmingham, AL. 139 p.
- Platts, William S.; Wagstaff, Fred J. 1984. Fencing to control livestock grazing on riparian habitats along streams: is it a viable alternative? *North American Journal of Fisheries Management* 4:266–72.
- Poff, N. Leroy; Allan, J.D.; Bain, M.B. [and others]. 1997. Natural flow regime: a paradigm for river conservation and restoration. *BioScience* 47(11):769–84.
- Pool, Duane B.; Austin, J.E. 2006. Migratory bird management for the Northern Great Plains Joint Venture: implementation plan. General Technical Report TC-01. Bismarck, ND: Northern Great Plains Joint Venture. 171 p.
- Price, Jeff; Glick, Patricia. 2002. The bird watchers guide to global warming. [City and State published unknown]: National Wildlife Federation and American Bird Conservancy. 34 p.
- Puckett, Karl. 2009a. Wildlife refuge grazing deal sought. *Great Falls Tribune*. July 8.
- . 2009b. Bids received for groups' offer of money for grazing land. *Great Falls Tribune*. August 21.
- Rademaker, L.; Nickerson, N. 2006. Niche News: 2005 nonresident traveler characteristics. Missoula, MT: University of Montana, Institute for Tourism and Recreation Research. <www.itrr.umt.edu/NicheNews06/2005TravChar.pdf> accessed December 2009.
- Ranchers Stewardship Alliance. 2008. Our mission. <www.ranchersstewardshipalliance.org/index.asp> accessed December 2011.
- Rasker, R. 2006. An exploration into the impact of industrial development versus conservation on western public lands. *Society and Natural Resources* 19:191–207.
- Rasker, R.; Hansen, A. 2000. Natural amenities and population growth in the Greater Yellowstone Region. *Human Ecology Review* (2):30–40.
- Red Lodge Clearinghouse. 2008. Matador Ranch grass bank. <www.rlch.org/stories/matador-ranch-grass-bank> accessed July 15, 2008.
- Resilience Alliance. 2007. Assessing and managing resilience in social-ecological systems: a practitioners workbook. <<http://resiliencealliance.com>> accessed February 2012. 54 p.
- Riley, Scott A.; Wilkinson, Kim M. 2007. Roadside revegetation: a new frontier for native plant growers. In: Riley, L.E.; Dumroese, R.K.; Landis, T.D.; technical coordinators. *National proceedings: Forest and Conservation Nursery Associations—2006*; [Date of meeting unknown]; [City and State of meeting unknown]. *Proceedings RMRS-P-50*. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. <www.rngr.net/nurseries/publications/proceedings> [access date unknown].
- Robbins, Mark B.; Dale, Brenda C. 1999. Sprague's pipit (*Anthus spragueii*). In: Poole, A.; editor. *The Birds of North America Online*. Ithaca, NY: Cornell Lab of Ornithology. <www.bna.birds.cornell.edu/bna/species/439> accessed September 2011.
- Rogers, K.H.; Biggs, H. 1999. Integrating indicators, end points, and value systems in the strategic management of Kruger National Park. *Freshwater Biology* 41:439–51.
- Rorabaugh, J.C. 2005. *Rana pipiens* Schreber, 1782, northern leopard frog. In: Lannoo, M.J.; editor. *Amphibian declines: the conservation status of United States species*. Berkeley, CA: University of California Press. 570–77.
- Rosenstock, Steven S.; Ballard, Warren B.; Devos, James C., Jr. 1999. Viewpoint benefits and impacts of wildlife water developments. *Journal of Range Management* 52(4):302–11.
- Rosgen, Dave. 1996. Applied river morphology. Pagosa Springs, CO: Wildland Hydrology. [Pages unknown].
- Rosenberg, Daniel K.; Noon, Barry R.; Meslow, E. Charles. 1997. Biological corridors: form, function, and efficacy. *BioScience* 47:677–87.
- Rowe, H.I.; Bartlett, E.T. 2001. Development and Federal grazing policy impacts on two Colorado counties: a comparative study. In: Torell, A.L.; Bartlett, E.T.; Larranaga, R.; editors. *Society for Range Management; February 20–23, 2001; Kailua-Kona, HI. Las Cruces, NM: New Mexico State University Agricultural Experiment Station*. 17 p.
- Rudzitis, G. 1999. Amenities increasingly draw people to the rural West. *Rural Development Perspectives* 14(2):9–13.
- Rudzitis, G.; Johansen, H. 1989. Migration to western wilderness counties: causes and consequences. *Western Wildlands* 15:19–23.
- Ruebelmann, George N. 1982. An archaeological study of the Lewistown BLM District. On file at Bureau of Land Management headquarters, Lewistown, MT. [Pages unknown].
- Rumble, Mark A.; Flake, Lester D. 1983. Management considerations to enhance use of stock ponds by waterfowl broods. *Journal of Range Management* 36(6):691–94.
- Salant, P.; Dillman, D.; Carley, L. 1997. Who's moving into the nonmetropolitan counties? Evidence from Washington State. Pullman, WA: Washington State

- University, Social and Economic Sciences Research Center. [Pages unknown].
- Samson, Fred; Knopf, Fritz. 1994. Prairie conservation in North America. *BioScience* 44(6):418–21.
- Sanderson, H. Reed; Meganck, Richard A.; Gibbs, Kenneth C. 1986. Range management and scenic beauty as perceived by dispersed recreationists. *Journal of Range Management* 39(5):464–69.
- Sando, Steven K.; Morgan, Timothy J.; Dutton, DeAnn M.; McCarthy, Peter M. 2009. Estimation of streamflow characteristics for Charles M. Russell National Wildlife Refuge, northeastern Montana. U.S. Geological Survey Scientific Investigations Report 2009–5009. [City and State published unknown]: U.S. Geological Survey. 60 p.
- Sauls, H.S. 2006. The role of selective foraging and cecal microflora in sage-grouse nutritional ecology [master's thesis]. Missoula, MT: The University of Montana. [Pages unknown].
- Schroeder, M.A.; Young, J.R.; Braun, C.E. 1999. Greater sage-grouse (*Centrocercus urophasianus*). In: Poole, A.; editor. *The Birds of North America Online*. Ithaca, NY: Cornell Lab of Ornithology. <<http://bna.birds.cornell.edu/bna>> accessed October 3, 2011.
- Schultz, James Willard. 1902. *Floating on the Missouri*. Helena, MT: Riverbend Publishing. 135 p.
- Scott, Michael L.; Auble, Gregor T.; Friedman, Jonathan M. [and others]. 1993. Flow recommendations for maintaining riparian vegetation along the Upper Missouri River, Montana. Prepared for Montana Power Company and U.S. Bureau of Reclamation. Fort Collins, CO: National Biological Survey, National Ecology Research Center. 43 p.
- Scott, Michael L.; Auble, Gregor T.; Friedman, Jonathan M. 1994. Impacts of dams and high flows along the Upper Missouri River, Montana. Prepared for Montana Power Company, Inc. Fort Collins, CO: National Biological Survey, Midcontinent Ecological Science Center. 19 p.
- Scott, M.L.; Auble, G.T. 2002. Conservation and restoration of semi-arid riparian forests: a case study from the upper Missouri River, Montana, USA. In: Middleton, B.; editor. *Flood pulsing and wetland restoration in North America*. [City and State published unknown]: John Wiley and Sons, Inc. 145–90.
- Scott, M.L.; Auble, G.T.; Friedman, J.M. 1997. Flood dependency of cottonwood establishment along the Missouri River, Montana, USA. *Ecological Applications* 7:677–90.
- Shackford, John S. 1996. The importance of shade to breeding mountain plovers. *Bulletin of the Oklahoma Ornithological Society* 29(3):17–24.
- Shearer, LeRoy A. 1960. Use of dugouts by breeding ducks. *Journal of Wildlife Management* 24(2):213–15.
- Sheley, R.L.; Svejcar, T.J.; Maxwell, B.D. 1996. A theoretical framework for developing successional weed management strategies on rangeland. *Weed Technology* 7:766–73.
- Short, Jeffrey J.; Knight, J.E. 2003. Fall grazing affects big game forage on rough fescue grasslands. *Journal of Range Management* 28(3):213–17.
- Silva, M. 2001. Abundance, diversity, and community structure of small mammals in forest fragments in Prince Edward Island National Park, Canada. *Canadian Journal of Zoology* 79:2,063–71.
- Simberloff, D. 1998. Flagships, umbrellas, and keystones: is single species management passe in the landscape era? *Biological Conservation* 83(3):47–257.
- Sipe, Gene. 1993. Tree and shrub planting—1993. U.S. Fish and Wildlife Service internal memo. Unpublished. On file at Charles M. Russell National Wildlife Refuge, Lewistown, MT.
- Skaar, P.D. (revised by Skaar, D.; Flath, D.; Thompson, L.S.). 1985. Montana bird distribution. *Montana Academy of Sciences Supplement to the Proceedings*. Volume 44. [City and State published unknown]: [Publisher unknown]. 2 p.
- Skagen, Susan K.; Knopf, F.L. 1994. Migrating shorebirds and habitat dynamics at a prairie wetland complex. *Wilson Bulletin* 106(1):91–105.
- Smith, B.E. 2003. Conservation assessment for the northern leopard frog in the Black Hills National Forest, South Dakota and Wyoming. [City and State published unknown]: [Publisher unknown]. [Pages unknown].
- Smith, Jane Kapler; editor. 2000. *Wildland fire in ecosystems: effects of fire on fauna*. General Technical Report RMRS–GTR–42, Volume 1. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station. <www.fs.fed.us/rm/pubs/rmrs_gtr042_1.pdf> accessed March 2010. 83 p.
- Smucker, Kristina M.; Hutto, Richard L.; Steele, Brian M. 2005. Changes in bird abundance after wildfire: importance of fire severity and time since fire. *Ecological Applications* 15(5):1,535–49.
- Stewart, E. Ray; Reese, Scott A.; Ultsch, Gordon R. 2004. The physiology of hibernation in Canadian leopard frogs (*Rana pipiens*) and bullfrogs (*Rana catesbeiana*). *Physiological and Biochemical Zoology* 77(1):65–73.
- Stewart, I.T.; Cayan, D.R.; Dettinger, M.D. 2004. Changes in snowmelt runoff timing in western North America under a “business as usual” climate change scenario. *Climate Change* 62:217–32.
- Stewart, Joanne E. 2007. An analysis of bat activity patterns along a prairie riparian corridor in eastern Montana at multiple spatial scales [master's thesis]. Denver, CO: University of Denver. 148 p.
- Stewart, Kelley M.; Bowyer, R. Terry; Kie, John G.; [and others]. 2002. Temporospatial distributions of elk, mule deer, and cattle: resource partitioning

- and competitive displacement. *Journal of Mammalogy* 83(1):229–44.
- Stewart, Robert E. 1975. Breeding birds of North Dakota. Version 06JUL2000. Fargo, ND: Tri-College Center for Environmental Studies. Jamestown, ND: Northern Prairie Wildlife Research Center Online. <www.npwrc.usgs.gov/resource/birds/bbofnd/biog.htm> 295 p.
- Stewart, Robert E.; Kantrud, Harold A. 1973. Ecological distribution of breeding waterfowl populations in North Dakota. *Journal of Wildlife Management* 37(1):39–50.
- Stynes, D. 1998. Guidelines for measuring visitor spending. [City unknown], MI: Michigan State University, Department of Park, Recreation and Tourism Resources. [Pages unknown].
- Swetnam, T.W.; Betancourt, J.L. 1990. Fire-southern oscillation relations in the southwestern United States. *Science* 249:1,017–20.
- Takats, Lisa D.; Francis, Charles M. [and others]. 2001. Guidelines for nocturnal owl monitoring in North America. Edmonton, AB: Beaverhill Bird Observatory and Bird Studies Canada. 32 p.
- Taylor, Audrey R.; Knight, R.L. 2003. Wildlife responses to recreation and associated visitor perceptions. *Ecological Applications* 13(4):951–63.
- Taylor, D.; Coupal, R.; Foulke, T.; Rashford, B.; Olson D. 2008. An economic profile of the Bridger-Teton National Forest. [City and State published unknown]: University of Wyoming, Department of Agricultural and Applied Economics. 144 p.
- Taylor, Daniel A.R.; Tuttle, Merlin D. 2007. Water for wildlife. A handbook for ranchers and range managers. Bat Conservation International <www.batcon.org/pdfs/water/bciwaterforwildlife.pdf> [access date unknown]. 20 p.
- Teel, T. ; Dayer, A.A.; Manfredo, M.J.; Bright, A.D. 2005. Wildlife values in the West. Project Report Number 58 for the Western Association of Fish and Wildlife Agencies. Fort Collins, CO: Colorado State University, Department of Human Dimensions in Natural Resources. 344 p.
- Tewksbury, Joshua J.; Black, Anne E.; Nur, Nadav [and others]. 2002. Effects of anthropogenic fragmentation and livestock grazing on western riparian bird communities. *Studies in Avian Biology* 25:158–202.
- Thackeray, L. 2006. Land buys by nonprofit conservation groups concern locals. *Billings Gazette*, February 27. <www.billingsgazette.net/articles/2006/02/27/news/state/50-locals.tx> accessed July 29, 2008.
- Thomas, Jack W.; Maser, Chris; Rodiek, John E. 1979. Wildlife habitats in managed rangelands—the Great Basin of southeastern Oregon riparian zones. General Technical Report PNW–80. Portland, OR: USDA Forest Service, Pacific Northwest Forest and Range Experiment Station. 19 p.
- Thompson, William H.; Ehart, Robert C.; Hansen, Paul L. [and others]. 1998. Assessing health of a riparian site. In: Proceedings: Specialty Conference on Rangeland Management and Water Resources; [Date of conference unknown]; [City and State of conference unknown]. [City and State published unknown]: American Water Resources Association. 13 p.
- Thompson, William H.; Hansen, Paul L. 1999. Lotic health assessment of selected streams on the Charles M. Russell National Wildlife Refuge. Contract completion report for U.S. Fish and Wildlife Service, Cooperative Agreement Number 14–48–0006–95–939, Modification Number 2. Missoula, MT: The University of Montana, School of Forestry, Montana Forest and Conservation Experiment Station, Riparian and Wetland Research Program. 35 p.
- Tilden, Freeman. 1957. Interpreting our heritage. Chapter 1. Chapel Hill, NC: University of North Carolina Press. 3–10.
- TravelMT.com. 2009. Jordan Montana travel information. <www.travelmt.com/mt-cities-Jordan.html> accessed December 2009.
- Tredennick, Cam. 2000. The National Wildlife System Improvement Act of 1997: defining the National Wildlife Refuge System for the twenty-first century. *12 Fordham Environmental Law Journal* 1:41–109.
- Truett, Joe C.; Dullum, Jo Ann L.D.; Matchett, Marc R.; Owens, Edward; Seery, David. 2001. Translocating prairie dogs: a review. *Wildlife Society Bulletin* 29(3):863–72.
- Tsharntke, Teja; Grieler, H.J. 1995. Insect communities, grasses and grasslands. *Annual Review of Entomology* 40:535–58.
- U.S. Bureau of Labor Statistics. 2008. USA counties, civilian labor force. <<http://censtats.census.gov/usa/usa.shtml>> accessed March 2010.
- U.S. Bureau of Reclamation, Montana Department of Natural Resources and Conservation, Upper Musselshell Water Users Association, and Deadmans Basin Water Users Association. 1998. Musselshell River basin water management study. Lewistown, MT: Department of Natural Resources and Conservation. 402 p.
- U.S. Census Bureau. 2008. State and county quickfacts. <<http://quickfacts.census.gov/qfd/index.html>> accessed October 2009.
- . 2009. USA counties. <<http://censtats.census.gov/usa/usa.shtml>> accessed October 2009.
- [USFS] U.S. Department of Agriculture, Forest Service. 2003. Missoula, Montana: backcountry road maintenance and weed management. <www.fs.fed.us/invasivespecies/document/BackcountryRdMtceWeed.pdf> accessed October 28, 2009. 26 p.
- . 2009. Fire and aviation management. Fire management. <www.fs.fed.us/fire/management/index.html> accessed March 2010.

- [USDA] U.S. Department of Agriculture, National Agricultural Statistics Service. 2009. 2007 Census of agriculture. <www.agcensus.usda.gov/Publications/2007/Full_Report/usv1.pdf> accessed March 12, 2012. 739 p.
- . 2011. Grazing fee rates for cattle by selected States and regions for 2008. <www.nass.usda.gov/Statistics_by_State/Montana/Publications/economic/prices/grazefee.htm> [access date unknown].
- U.S. Department of Agriculture and U.S. Department of the Interior: Forest Service, Bureau of Land Management, Bureau of Indian Affairs, Fish and Wildlife Service, and National Park Service. 2009. Guidance for implementation of Federal wildland fire management policy <www.nifc.gov/policies/policies_documents/GIFWFMP.pdf> accessed February 2012. 20 p.
- [USACE] U.S. Department of Army, Army Corps of Engineers. 1995. Seaplane landing plan. <www.nwo.usace.army.mil/html/Lake_Proj/Seaplane/SeaplanePlan.htm> accessed November 13, 2009.
- . 2004. Environmental assessment implementation of the Charles M. Russell National Wildlife Refuge Enhancement Act of 2000. [City and State published unknown]: U.S. Army Corps of Engineers, Omaha District; U.S. Fish and Wildlife Service, Mountain–Prairie Region. 60 p.
- . 2005. Finding of no significant impact. Implementation of the Charles M. Russell National Wildlife Refuge Enhancement Act of 2000. On file at Charles M. Russell National Wildlife Refuge. [Pages unknown].
- . 2008. Fort Peck Dam/Fort Peck Lake master plan. Northwestern Division. <www.nwo.usace.army.mil/masterplans/> accessed December 2, 2009.
- . 2009a. Fort Peck brochure. <www.nwo.usace.army.mil/html/Lake_Proj/brochures/FP_brochure.pdf> accessed February 3, 2010. 4 p.
- . 2009b. Missouri River Recovery Program. Missouri River ecosystem restoration plan and environmental impact statement (in draft). <www.moriverrecovery.org> [access date unknown].
- . 2009c. September 2009 monthly visitation data for Fort Peck Dam and Lake. Internal report provided by Darin McMurry, June 2010. Fort Peck, MT. [Pages unknown].
- U.S. Department of Commerce. 2008. Bureau of Economic Analysis—regional economic information system. <www.bea.gov> accessed December 2009.
- U.S. Department of Energy. 1999. Office of Fossil Energy and Office of Science report. Carbon sequestration research and development. <www.fossil.energy.gov/programs/sequestration/publications/1999_rdreport> [access date unknown].
- [DOI] U.S. Department of the Interior. 1974a. Draft environmental impact statement. DES 74–54. Proposed Charles M. Russell National Wildlife Range wilderness area. Washington, DC: U.S. Department of the Interior. Bureau of Sport Fisheries and Wildlife and Bureau of Land Management. 136 p.
- . 1974b. Report on proposed recommendations from draft environmental impact statement as forwarded to Congress. DES 74–54. Proposed Charles M. Russell National Wildlife Range wilderness area. Washington, DC. 65 p.
- . 1974c. UL Bend National Wildlife Refuge, Montana: wilderness study summary. Washington, DC. 55 p.
- . 2001. Secretarial Order 3226. Evaluating climate change impacts in management planning. 1 p.
- . 2008a. Bison conservation initiative. <www.doi.gov/initiatives/bison/Bison%20Bridge%20Page%20DOI%20Bison%20Conservation%20Initiative%20framework.pdf> accessed October 2009.
- . 2008b. An analysis of climate change impacts and options relevant to the Department of the Interior's managed lands and waters. Department of the Interior Task Force on Climate Change. Report of the Subcommittee on Land and Water Management. <www.usgs.gov/global_change/doi_taskforce.asp> [access date unknown].
- . 2009. Secretarial Order 3289. Addressing the impacts of climate change on America's water, land, and other natural and cultural resources. <www.doi.gov/climatechange/SecOrder3289.pdf> accessed September 22, 2009. 4 p.
- U.S. Department of the Interior, Fish and Wildlife Service and Bureau of Land Management. 1996. Kofa National Wildlife Refuge and Wilderness and New Water Mountain Wilderness interagency management plan, environmental assessment, and decision record. Washington, DC. <www.fws.gov/southwest/refuges/Plan/Kofa%20NWR%20&%20Wilderness%20&%20New%20Water%20Mtns%20IAMP%20&%20EA%20BINDER.pdf> accessed September 2011. 140 p.
- U.S. Department of the Interior, Fish and Wildlife Service; SEMARNAP Mexico; and Environment Canada. 1998. North American waterfowl management plan. <www.fws.gov/birdhabitat/NAWMP/files/NAWMP1998.pdf> accessed December 2011. 43 p.
- U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2006. National survey of fishing, hunting, and wildlife-associated recreation. Washington, DC. 168 p.
- U.S. Department of Labor. 2008. Local area unemployment statistics. <www.bls.gov/lau/#tables> accessed March 2010.
- U.S. Department of State. 2011. Final environmental impact statement for the Keystone XL Oil Pipeline Project. Applicant for a Presidential permit: Trans-Canada Keystone Pipeline, LP. <www.keystone

- pipeline-xl.state.gov/clientsite/keystonexl.nsf?Open> accessed February 2012.
- [FWS] U.S. Fish and Wildlife Service, Department of the Interior. 1982. Grazing and haying management. 6 RM 9. Fish and Wildlife Service Policy Manual. Washington, DC. [Pages unknown].
- . 1985. Final environmental impact statement. Management of Charles M. Russell National Wildlife Refuge. Washington, DC. 453 p.
- . 1986. Record of decision on final environmental impact statement. Management of Charles M. Russell National Wildlife Refuge. [City and State published unknown]. 5 p.
- . 1994a. Comprehensive management plan and final environmental impact statement. Volume 1. Hart Mountain National Antelope Refuge. Washington, DC. 326 p.
- . 1994b. Stocking guidelines and management strategies for ponds and small impoundments. Prepared by Fish and Wildlife Service, Office of Fisheries and Wildlife Assistance. Valentine, NE. 5 p.
- . 1996. A history—Charles M. Russell National Wildlife Refuge, Montana. On file at Charles M. Russell National Wildlife Refuge, Lewistown, MT. [Pages unknown].
- . 1999a. Fulfilling the promise: the National Wildlife Refuge System. Arlington, VA. 94 p.
- . 1999b. National policy issuance #99-01. <www.fws.gov/policy/npi99_01.html> accessed January 25, 2010.
- . 2000a. Compatibility. 603FW2. In: Fish and Wildlife Service Policy Manual. Washington, DC. 12 p.
- . 2000b. Prescribed fire management. 621FW3. In: Fish and Wildlife Service Policy Manual. Washington, DC. 3 p.
- . 2000c. Refuge planning overview. 602FW1. In: Fish and Wildlife Service Policy Manual. Washington, DC. 6 p.
- . 2001. Biological integrity, diversity, and environmental health. 601FW3. In: Fish and Wildlife Service Policy Manual. Washington, DC. 8 p.
- . 2003. Status assessment and conservation plan for the western burrowing owl in the United States. <www.fws.gov/mountain-prairie/species/birds> [access date unknown].
- . 2004a. A blueprint for the future of migratory birds. <<http://migratorybirds.fws.gov/mbstratplan/mbstratplan.htm>> [access date unknown].
- . 2004b. National Wildlife Refuge System wildland fire management program strategic plan 2003-2010. <www.fws.gov/fire/downloads/fwsfirestrategicplan.pdf> accessed October 2009. 6 p.
- . 2006a. Post 2005 hunting season mule deer and elk survey summary. Report on file at Charles M. Russell National Wildlife Refuge headquarters, Lewistown, MT. 18 p.
- . 2006b. Service responsibilities to protect migratory birds. 720FW2 In: Fish and Wildlife Service Policy Manual. Washington, DC. 11 p.
- . 2006c. Wildlife-dependent recreation. 605FW1. In: Fish and Wildlife Service Policy Manual. Washington, DC. 11 p.
- . 2006d. Environmental education. 605FW6. In: Fish and Wildlife Service Policy Manual. Washington, DC. 3 p.
- . 2006e. Recreational fishing. 605FW3. In: Fish and Wildlife Service Policy Manual. Washington, DC. 6 p.
- . 2006f. Hunting. 605FW2. In: Fish and Wildlife Service Policy Manual. Washington, DC. 5 p.
- . 2006g. Interpretation. 605FW7. In: Fish and Wildlife Service Policy Manual. Washington, DC. 3 p.
- . 2006h. Cabeza Prieta National Wildlife Refuge: comprehensive conservation plan, wilderness stewardship plan, and environmental impact statement. Washington, DC. 668 p.
- . 2007a. Charles M. Russell National Wildlife Refuge planning Web site. <www.fws.gov/cmrr/planning> accessed February 10, 2010.
- . 2007b. Chronic wasting disease management on the Charles M. Russell National Wildlife Refuge Complex, Montana: environmental assessment. <www.fws.gov/cmrr/PDF_Files/CMRNWR_CWD_EA_061307.pdf> accessed October 30, 2009. 13 p.
- . 2007c. Invasive species program: National Wildlife Refuge System fiscal year 2007 update. <www.fws.gov/invasives/pdfs/InvasiveSpeciesProgram_2007_revised.pdf> accessed February 3, 2010.
- . 2007d. National bald eagle management guidelines. Helena, MT: Fish and Wildlife Service, Ecological Services. 25 p.
- . 2008a. Partners for Fish and Wildlife Program in Montana. <www.fws.gov/mountain-prairie/pfw/montana/> accessed October 3, 2011.
- . 2008b. Scoping report for Charles M. Russell and UL Bend National Wildlife Refuges. <http://fws.gov/cmrr/planning/Scopingrpt_4_18_08.pdf> accessed November 2, 2009.
- . 2008c. Wilderness stewardship planning. 610FW3. In: Fish and Wildlife Service Policy Manual. Washington, DC. 5 p.
- . 2008d. Volunteers. <www.fws.gov/volunteers/pdfs/2008_VolunteerAndFriendsReport_072909_Final.pdf> [access date unknown].
- . 2009a. Desert National Wildlife Refuge Complex; Ash Meadows, Desert, Moapa Valley, and Pahrangat National Wildlife Refuges: final comprehensive conservation plan and environmental impact statement. Volume I. <www.fws.gov/desertcomplex/ccp.htm> accessed September 2011.
- . 2009b. Joint ventures. <www.fws.gov/mountain-prairie/nawm/> accessed September 22, 2009.

- . 2009c. Let's go outside. <www.fws.gov/letsgo/outside> accessed October 30, 2009.
- . 2009d. Mountain–Prairie. <www.fws.gov/mountain-prairie/mt1.html> accessed September 2, 2009.
- . 2009e. Refuge System. <www.fws.gov/refuges> accessed September 2, 2009.
- . 2009f. Wildlife and Sport Fish Restoration Program. <http://wsfrprograms.fws.gov/Subpages/GrantPrograms/SFR/SFR_Accomplishments.htm> accessed July 30, 2009.
- . 2010a. Annual report of lands under control of the U.S. Fish and Wildlife Service as of September 30, 2010. Washington, DC. 50 p.
- . 2010b. Refuge revenue sharing database. 2008. Washington, DC: Realty Division.
- . 2010c. Rising to the challenge: strategic plan for responding to accelerating climate change. Washington, DC. <www.fws.gov/home/climatechange/pdf/CCStrategicPlan.pdf> accessed April 2011.
- . 2010d. Timeline of the American bison. <www.fws.gov/bisonrange/timeline.htm> accessed June 2010.
- . 2010e. Sprague's pipit (*Anthus spragueii*) conservation plan. <www.fws.gov/mountain-prairie/species/birds/spraguespipit/SpraguesJS2010r4.pdf> accessed October 2011.
- . 2011a. Information quality. Ensuring the quality and credibility of information. <www.fws.gov/informationquality/peer_review/index.html> accessed July 2011.
- . 2011b. Managing invasive plants. Management methods: grazing. <www.fws.gov/invasives/staffTrainingModule/methods/grazing/introduction.html> accessed July 2011.
- . 2011c. Migratory bird lists. Migratory Bird Program. <www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BirdManagement.html> accessed September 2011.
- . 2011d. National wildlife refuges purposes database. <www.fws.gov/refuges/policiesandbudget/purposes/Purposes_Search.cfm> accessed April 18, 2011.
- . 2011e. Sheldon National Wildlife Refuge: draft comprehensive conservation plan and environmental impact statement. Washington, DC. <www.fws.gov/pacific/planning/main/docs/NV/docssheldon.htm> accessed September 2011. 591 p.
- . 2011f. Montana refuge saves sage-grouse as part of broader initiative. Refuge Update, May/June 2011. <www.fws.gov/refuges/RefugeUpdate/pdfs/refUp_MayJune_2011.pdf> accessed October 2011. 28 p.
- . 2011g. Visitor services standards: a handbook for evaluating visitor services programs. Washington, DC. 87 p.
- U.S. Geological Survey and U.S. Bureau of Mines. 1979. Mineral resources of the Charles M. Russell National Wildlife Refuge; Fergus, Garfield, McCone, Petroleum, Phillips and Valley Counties, Montana. Revised 2010. Washington, DC: U.S. Geological Survey. [Pages unknown].
- U.S. House of Representatives, 105th Congress, 1st Session. 1997. Report 105–106. National Wildlife Refuge Improvement Act. <www.fws.gov/refuges/realty/archives/pdf/HR_Report_106.pdf> accessed September 2011. 26 p.
- Van Dyke, F. 2003. Conservation biology: foundations, concepts, applications. 2nd edition. [City and State published unknown]: McGraw-Hill. [Pages unknown].
- Van Tassell, Larry W.; Richardson, James W. 1998. Impacts of Federal grazing reductions on Wyoming ranches. In: Stubble height and utilization measurements: uses and misuses. Western Regional Research Publication. Oregon State University Bulletin 682. Corvallis, OR: Oregon State University, Oregon State Agricultural Experiment Station. 1998:50–56.
- Van Vuren, Dirk. 1981. Comparative ecology of bison and cattle in the Henry Mountains, Utah. In: Proceedings of the wildlife–livestock relationships symposium; April 20–22, 1981; Coeur d'Alene, ID. Moscow, ID: University of Idaho; Forest, Wildlife and Range Experiment Station. 449–57.
- Vavra, Martin; Sheehy, D.P. 1996. Improving elk habitat characteristics with livestock grazing. Rangelands 18(5):182–85.
- Vias, A.C. 1999. Jobs follow people in the rural Rocky Mountain West. Rural Development Perspectives 14(2):14–23.
- Vickery, P.D.; Blanco, D.E.; Lopez-Lanus, B. 2008. Conservation plan for the upland sandpiper (*Bartramia longicauda*). Version 1.0. Manomet, MA: Manomet Center for Conservation Sciences. [Pages unknown].
- Vickery, Peter D.; Herkert, James R.; Knopf, Fritz L. 1999. Grassland birds: an overview of threats and recommended management strategies. In: Bonney, Rick; Pashley, David N.; Cooper, Robert J.; Niles, Larry; editors. 1999. Strategies for bird conservation: the Partners in Flight planning process. Cornell Lab of Ornithology. <<http://birds.cornell.edu/pifcapemay>> [access date unknown].
- Vinkey, Ray S.; Schwartz, M.K.; McKelvey, K.S. [and others]. 2006. When reintroductions are augmentations: the genetic legacy of fishers (*Martes pennanti*) in Montana. Journal of Mammalogy 87(2):265–71.
- Vodehnal, W.L.; Haufler, J.B.; compilers. 2007. A grassland conservation plan for prairie grouse. Fruita, CO: North American Grouse Partnership. 286 p.

- Wagner, Robbin. 1996. Memorandum to Bill Haglan. Rock Creek Fish Collections. On file at Charles M. Russell National Wildlife Refuge, Lewistown, MT.
- Walcheck, Kenneth C. 1970. Nesting bird ecology of four plant communities in the Missouri River Breaks, Montana. *Wilson Bulletin* 82(4):370–82.
- Walker, Brian; Salt, David. 2006. Resilience thinking. [City and State published unknown]: Island Press. 174 p.
- Watts Robert C.; Eichhorn, L.C. 1981. Changes in the birds of central Montana. *Proceedings, Montana Academy of Science* 40:31–40.
- Werner, J. Kirwin; Mawell, Bryce A.; Hendricks, Paul; Flath, Dennis L. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 p.
- Western Hemisphere Shorebird Reserve Network. 2007. U.S. Shorebird Conservation Plan. <www.whsrn.org/shorebirds/status.html> [access date unknown].
- White, T. 1978. The importance of a relative shortage of food in animal ecology. *Oecologia (Berl.)* 33:71–86.
- The Wilderness Society. 1992. Wilderness Society, volume 56–57. Ann Arbor, MI: University of Michigan. [Pages unknown].
- . 2009. Evaluation of accessibility and visibility of roads on the Charles M. Russell NWR. On file at the Charles M. Russell National Wildlife Refuge headquarters, Lewistown, MT. [Pages unknown].
- The WILD Foundation. 2006. *International Journal of Wilderness 2006: trust in wildland fire and fuel management decisions*. April 2006:(12)1.
- Wildland Fire Associates. 2005. Charles M. Russell National Wildlife Refuge wildland fuels assessment. Prepared for U.S. Fish and Wildlife Service, Mountain–Prairie Region, Denver, CO. 40 p.
- Williams, Eugene. 1991. Riparian rehabilitation: UL Bend NWR. U.S. Fish and Wildlife Service internal report. Unpublished. On file at Charles M. Russell National Wildlife Refuge, Lewistown, MT. [Pages unknown].
- Williams, J.E.; Johnson, J.E.; Hendrickson, D.A. [and others]. 1989. Fishes of North America endangered, threatened, or of special concern: 1989. *Fisheries* 14(6):3–20.
- Willmore, Ille. 1990. Homesteading and homesteaders. In: *Homestead shacks over buffalo tracks—a history of northeastern Fergus County by Roy History Committee*. Bozeman, MT: Color World Printer. 516 p.
- Wilson, Don E.; Ruff, Sue. 1999. *The Smithsonian book of North American mammals*. Washington, DC: Smithsonian Institute and American Society of Mammalogists. 750 p.
- Wilson, S.D.; Belcher, J.W. 1989. Plant and bird communities of native prairie and introduced Eurasian vegetation in Manitoba, Canada. *Conservation Biology* 3(1):39–44.
- Wood, Garvey. 1977. Wild and scenic river historical archaeological investigation. Report for Bureau of Land Management, Lewistown Field Office, by Gar Wood and Associates, Loma, MT. [Pages unknown].
- Wright, H.A.; Neuenschwander, L.F.; Britton, C.M. 1979. The role and use of fire in sagebrush-grass and pinyon-juniper plant communities. A state-of-the-art review. General Technical Report INT–58. Ogden, UT: USDA Forest Service, Intermountain Forest and Range Experiment Station. 48 p.
- Wright, Henry A.; Bailey, Arthur W. 1982. *Fire Ecology. United States and southern Canada*. [City and State published unknown]: John Wiley and Sons, Inc. [Pages unknown].
- Wyman, S.; Bailey, D.; Borman, M. [and others]. 2006. Riparian area management: grazing management processes and strategies for riparian–wetland areas. Technical Reference 1737–20. BLM/ST/ST–06/002+1737. Denver, CO: U.S. Department of the Interior, Bureau of Land Management, National Science and Technology Center. 105 p.
- Young, D.J.; Martin, L. 2003. Moving in or moving out? Migration patterns vary by age and region. In: *Montana Business Quarterly*, winter. Missoula, MT: The University of Montana, School of Business Administration, Bureau of Business and Economic Research. 3 p.
- Young, Jock; Cilimburg, A.; Noson, A.; [and others]. 2006. A plan for coordinated all-bird monitoring in Montana. Missoula, MT: Montana CBM Steering Committee. [Pages unknown].
- Young, Jock A.; Hoffland, John R.; Hutto, Richard L. 2001. Birds and vegetation structure in tall-willow riparian communities of central Montana. Missoula, MT: The University of Montana, Division of Biological Sciences, Avian Science Center. <http://avianscience.dbs.umt.edu/projects/documents/Willow2001_Report.pdf> accessed February 16, 2010.
- Zwickel, F.C.; Schroeder, M.A. 2003. Grouse of the Lewis and Clark Expedition, 1803 to 1806. *Northwestern Naturalist* 84(1):2003, 1–9.

