

Final Comprehensive Conservation Plan and Environmental Impact Statement

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

Volume 1

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U.S. Fish and Wildlife Service**

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Abstract

Final Comprehensive Conservation Plan and Environmental Impact Statement

Charles M. Russell National Wildlife Refuge and UL Bend National Wildlife Refuge, Montana

Type of Action: Administrative

Lead Agency: U.S. Fish and Wildlife Service

Responsible Official: Steve Guertin, Regional Director, region 6, U.S. Fish and Wildlife Service

Abstract: This final comprehensive conservation plan and environmental impact statement (final CCP and EIS) identifies the purpose and need for a management plan, outlines the legal foundation for management of two refuges in Montana, Charles M. Russell National Wildlife Refuge and UL Bend National Wildlife Refuge, and describes and evaluates four alternative plans including the no-action alternative, for managing wildlife, habitat, and wildlife-dependent public use. This process has involved the development of a vision, goals, objectives, and strategies that meet the legal directives of the U.S. Fish and Wildlife Service (Service) and has considered the input of interested groups and the public.

Under the no-action alternative (A), few changes would occur in managing existing wildlife populations and habitat. The habitat regime would be maintained mostly through a fire suppression program with little use of prescribed fire. There would be continued emphasis on big game management, annual livestock grazing, fencing, invasive species control, and water development. Habitats would continue to be managed in 65 units, and residual cover would be measured. Wildlife-dependent public use would occur at current levels, which includes hunting, fishing, wildlife observation, photography, and limited interpretation and environmental education programs. About 670 miles of road would remain open. The Service would continue to manage the 20,819-acre UL Bend Wilderness and 155,288 acres of proposed wilderness within the Charles M. Russell National Wildlife Refuge.

Under alternative B's wildlife population emphasis, the Service would manage the landscape in cooperation with partners to emphasize abundant wildlife populations using both (1) natural ecological processes

such as fire and wildlife ungulate herbivory (grazing) and (2) responsible farming practices or tree planting. Wildlife-dependent public use would be encouraged, but economic uses would be limited when they compete for habitat resources. About 106 miles of road would be closed. The Service would expand the acreage of existing proposed wilderness by 25,869 acres.

Under alternative C's public use and economic use emphasis, the Service would manage the landscape in cooperation with partners to emphasize and promote maximum levels of compatible, wildlife-dependent public use and economic use. Wildlife populations and habitats would be protected with various management tools that would minimize damaging effects to wildlife and habitats while enhancing and diversifying public and economic opportunities. None of the existing, proposed wilderness units would be expanded.

Under the Service's preferred alternative (alternative D's ecological processes emphasis), the Service would work with partners to use natural, dynamic, ecological processes along with active management in a balanced, responsible manner to restore and maintain biological diversity, biological integrity, and environmental health. Once natural processes were restored, more passive approaches would be favored. The Service would provide for quality wildlife-dependent public use and experiences and would limit economic uses when they were injurious to ecological processes. About 21 miles of road would be permanently closed, and 15 miles of road would be seasonally closed. The Service would expand the acreage of existing, proposed wilderness units by 19,942 acres.

Public Review and Distribution. The draft CCP and EIS was available for public review from September 7, 2010, to December 10, 2010. The Service received 53 letters from Federal, State, and local government agencies and nearly 20,600 letters, emails, and verbal comments from individuals. The final CCP and EIS can be viewed at <www.fws.gov/cmr/planning> and is presented in two volumes: volume 1 is the final CCP and EIS and volume 2 contains comments on the draft CCP and EIS along with the Service's responses to substantive comments. The Service will issue a record of decision no sooner than 30 days after publication of the notice of availability of the final CCP and EIS in the Federal Register. For further information, contact Laurie Shannon at 303 / 236 4317.

Cooperating Agencies: U.S. Army Corps of Engineers; Bureau of Land Management; Montana Department of Fish, Wildlife and Parks; Montana Department of Natural Resources and Conservation; Fergus, Garfield, McCone, Petroleum, Phillips, and Valley Counties; and Missouri River Conservation Districts Council (for the six districts that surround the refuge).

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Summary



Brett Billings / USFWS

Low clouds hang over the Missouri River on the Charles M. Russell National Wildlife Refuge.

The U.S. Fish and Wildlife Service has developed this final comprehensive conservation plan and environmental impact statement (final CCP and EIS) to provide alternatives and identify consequences for the management and use of the Charles M. Russell National Wildlife Refuge and the UL Bend National Wildlife Refuge in Montana. The alternatives are the result of extensive public input and of working closely with several cooperating agencies: U.S. Army Corps of Engineers; Bureau of Land Management; Montana Department of Fish, Wildlife and Parks; Montana Department of Natural Resources and Conservation; counties of Fergus, Garfield, McCone, Petroleum, Phillips, and Valley; and Missouri River Conservation Districts Council (for the six districts that surround the refuge). Other tribal governments, governmental agencies, nongovernmental organizations, businesses, and private citizens contributed substantial input to the plan.

This document (volume 1) contains the final CCP and EIS. The accompanying volume 2 contains the Service's summarization and response to public comments and testimony received during public review of the draft CCP and EIS.

Encompassing nearly 1.1 million acres—including Fort Peck Reservoir and UL Bend National Wildlife Refuge—Charles M. Russell National Wildlife Refuge is one of the largest refuges in 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. 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, Petroleum, Garfield, McCone, Valley, and Phillips.

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, and more than 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 an aquarium of native and game fish, other wildlife, and several casts of dinosaur fossils including a *Tyrannosaurus rex*. Still others enjoy fishing along the Missouri River or on Fort Peck Reservoir.

REFUGE BACKGROUND

In 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 (Moulton 2002). One hundred thirty years later, Olaus J. Murie, a renowned wildlife biologist for the U.S. Biological Survey, made the first biological assessment of plant and wildlife species for the proposed Fort Peck Migratory Bird Refuge (Murie 1935).



Dan Studia / USFWS

The veery is a “focal” species, one of the first to respond to changed conditions, for refuge river bottoms.

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; these two Refuge System 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. 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.

PURPOSE and NEED for the PLAN

The purpose of this final CCP and EIS is to identify actions necessary to accomplish the purposes of the 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 (Improvement Act);

- 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.

The Service is committed to sustaining the Nation’s fish and wildlife resources together 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 Refuges are administered under the National Wildlife Refuge System Administration Act of 1966, as amended in 1997.

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.

The purpose for a national wildlife refuge comes from one or more authorities—law, proclamation, Executive order, agreement, or other document—that establish or expand a refuge. 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, giving the refuges more than one purpose.

PUBLIC INVOLVEMENT

In fall 2007, the Service began the public scoping for this project 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. Since then, the Service has conducted 21 public meetings during scoping and development of the alternatives, 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.



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The scoping process identified the qualities of the refuge and issues of concern.

SIGNIFICANT ISSUES

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

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

HABITAT and WILDLIFE

The final CCP and EIS addresses the following habitat and wildlife issues:

- the use and role of wildfire, 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
- habitat and wildlife management in the context of the larger landscape that includes adjacent private, State, tribal, and Federal lands
- species reintroductions and management of species that could move onto the refuge such as 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
- 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. The final CCP and EIS addresses the following important water issues:

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

PUBLIC USE and ACCESS

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. The final CCP and EIS addresses the following public use and access issues:

- 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 livestock grazing, commercial recreation, or other uses

WILDERNESS

Planning policy requires refuges to review special designation areas such as wilderness and address the potential for any new designations. Concurrent with the comprehensive conservation planning and environmental analysis process, the Service conducted a wilderness review and will make final recommendations in the record of decision. The final CCP and EIS addresses the following wilderness issues:

- 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. The final CCP and EIS addresses the following socioeconomic issues:

- benefits of the refuge and promotion of refuge values
- a 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 inter-

related with, refuge resources. Therefore, it is crucial for the Service to collaborate with refuge neighbors and to establish partnerships with interested agencies and groups. 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. 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. The final CCP and EIS addresses the following partnership and collaboration issues:

- 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 has significant archaeological resources and rich prehistoric and historic values to the local and regional community. The western traditions and practices of livestock grazing have affected the lives of ranchers and their families for many generations. Of unique value are the significant paleontological resources (fossilized plants and animals). The final CCP and EIS addresses the following cultural, traditions, and resource issues:



Dotted Gayfeather

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

VISION

The Service developed a vision for the refuge at the beginning of the planning process. 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.

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.

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.

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.

ALTERNATIVES

Following the initial scoping process in 2007 and 2008, the Service held meetings and workshops with the cooperating agencies and the public and identified a reasonable range of preliminary alternatives. The Service carried forward the following four alternatives and analyzed them in detail in this environmental impact statement:

- Alternative A—No Action
- Alternative B—Wildlife Population Emphasis
- Alternative C—Public Use and Economic Use Emphasis
- Alternative D—Ecological Processes Emphasis (preferred alternative)

These alternatives examine different ways for providing permanent protection and restoration of fish, wildlife, plants, habitats, and other resources and for providing opportunities for the public to engage in compatible wildlife-dependent recreation. Each alternative incorporates specific actions intended to achieve the goals. However, the no-action alternative represents the current, unchanged refuge management and may not meet every aspect of every goal. The no-action alternative provides a basis for comparison of the action alternatives B–D.



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Big game management includes objectives for mule deer.

ELEMENTS COMMON to ALL ALTERNATIVES

The following actions and programs apply to all alternatives:

- protection and management of significant cultural and paleontological resources
- special regulations for public access on the refuge
- landing sites for seaplanes
- collection of grazing fees
- collaboration with U.S. Army Corps of Engineers
- protection of UL Bend Wilderness and management as a class 1 air shed
- closure of roads in proposed wilderness units except for roads that provide access to private land within the refuge
- wildfire suppression and use of prescribed fire under an approved fire management plan
- collaboration with partners to carry out the plan
- suppression of wildfires and issuance of special use permits for grazing on State school-section lands within the boundary of the refuge
- integrated pest management
- capping of artesian wells
- adjudication of water rights
- access to State lands for livestock permittees
- exchange of State lands within the refuge boundary where feasible
- acquisition of priority lands within the refuge boundary from willing sellers
- jurisdiction transfer for lands not needed by U.S. Army Corps of Engineers
- adherence to legal obligations of rights-of-way for access to private and State lands
- boating
- partnerships for providing accessible opportunities
- prohibition of shed hunting
- protection of areas with special designations such as historic trails, landmarks, research areas, and scenic rivers
- evaluation of predator control for appropriateness and compatibility

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,



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A range of alternatives was identified for managing the 1.1 million-acre refuge.

and water development. Habitat would continue to be managed in the 65 habitat units that were established by the Bureau of Land Management for grazing purposes. Prescriptive grazing would be carried out gradually as units became available and habitat evaluations were completed.

- Big game would be managed to achieve target levels in the 1986 environmental impact statement record of decision: 160 bighorn sheep, 10 mule deer per square mile, and 2.5 elk per square mile. This would include a more restrictive rifle season for mule deer in some State hunting districts as compared with the State season.
- Select stock ponds would be maintained or 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.

ALTERNATIVE B—WILDLIFE POPULATION EMPHASIS

The Service would manage the landscape, in cooperation with 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. Key actions of alternative B follow:

- The Service would actively manage and manipulate habitat, thus creating a diverse plant commu-

nity of highly productive wildlife food and cover plants. The management emphasis would be on habitat for targeted wildlife species, including focal bird species, in separate parts of the refuge. The Service would consolidate the 65 habitat units. Subsequently, the refuge staff would write new habitat management plans based on field station boundaries and habitat evaluation for target species. The Service would work with others to develop methods to monitor and evaluate target or focal species and habitat needs.

- Desired habitat conditions may be created using natural ecological processes (such as fire, grazing by wildlife, or flooding) or through management practices (such as prescriptive livestock grazing, agricultural plantings or managed fire).
- An aggressive approach to reduction of invasive plants in the river bottoms would be based on funding and other staffing priorities. Work would include use of prescribed fire, spraying with herbicides, and planting of wildlife food crops to clear invasive plants. In addition, the Service would collaborate with others to combat invasive plants in shoreline habitat. Where feasible and combined with research, the Service would restore the functioning condition of riparian areas and preserve fire refugia (places where fire rarely burns).
- Through cooperation and collaboration with the Montana Department of Fish, Wildlife and Parks and adjoining landowners, the Service would use wildlife- and habitat-based objectives and strategies that consider natural densities, social structures, and population dynamics at the landscape level. The Service and cooperators would mutually agree on population levels that can be tolerated by adjoining landowners and provide quality recreational experiences without negatively affecting habitat or other wildlife. The

Service would collaborate with others to manage wildlife to benefit all species in and around the refuge, actions could include conservation easements or other incentives.

- The Service would 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 a restoration effort for wild bison on the surrounding landscape.
- The Service would identify habitat suitable for bighorn sheep and establish new populations based on the Montana Department of Fish, Wildlife and Parks' modeling and transplant criteria. The Service would work with the department to provide quality hunting opportunities as a management tool that maintains both sustainable populations of big game and habitat for nongame species.
- In managing the hunting program, the Service would seek to benefit wildlife populations and promote harvest experiences that are not always achieved on other public lands. An example would be providing opportunities to hunt big game animals with all age classes represented (i.e., mule deer in the 8- to 10-year class).
- The Service would close about 106 miles of road and would work with partners to develop a travel plan and secure access to the refuge through other lands. Nonmotorized access would be promoted, but the Service would consider allowing motorized access on existing roads only for game retrieval and restricting access on a seasonal basis to sensitive areas by the river and roads.
- Opportunities for expanding hunting programs would be considered to encourage and facilitate young hunters and mobility-impaired hunters. Limited hunts for furbearers or other predators would be considered only if monitoring verified that population levels could be sustained.
- The Service 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 C—PUBLIC USE and ECONOMIC USE EMPHASIS

The Service would manage the landscape, in cooperation with 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



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The alternatives address a variety of public uses including hunting and access.

effects on wildlife habitats would be minimized while using a variety of management tools to enhance and diversify public and economic opportunities. Key actions of alternative C follow:

- In addition to the habitat elements in alternative A, the Service would generally manage habitats to provide more opportunities for wildlife-dependent recreation. In places, the refuge staff would manage for plant communities that could necessitate a compromise between providing wildlife food and cover and livestock forage needs. Where needed, fencing and water gaps would be used to manage livestock use and prevent further degradation of riparian habitat. Camping areas would be managed to limit expansion and further degradation of riparian habitat.
- Through collaboration with the Montana Department of Fish, Wildlife and Parks and others, the Service would keep a balance between numbers of big game and livestock to sustain habitats and populations of big game and sharp-tailed grouse. Similar balancing could be necessary when managing populations of nongame or migratory birds and livestock needs. For example, it could be necessary to balance prairie dog needs with public and economic uses such as livestock grazing or with needs of other wildlife.
- Working with the Montana Department of Fish, Wildlife and Parks, the Service would expand and maximize the following hunting opportunities: (1) programs to include new species and traditional or

niche (primitive weapon) hunting; (2) mule deer season; (3) predator hunting; (4) trapping; and (5) opportunities for young hunters.

- Refuge access would be managed to benefit public and economic uses. The Service would improve access to boat ramps and consider establishing new roads in some areas and seasonally closing other areas, such as those around Fort Peck, to protect habitat and to provide for a diversity of experience.
- Wilderness areas would be managed similar to alternative A (155,288 acres in 15 units).

ALTERNATIVE D—ECOLOGICAL PROCESSES EMPHASIS (Preferred Alternative)

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. Economic uses would be limited when they are injurious to ecological processes. Key actions of alternative D follow:

- Where feasible, the Service would apply management practices that mimic and restore natural processes on the refuge, managing for a diversity of plant species and wildlife species in upland and riparian areas. This would include a concerted manipulation of habitats or wildlife populations (using prescribed fire and grazing and hunting) through coordinated objectives. Management would evolve toward more passive approaches, allowing natural processes such as fire, grazing, and flooding to occur with less human aid or money.
- The Service would 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; see appendix F).
- In collaboration with the Montana Department of Fish, Wildlife and Parks and others, the Service would 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



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The use of prescribed fire, wildfire, and grazing by wild ungulates and livestock is addressed.

balanced, self-sustaining populations. This could include manipulating livestock grazing and wildlife numbers, or both, if habitat monitoring found that conditions were declining or plant species were being affected by overuse. Predators would be managed to benefit the ecological integrity of the refuge. Limited hunting for mountain lion or other furbearers or predators would be considered only after monitoring verified that population levels could be sustained with a hunt.

- The Service would 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 a restoration effort for wild bison on the surrounding landscape.
- The Service would cooperate with Montana Department of Fish, Wildlife and Parks to provide hunting experiences that keep game species at levels that meet State objectives, sustain ecological health, and provide opportunities not found on other public lands. The Service would develop cooperative big game population and habitat monitoring programs with the department. During development of habitat management plans, the Service would 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. Hunting regulations would be designed to provide a variety of quality recreational opportunities including population objectives with diverse male age structures not generally managed for on other public lands.
- Refuge access would be managed primarily to benefit natural processes, but some improvements would be made to provide quality visitor experiences. Initially, the Service would 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 would be applied. Other closures or modifications could be necessary after further review of the road program. This would encourage free movement of wildlife, permit prescribed fire or wildfire suppression activities, and increase effective harvest of wild ungulates. Additionally, the Service would 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.

- The Service would 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.

OBJECTIVES and STRATEGIES

Based on the vision and goals for the refuge, the Service has developed objectives and strategies for each alternative. An objective is a general statement about what the Service wants to achieve on the refuge, while a strategy is a specific action or tool that is used to achieve an objective. Because each alternative has a different emphasis, objectives vary by alternative. The following summarizes key objective topics addressed for each alternative in the final CCP and EIS:

- management of four broad categories of vegetation found on the refuge: upland, river bottom, riparian area and wetland, and shoreline
- use of fire (both prescribed and wildfire), grazing by wildlife and livestock, restoration, predation, and hunting in managing refuge's uplands, river bottoms, riparian areas, and shoreline
- managing for climate change and controlling invasive species
- management of birds; threatened and endangered species or species of concern; furbearers and small predators; big game; and other wildlife such as invertebrates, amphibians, reptiles, fish, and small mammals
- public uses including hunting, fishing, wildlife observation, photography, and interpretation,



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The affected environment chapter describes the resources at the refuge including greater sage-grouse.

and the management of commercial outfitting, recreation areas, and public access

- management of wilderness and other special area designations and the protection of significant cultural and paleontological resources
- refuge operations and partnerships

AFFECTED ENVIRONMENT

The final CCP and EIS describes the characteristics and resources of the refuge and how existing or past management or other influences have affected these resources. The affected environment addresses the physical, biological, and social aspects of the refuge that could be affected by management under the four alternatives. These aspects include the physical and biological environment, special management areas, visitor services, cultural and paleontological resources, and the socioeconomic environment. The Service used published and unpublished data, as noted in the bibliography, to quantify what is known about the refuge.

ENVIRONMENTAL CONSEQUENCES

The alternatives for refuge management would provide a variety of positive effects (benefits) and negative effects (impacts) to resources at Charles M. Russell National Wildlife Refuge and UL Bend National Wildlife Refuge. Some of the greatest benefits would come from consolidating habitat units and managing the upland vegetation to create a mosaic of habitats using prescribed fire, naturally occurring wildfires, and prescriptive grazing to support a diversity of species and improve the overall health of the refuge. The Service would restore numerous former agricultural river bottoms by reducing invasive plant infestations and planting native species. Another significant benefit would be the improved function and quality of riparian areas for wildlife using prescriptive grazing, possible water impoundment removal or modification, and restoration projects.

The greatest effect on refuge resources would be the continuation of current fire suppression strategies and constant grazing pressure over large parts of the refuge under alternative A. While the overall economic effects of any alternative would be beneficial, implementation of new grazing and habitat management approaches in alternatives B or D would result in impacts to individual livestock permittees. From a habitat perspective, the action alternatives (B, C, and D) would benefit upland and riparian hab-

itats, with alternatives B and D resulting in moderate to major long-term benefits to both habitat and wildlife. These and other effects including a description of their context, intensity, and duration are described in detail in chapter 5. The degree of effect was quantified using known numeric or modeled estimates or information derived from extensive monitoring or research. Where sufficient numeric information was not available, qualitative or relative assessments were made using scientific literature or professional field experience.

PHYSICAL ENVIRONMENT

The slower transition to prescriptive grazing under alternatives A and C could cause moderate to major negative effects on soils, while the transition to prescriptive grazing over a shorter period, and over most of the refuge in alternatives B and D, would reduce those impacts in the long term. The use of prescribed fire in any alternative would generally result in short-term, negligible, negative effects on air quality, visual resources, and soils. The impacts of large wildfires on these resources would be major under alternative A and would be minor to moderate under alternatives B–D.

Livestock grazing in some areas would result in moderate to major negative effects on soils under alternatives A and C, while prescriptive grazing in alternatives B and D would reduce those impacts over the long term. The aesthetic impacts of livestock grazing and prescribed fire on visual resources for some refuge visitors would be negligible to minor under alternatives A and C, while they would be moderate benefits under alternatives B and D.

The overall impacts of motorized use on soundscapes would be negligible to minor under all alternatives.

BIOLOGICAL ENVIRONMENT

The continuation of current management of uplands under alternative A would have minor short-term impacts, with moderate to major long-term impacts. The localized effects of alternative B on upland habitat would be variable but overall would result in moderate long-term benefits. Increased prescriptive grazing and balanced ungulate use under alternative C would result in minor long-term benefits. Efforts to restore natural processes under alternative D would result in major long-term benefits to uplands.

Ongoing habitat protection and water impoundment removal or improvement would benefit riparian areas and wetlands. Over the long term, these benefits would be minor under alternative A, moderate under alternative B, minor to moderate under alternative C, and moderate to major under alternative D. In all alternatives, localized moderate



Implementation of the action alternatives (B–D) would have the greatest benefit to riparian areas.



The 670 miles of roads that crisscross the refuge affect the physical, biological, and public environment.

impacts from grazing on riparian habitat would persist in some areas. While the approaches and time-frame would vary, river bottom restoration in all alternatives would result in minor to moderate long-term benefits. Effects of the alternatives on shoreline habitat would be negligible.

Under alternative A, continued negative effects on bird habitat would generally offset the benefits of protection and enhancement efforts, resulting in negligible effects. Habitat protection and management efforts in the action alternatives (B–D) would benefit birds on the refuge. These long-term benefits would be moderate to major under alternatives B and D, and minor under alternative C. In all alternatives, moderate to major localized impacts would continue to occur in some areas due to grazing.

As the Service is required to manage for the benefit of special status species, alternative A, with no specific objectives, would have negligible effects. More active management of threatened and endangered species and species of concern under the action

alternatives (B–D) would have moderate to major long-term benefits for those species.

Continued management of furbearers and small predators would have negligible effects. Alternative B would have major long-term benefits to furbearers and small predators due to reintroductions, while alternative C would have minor to major impacts due to increased harvest. The effects of alternative D would be negligible.

While the big game management emphases and approaches would vary, all alternatives would benefit big game populations. Over the long term, these benefits would be minor under alternative A, minor to moderate under alternative B, and moderate under alternatives C and D.

Continued habitat degradation under alternative A would have minor, incremental, negative effects on amphibians, reptiles, fish, and small mammals, while habitat improvements under the action alternatives would benefit those species. Benefits would be moderate under alternative B, minor under alternative C, and moderate to major under alternative D.

SPECIAL MANAGEMENT AREAS

Alternative A would keep the current and proposed wilderness configurations. Expansion of proposed wilderness units under alternatives B and D would result in minor benefits. None of the alternatives would affect the designation or management of other special management areas.

VISITOR SERVICES

Continuation of current hunting opportunities and management under alternative A would have negligible effects, while the action alternatives (B–D) would have varying benefits to hunting. Expanded hunting opportunities under alternative B would have negligible to minor benefits, while an expanded emphasis on hunting opportunities and harvest under alternative C would have minor to moderate benefits. The benefits of higher quality hunting opportunities under alternative D would be minor to moderate, depending on the preferences of individual hunters. None of the alternatives would affect fishing.

Alternative A would have negligible effects on wildlife observation and photography. Increases in personnel, facilities, and programs would result in negligible to minor benefits under alternative B and moderate benefits under alternatives C and D. Limited environmental education, interpretation, and outreach under alternative A would have negligible effects. Alternative B would have negligible benefits due to more staff and program and facility improvements. Alternatives C and D would have minor benefits due to expanded staff and facilities. Effects on



Brett Billings / USFWS

Fishing would continue to be a popular activity under all alternatives.

commercial uses would be negligible under all alternatives except for alternative C, which would have minor benefits due to more permits and efforts to reduce conflicts.

Under alternative A, access would remain as it is currently with 670 miles of road open to visitors. Alternative B would result in minor negative effects on vehicle access, with 106 miles of road closures, while the 21 miles of closed roads and 15 miles of seasonal closures in alternative D would have negligible impacts. Alternatives C and D would consider allowing more winter fishing access along the southwest side. There would be 16 miles of upgrades to roads under alternative C and 5 miles in alternative D, which would have minor benefits. The impacts of specific road closures would be greater for individuals who prefer to access the refuge by those particular routes.

CULTURAL and PALEONTOLOGICAL RESOURCES

While alternative A would have negligible effects, all of the action alternatives (B–D) would have negligible to minor benefits on cultural and paleontological resources due to improved resource identification, protection, law enforcement, and interpretation.

SOCIOECONOMIC ENVIRONMENT

The regional economic impacts of refuge management activities, including local economic output and

jobs, would be negligible under alternatives A and B. Alternatives C and D would result in minor benefits. Alternative C would generate \$3.9 million in local output and 48 additional jobs, and alternative D would generate \$2.1 million in local output and 25 additional jobs.

As the refuge currently supplies less than 1 percent of total animal unit months in the six-county area, any changes in grazing management would have negligible economic effects. However, refuge management changes would affect individual livestock permittees. The negative effects on permittees would be negligible to minor under alternatives A and C and would be potentially moderate to major under alternatives B and D.

COMMENTS on the DRAFT CCP and EIS

The Service received nearly 20,600 comments on the draft CCP and EIS, which was released to the public for review and comment on September 7, 2010. A 60-day comment period for the document closed on November 16, 2010 and then was extended to December 10, 2010. The Service held seven public hearings throughout Montana during the comment period. Refer to appendix B for the public involvement summary and volume 2, which contains public comments and Service responses.

SIGNIFICANT CHANGES in the FINAL CCP and EIS

As a result of public comment on the draft CCP and EIS, the Service made several significant changes while preparing the final CCP and EIS.

WILDERNESS

- Revised appendix E and clarified that any additions would become wilderness study areas (existing proposed wilderness units would remain the same).
- Modified the acreage for the wilderness study areas in alternatives B and D due in part to a mapping error in the draft CCP and EIS (640 acres within East Seven Blackfoot proposed wilderness and next to the Bureau of Land Management wilderness study area was mislabeled as State lands). The Mickey Butte addition was included in alternative D (already considered in alternative B). As a result, the acreage for alternative B would be 25,869 acres, and alternative D would be 19,942 acres.
- Determined that there is not sufficient justification for recommending the removal of any existing proposed wilderness previously considered in alternatives C and D.

ROADS

- Changed road 315 (Petroleum County) in alternative D from closed to seasonally closed from junction of road 838 to its end.
- Designated about 13 miles on the northeast side (roads 331, 332, 333, and 440 in Valley County) as game-retrieval roads in alternative D (previously identified for closure in alternative B only). These would be seasonal closures during the hunting season, when most of the use occurs.

WILDLIFE OBJECTIVES

- Adjusted and clarified the big game objectives. The objectives would meet or exceed the objectives approved in existing State plans. Refuge-specific abundance and population composition objectives would be established through the habitat management planning process and would be tailored to regional habitat conditions, productivity, and considerations for functioning ecosystem processes, biological integrity, and hunting opportunities and experiences.

- Updated the information on threatened and endangered species and species of concern (gray wolf, Sprague's pipit, mountain plover, and northern leopard frog).

HABITAT OBJECTIVES and STRATEGIES

- Clarified and expanded on the prescriptive grazing definition and information.
- Made several organizational changes to the habitat objectives including changing livestock grazing from an objective level to a strategy, which is consistent with Service policy (timeframes would remain the same).
- Clarified that the timeframe for implementation of prescribed grazing under alternative A would be similar to alternative C (50 percent or more would have converted to prescribed grazing over 15 years, based on the current trends for conversion).
- Expanded the discussion on monitoring sentinel plant and the refuge's past monitoring efforts.
- Identified the miles of streams and the percentage of riparian areas within the refuge that would be improved from restoration efforts.

FOCAL BIRD SPECIES

- Identified the focal bird species for each broad habitat category (upland, river bottom, riparian areas and wetland, and shoreline) and connected the sentinel plant monitoring to the focal bird species, particularly in alternative D and to a lesser extent in the other alternatives. Previously, these were identified as potential sentinel bird species. The use of "focal birds" is consistent with the Service's focal bird strategy (FWS 2011c).

MINERALS

- Clarified that mineral withdrawals are for locatable minerals.

LAND ACQUISITION

- Clarified that, under all alternatives, the Service would continue to acquire lands within its authorized boundary and in accordance with Title VIII of the Water Resources Development Act of 2000 (Enhancement Act).

LEGAL MANDATES

- Expanded discussion on the history of the passage of the Improvement Act, Service policies, refuge history, and legal mandates.

WATER QUALITY, AIR MONITORING, and CLIMATE CHANGE

- Added information and clarified these topics.
- Added climate change to several of the goals.

WHAT HAPPENS NEXT

The Service's final decision will be documented in a record of decision published in the Federal Regis-

ter no sooner than 30 days after filing this final EIS and CCP with the U.S. Environmental Protection Agency and distributing it to the public.

The Service will begin to carry out the final CCP immediately on publication of the decision in the Federal Register. Selected management activities and projects will be carried out as funds become available. The final plan does not constitute a commitment for funding, and future budgets could influence implementation priorities.

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
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 5.

1—Introduction

The U.S. Fish and Wildlife Service (Service) has developed this final comprehensive conservation plan and environmental impact statement (final CCP and EIS) to provide alternatives and identify consequences for the management and use of Charles M. Russell National Wildlife Refuge and UL Bend National Wildlife Refuge, located in north-central Montana. 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.

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 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.

This document (volume 1) contains the final CCP and EIS. The accompanying volume 2 contains the Service’s summarization and response to public com-

ments and testimony received during public review of the draft CCP and EIS.

This final CCP and EIS discusses program levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning purposes. Once completed, the CCP will specify the necessary actions to achieve the vision and goals of the refuge. The plan will guide the management, programs, and actions for 15 years after CCP approval.

The Service has formulated four final alternatives that are the result of extensive public input and working closely with agencies and local governments that have close ties to the refuge. The core planning team of representatives from several Service programs prepared this final CCP and EIS (refer to appendix A). In addition, 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 in the planning process is discussed in section 1.6 below and in detail in appendix B.



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

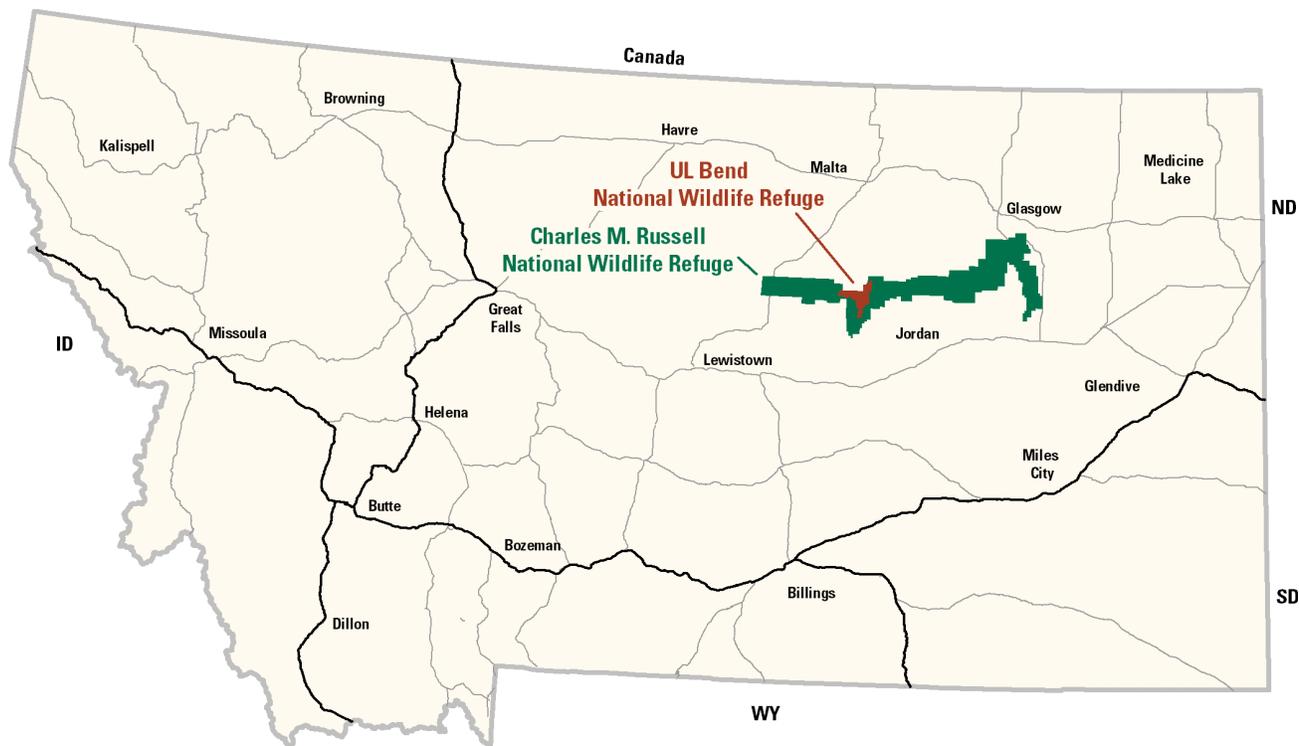


Figure 1. Vicinity map for the Charles M. Russell and UL Bend Refuges.

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 planning team developed four sets of alternatives, objectives, and strategies for management of the refuge. Details on the no-action alternative and the three action alternatives and are in chapter 3, and the predicted effects of the alternatives are described in chapter 5. The Service has identified one alternative (D) as the preferred alternative.

- 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.

1.1 PURPOSE and NEED for ACTION

The purpose of this final CCP and EIS 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;

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

DECISION to be MADE

The Regional Director of Region 6 of the Service will make the final decision on the selection of a preferred alternative for the CCP. The Regional Director’s decision will be based on the legal responsibility of the Service including the mission of the Service and the Refuge System, other legal and policy mandates, the purposes of Charles M. Russell and UL Bend Refuges, and the vision and goals in this final CCP. In addition, the Regional Director will consider public input from the cooperating agencies, Native American tribes, and the public about the final CCP and EIS. Other con-

siderations are land uses in the surrounding area and other parts of the ecosystem, the environmental effects of the alternatives, and future budget projections.

The Service's final decision will be documented in a record of decision that is published in the Federal Register, no sooner than 30 days after filing the final CCP and EIS with the U.S. Environmental Protection Agency and distributing it to the public. The Service will begin to carry out the final CCP immediately on publication of the decision in the Federal Register.

1.2 The U.S. FISH and WILDLIFE SERVICE and the 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.



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. 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 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.

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.

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.

The compatibility determinations for the refuge are in appendix C.

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 extrac-

tive 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 D. 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



Phil Norton / USFWS

Yellow-headed blackbirds nest on the refuge.

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 2). The refuge lies within Bird Conservation Region 17—Badlands and Prairies (North American Bird Conservation Initiative 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 3.8, and chapter 4, section 4.3, 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

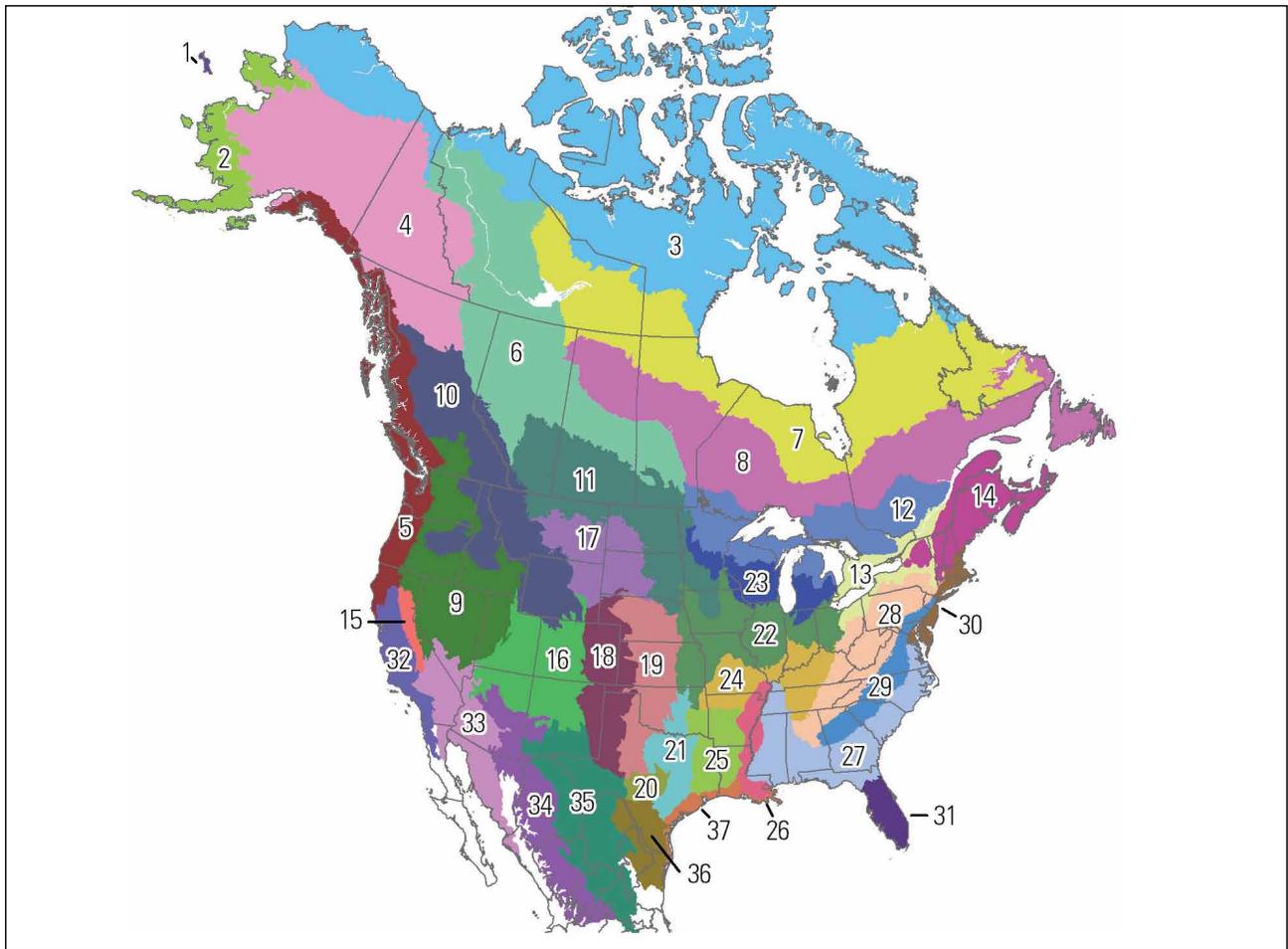


Figure 2. Map of the bird conservation regions in North America.

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 4).

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 would 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 com-

plex 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 2). The Charles M. Russell and UL Bend Refuges lie in the Plains and Prairie Potholes Geographic Area (figure 3). 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 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 strategies: adaptation, mitigation, and engagement. In addition, the plan acknowledges that no single organization or agency can address climate change without allying itself with others in 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).

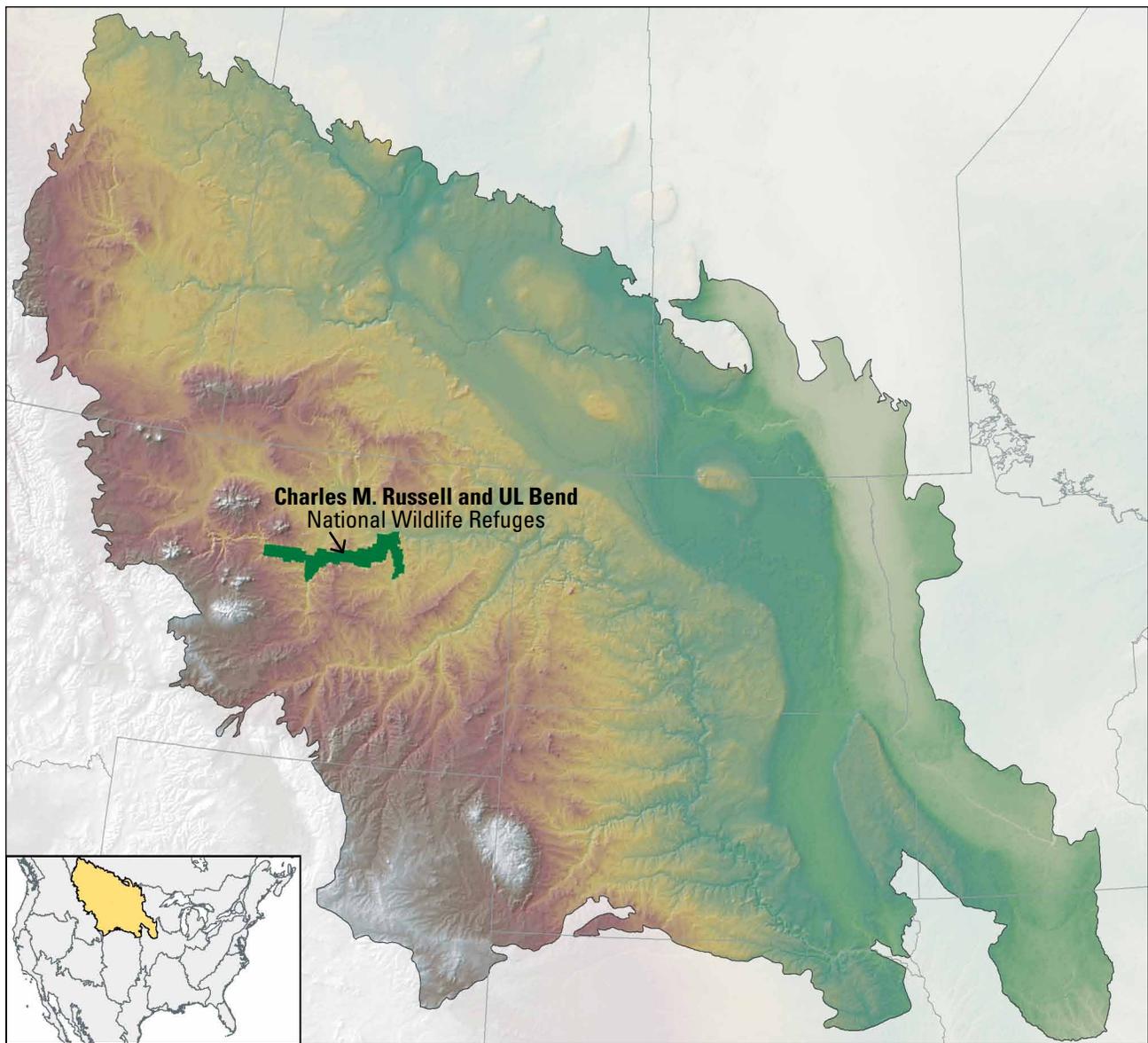


Figure 3. Map of the Plains and Prairie Potholes Geographic Area.

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 4).



Figure 4. The process for comprehensive conservation planning and environmental analysis.

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 A lists the planning team members, cooperating agency members, contributors, and consultants for this planning process.

The core team is 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 has met throughout the process to develop and review the alternatives and to review drafts of the CCP and EIS.

While developing the CCP and EIS, the planning team collected available information about the resources of the refuge and surrounding area. This information is summarized in chapter 4 and served as baseline information for analyzing the predicted effects of alternatives documented in chapter 5. Table 1 lists these and many other planning activities that have occurred to date.

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. Since then, the Service has conducted 21 public meetings during scoping and development of the alternatives and draft CCP and EIS, mailed six planning updates, posted information on the CCP Web page, 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 B, the Service has consulted with Native American tribes and actively involved Federal and State agencies, local governments, organizations, and private citizens throughout the process.

Table 1. Planning process summary for the CCP for the Charles M. Russell and UL Bend Refuges.

<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.
July 2009	Tribal consultation	Consultation with the Fort Peck Tribes and Fort Belknap Tribes about the CCP and EIS process.

Table 1. Planning process summary for the CCP for the Charles M. Russell and UL Bend Refuges.

<i>Date</i>	<i>Planning activity</i>	<i>Outcome</i>
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.

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



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and encourage participation in the CCP process. The Service formally consulted with the Fort Belknap Tribes and Fort Peck Tribes in July 2009.

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 to ADDRESS

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

- 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 final CCP and EIS 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. The final CCP and EIS 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 final CCP and EIS 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

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 and EIS process, the Service is conducting a wilderness review (refer to appendix E). This final CCP and EIS 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 final CCP and EIS 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 inter-related 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 final CCP and EIS 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 Sce-

nic 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 final CCP and EIS 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 has identified and eliminated from detailed study the topics or issues that are not significant or are 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 final CCP and EIS 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, hydropower, 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

Grazing Fee Rates

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. For region 6, grazing fee rates are based on the U.S. Department of Agriculture (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 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 final CCP and EIS.

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 final CCP and EIS does not address this topic further.

Increase Animal Unit Months

The 1986 record of decision for the final EIS for resource management for the refuge (FWS 1986) called for a substantial decrease in the number of AUMs of livestock grazing. This decision was subsequently carried out and is the basis of the no-action alternative described in chapter 3. This final CCP and EIS 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 final CCP and EIS addresses how livestock grazing would 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 this final CCP and EIS.

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 final CCP and EIS. 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 final CCP and EIS. More information about water rights is in chapter 4 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.

1.10 SCOPE of the DOCUMENT

This planning process considers different geographic designations, the decision area and primary analysis area, as depicted in figure 5.

DECISION AREA

The decision area is the area within the designated boundaries for the Charles M. Russell and UL Bend National Wildlife Refuges (figure 5; refer to chapter 2 for a complete description of the refuge). Where USACE holds primary jurisdiction and the refuge has secondary jurisdiction (refer to chapters 2 and 3), a memorandum of understanding guides how habitat and wildlife resources are managed.

ANALYSIS AREA

The analysis area (figure 5) includes the decision area and areas outside of the decision area where most of the direct, indirect, or cumulative effects could occur as a result of implementing the alternatives. The analysis area includes the area used in the socioeconomic analysis (chapter 4, section 4.8, and chapter 5, section 5.10). Additionally, the foreseeable activities in this area that could result in cumulative impacts are described in detail in chapter 3, section 3.9.

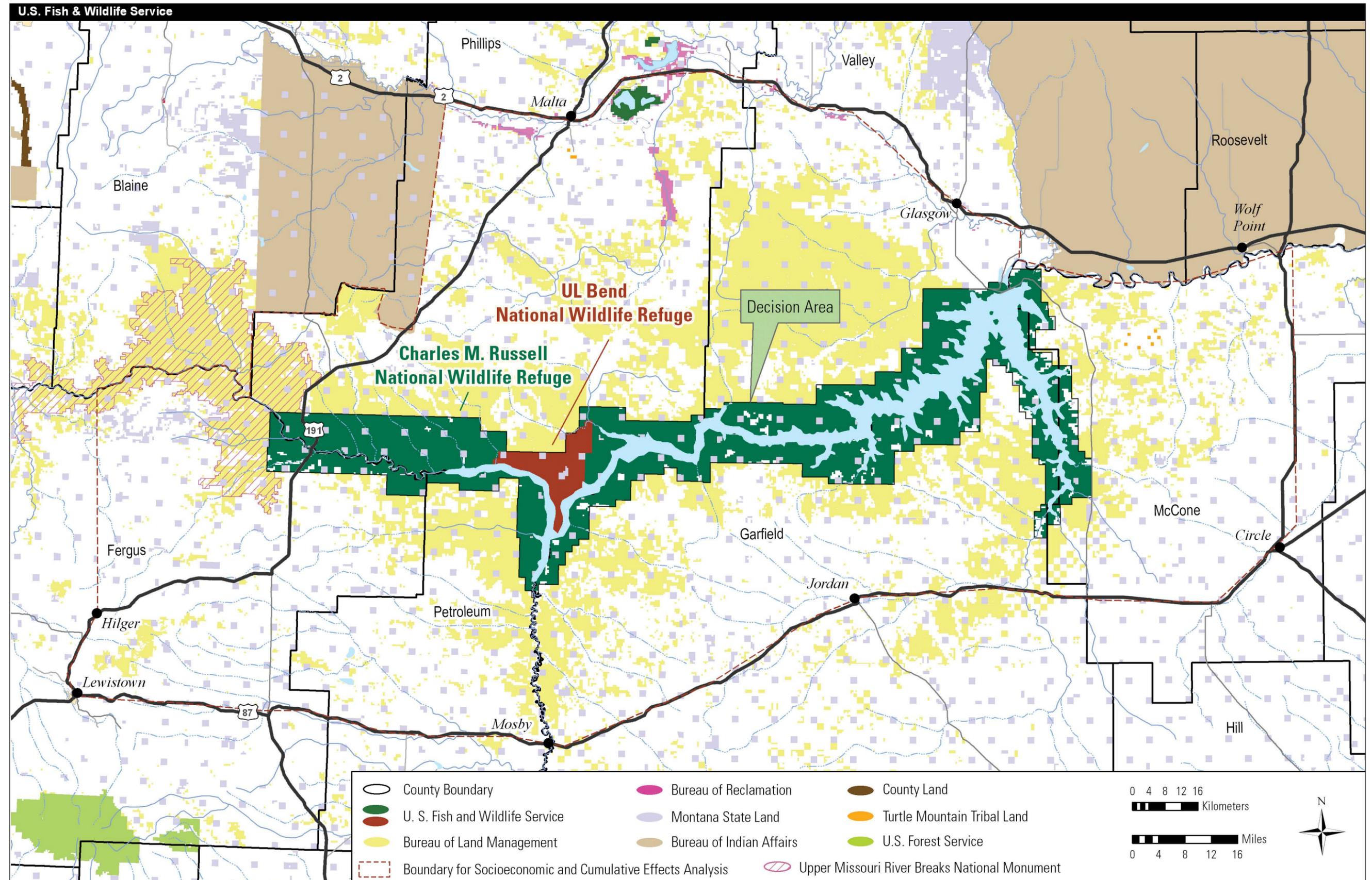


Figure 5. Map of the decision and analysis areas for the Charles M. Russell and UL Bend Refuges.

Figure 5 (decision and analysis areas)

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 final CCP and EIS.

Every refuge has a purpose for which it 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 ref-

uge 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 goals, objectives, and strategies in the final CCP (refer to chapter 3) 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.

<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 (see figure 6). 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 administered). The refuge spans six counties: Fergus, Garfield, McCone, Petroleum, Phillips, and Valley. Habitat includes native prairie, forested coulees (ravines),

river bottoms, 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 the refuge species list in appendix F). 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

*Figure 6 follows
(two foldout pages)*

U.S. Fish & Wildlife Service

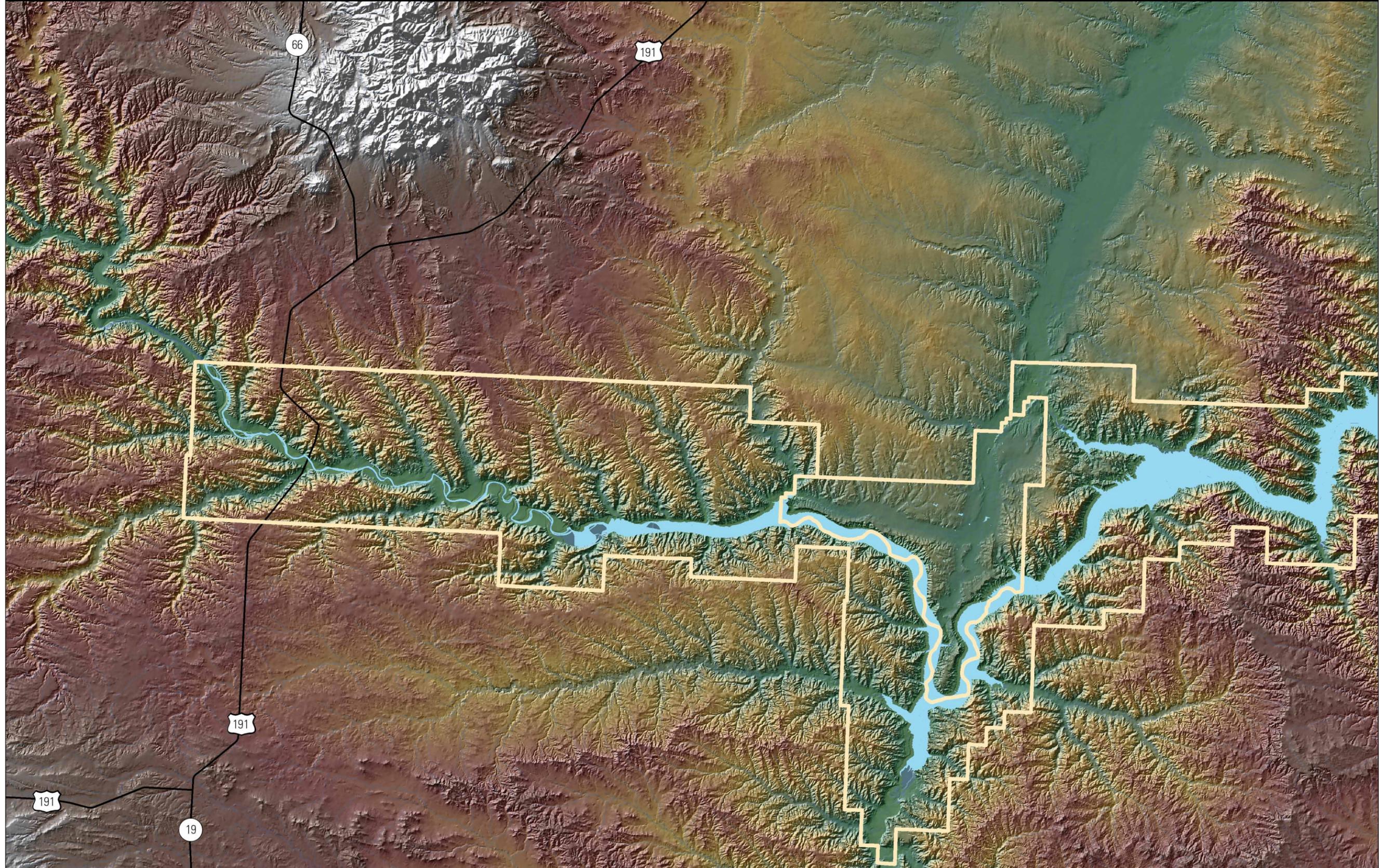


Figure 6. Topographic base map of the Charles M. Russell and UL Bend Refuges.

Figure 6 (topographic map, west)

U.S. Fish & Wildlife Service

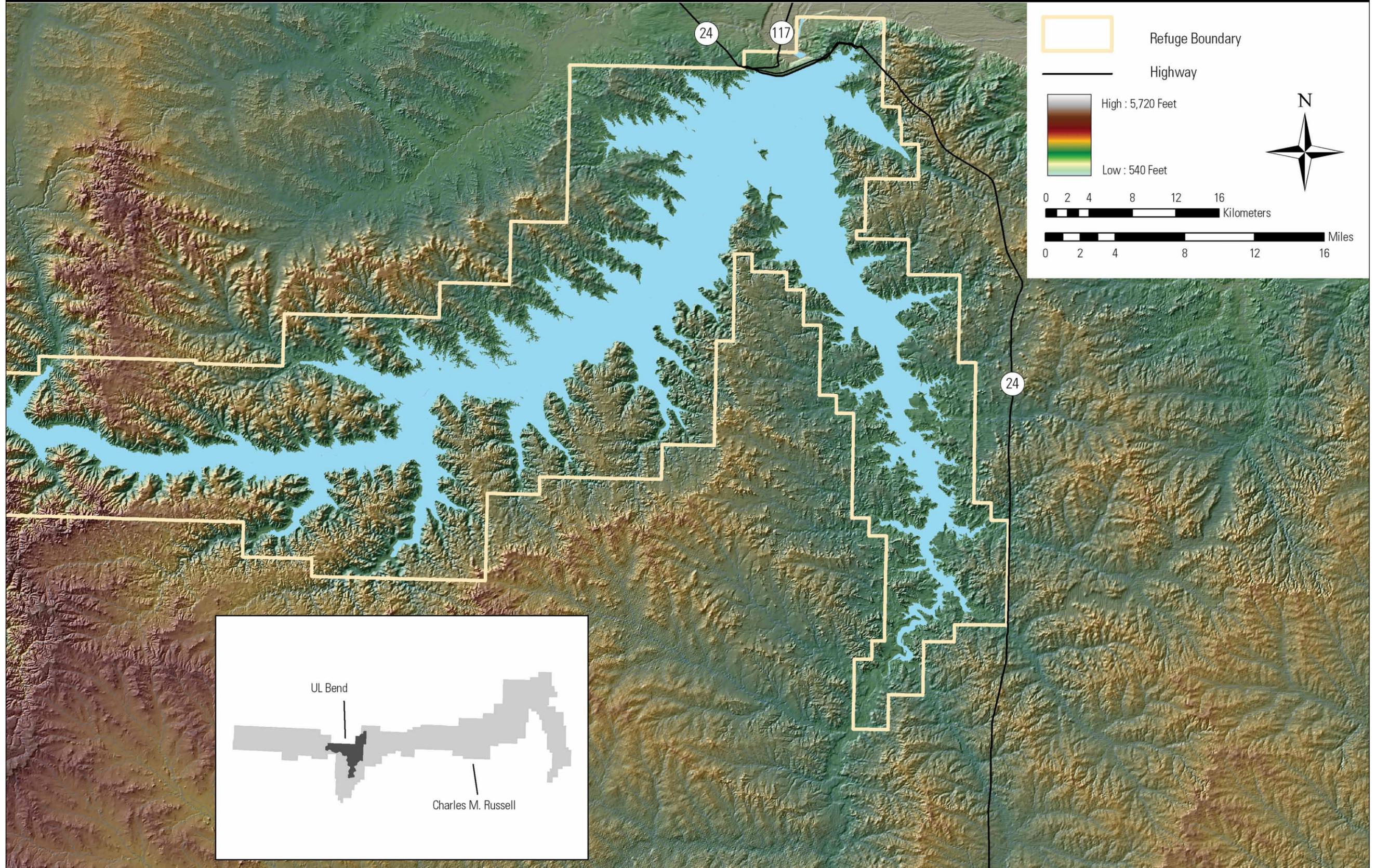


Figure 6 (topographic map, east)

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

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 4 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 (refer to 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.



Brett Billings / USFWS

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



USFWS

Pronghorn

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).

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 co-managing 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 (refer to 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.) (refer to table 2). Today, Charles M. Russell National Wildlife Refuge is the only former 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 (see figure 5 in chapter 1) managed by DNRC and about 41,000 acres of private inholdings (figure 5) within the refuge. 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.

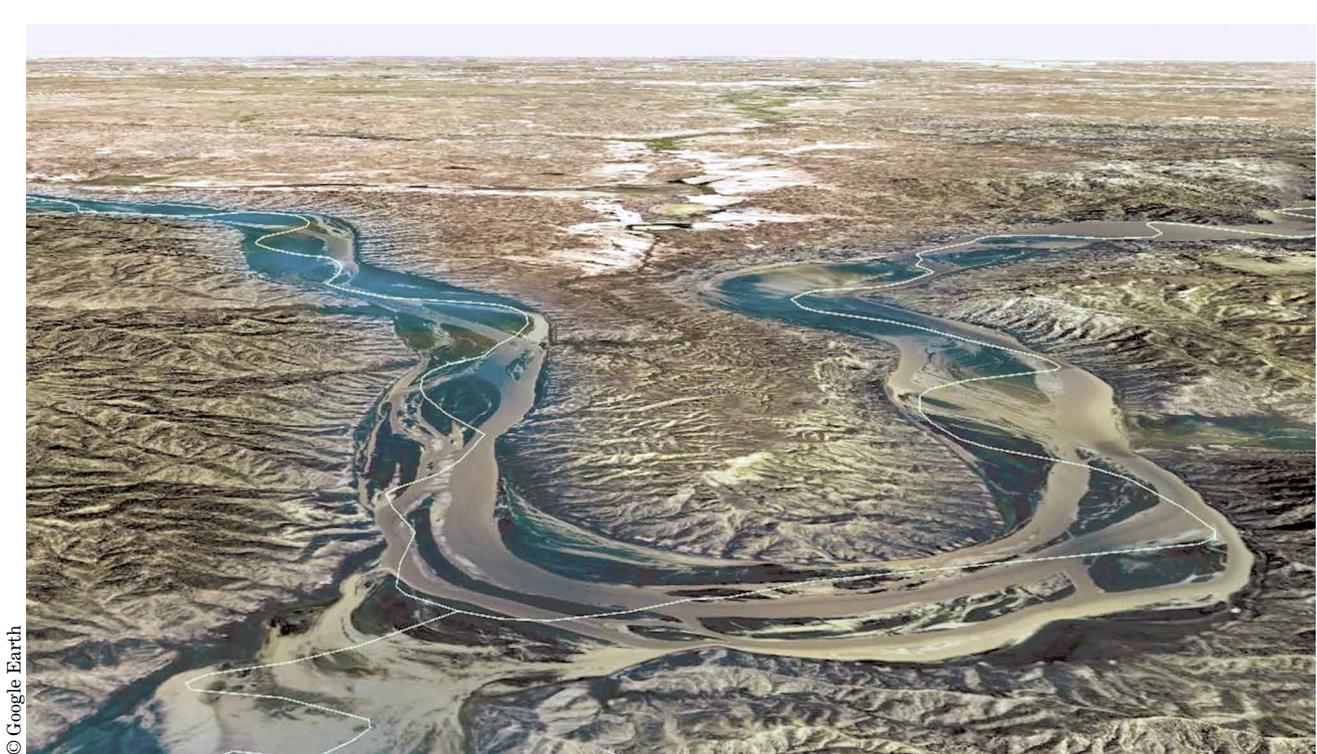
The refuge annual performance plan reports that 250,000 visitors, on average, come to the refuge each year. Containing some of the best elk habitat in Montana, the refuge hosts recreationists not only for hunting, but for fishing, wildlife and landscape photography, wildlife observation, hiking, camping, 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 7 in chapter 3) 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 4 and appendix E.

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, to receive the Muscle shell river, the point of country thus formed tho' high is still much lower than that surrounding it, thus forming



© Google Earth

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

a valley of wavy 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 (refer to table 2). This acreage was later modified to its current size of about 20,819 acres (see figure 7 in chapter 3). More details about wilderness are in chapter 4 and appendix E.

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.

EXISTING MANAGEMENT

For nearly 25 years, the Service has managed the refuge under a resource management plan that was 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 has helped to improve habitat for wildlife, many problems and

issues still exist (refer to chapter 4). 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. Currently, many of the units are 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 have seen 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 have been court challenges to the Service's management of the refuge both before and after the 1986 record of decision, and these decisions have 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 per-

mit. 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

Early in the planning process, the planning team and public identified many outstanding qualities and values of the refuge. 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 Service developed a vision for the refuge at the beginning of the planning process. 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

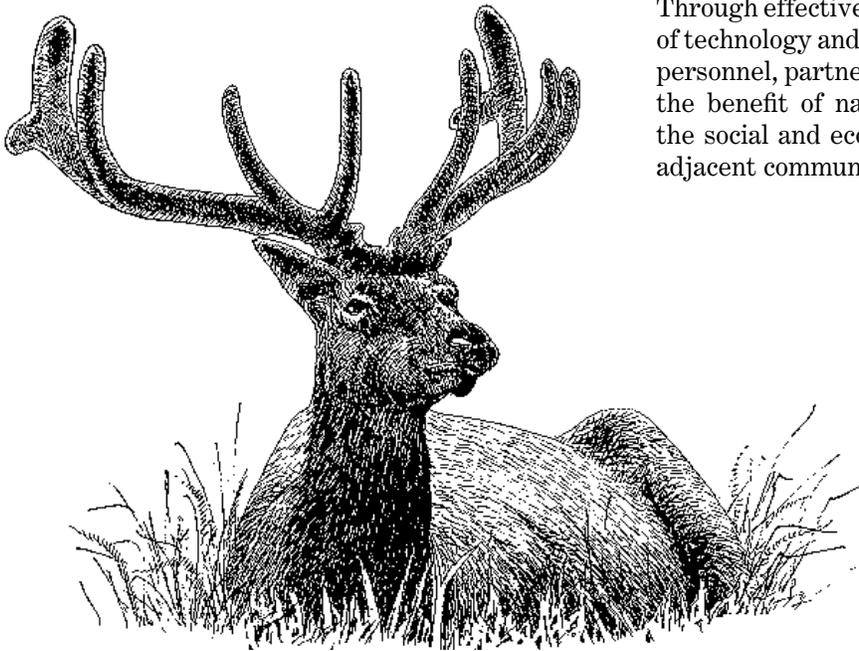
Contribute to the identification, preservation, and recovery of threatened and endangered species and species of concern that occur, or have historically occurred, in the northern Great Plains.

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.



Rocky Mountain Elk

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.

3—Alternatives

This chapter describes the management alternatives for the Charles M. Russell and UL Bend National Wildlife Refuges. Alternatives are different approaches to management designed to achieve the refuge purposes, vision, and goals; the mission of the Refuge System; and the mission of the Fish and Wildlife Service. Alternatives are formulated to address significant issues, concerns, and problems identified by the Service, cooperating agencies, interested groups, tribal governments, and the public during public scoping and throughout the development of the final plan. Chapter 1 contains descriptions of the issues.



Service staff present the management alternatives to the public.

USFWS

3.1 CRITERIA for ALTERNATIVES DEVELOPMENT

Following the initial scoping process in fall 2007 and early 2008, the Service held meetings and workshops with the cooperating agencies and the public and identified a reasonable range of preliminary alternatives. Some ideas were eventually dropped, and those are discussed later in section 3.10. The Service carried forward the following four alternatives and analyzed them in detail in this EIS:

- Alternative A—No Action
- Alternative B—Wildlife Population Emphasis
- Alternative C—Public Use and Economic Use Emphasis
- Alternative D—Ecological Processes Emphasis (preferred alternative)

These alternatives examine different ways for providing permanent protection and restoration of fish, wildlife, plants, habitats, and other resources and for providing opportunities for the public to engage in compatible wildlife-dependent recreation. Each alternative incorporates specific actions intended to achieve the goals described in chapter 2. However, the no-action alternative A represents the current, unchanged refuge management and may not meet every aspect of every goal. The no-action alternative provides a basis for comparison of the action alternatives B, C, and D.

3.2 ELEMENTS COMMON to ALL ALTERNATIVES

Key elements of refuge management will be included in the final CCP regardless of the alternative selected. For example, 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, and archaeological and historical resources. These 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 D. Specific elements common to all alternatives follow:

- 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.
- Several special regulations for public access on the refuge will continue to apply. Many of these are identified at the beginning of the public use—access discussion in section 3.8. This includes, among others, the requirement for all-terrain vehicles (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.

Although the amount or type of access varies by alternative, the Service will develop a stepdown management plan for transportation based on the alternative selected for the final CCP.

- Landing sites for seaplanes will continue to be allowed under the provisions of the Seaplane Landing Plan (USACE 1995). Aircraft may not land on the uplands of the refuge. Landing and taxiing of fixed-wing aircraft on the surface of Fort Peck Reservoir is allowed in designated landing locations.
- The Service will continue to collect grazing fees in accordance with the region 6 grazing policy.
- 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.
- The UL Bend Wilderness and all proposed wilderness will be protected in accordance with the 1964 Wilderness Act and the Service's Wilderness Stewardship Policy (FWS 2008c).
- 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.
- The Service will carry out actions in the CCP through cooperation and collaboration with Federal, State, tribal, and local governments; nongovernmental organizations; and adjacent private landowners. Section 3.11 describes existing and potential partnerships.
- 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. The Service will continue to issue special use permits for grazing on the State school sections that recognize those AUMs allotted.
- 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.
- 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 determined by the Montana Reserved Water Rights Compact Commission (refer to chapter 4, under "4.2 Physical Environment," "Water Resources").
- 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.
- The Service will look to facilitate the exchange of State lands within the refuge boundary where feasible.
- The Service will work with willing sellers as money is available to buy priority lands within the authorized boundary.
- The Service will cooperate with USACE to transfer jurisdiction of lands not needed by USACE to meet its legal mandates.
- The Service will adhere to legal obligations for any valid rights-of-way for access to private and State lands.
- Boating will continue to be allowed on the refuge. Special regulations apply along the western end, which is part of the National Wild and Scenic River System.
- The Service will cooperate with partners to provide comparable accessible opportunities for all.
- The Service will continue to prohibit shed hunting.
- The Service will continue to protect all areas with special land designations: wilderness, proposed wilderness, recommended wilderness, 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.

- In any actions involving the taking of wildlife on the refuge for predator control by U.S. Department of Agriculture (Wildlife Services), the Service will decide whether the activity is appropriate (603 FW 1), and, if so, whether it is compatible with the purposes of the refuge and the Refuge System.

3.3 STRUCTURE of ALTERNATIVE DESCRIPTIONS

Each alternative is designed to clearly address the goals described in chapter 2; therefore, the alternatives are organized by the following goal headings:

- Habitat and Wildlife Management
- Threatened and Endangered Species and Species of Concern
- Research and Science
- Fire Management
- Public Use and Education
- Wilderness
- Cultural and Paleontological Resources
- Refuge Operations and Partnerships

Sections 3.4–3.7 summarize alternatives A–D, respectively, which the Service developed to achieve the refuge vision and goals and to address significant issues. There is a no-action, or current management, alternative (A) and three action alternatives (B–D). The Service has identified alternative D as the preferred alternative. These alternative summaries describe the overall focus of each alternative along with its key management elements. In addition, there is a map of each alternative showing management elements that could be visually represented.

To easily compare the alternatives by topic, section 3.8 contains the detailed actions by which the goals would be achieved. Each goal title is followed by the related objectives for each of the four alternatives. The timeframe to accomplish each objective refers to the number of years after the Service approves the final CCP. Detailed rationale explains how and why each objective would help meet the goal under the specific emphasis of the associated alternative. Additionally, there are strategies listed for achieving each objective. Comparing the objectives and strategies by goal, instead of separating out the topics by alternative, makes it easier to compare the differences between specific objectives. Table 10 in section 3.15 is a summary of the actions for each alternative. Table 56 in chapter 5, section 5.16, summarizes the consequences of these actions.

3.4 SUMMARY of ALTERNATIVE A (No Action)

Few changes would occur in managing existing wildlife populations and habitat. Wildlife-dependent public and economic uses would continue at current levels. Figure 7 depicts the management of resources and public use for alternative A.

HABITAT and WILDLIFE MANAGEMENT, THREATENED and ENDANGERED SPECIES and SPECIES of CONCERN, RESEARCH and SCIENCE, and FIRE MANAGEMENT

Goals for the topics above are intricately linked in managing habitat, wildlife, and water resources. The elements below reflect these relationships for alternative A.

Habitat

There would be a continued emphasis on big game management, annual livestock grazing, use of fencing for pastures, and invasive species control. Habitats would continue to be managed in the 65 habitat units that were established by BLM for grazing purposes, and residual cover on these units would be measured. Some small bottomland or riparian area restoration projects would occur. Monitoring of habitat would continue at existing levels: (1) residual cover; and (2) sentinel plant species throughout the refuge.

Livestock Grazing. Livestock would be kept out of most riparian areas primarily through fencing. The Service would gradually implement prescriptive grazing across the refuge as required by Service policy. This would occur as habitat evaluations are completed or following the sale of a ranch to a third party. By the end of 15 years, about 50 percent or more of the units would have been converted to a prescriptive component (see section 3.8, “Habitat—Upland,” for a full definition and description).

Wildland Fire. The current fire management strategies would be maintained. Wildfires would be suppressed with no benefit obtained. Prescribed fire would continue to be minimally used as a management tool.

Invasive Species. The existing control programs for invasive species would continue. Actions include mapping; using biological controls, chemical spraying, and weed wash stations; and requiring horse users to use weed-seed-free hay.

Climate Change. Following Service policy and guidelines on climate change initiatives, the Service would

carry out the following actions: (1) maintain a small wind turbine; (2) continue recycling; (3) increase energy efficiency and adopt other ways to reduce the carbon footprint; 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.

Water Resources

Select stock ponds would be maintained and rehabilitated. Riparian habitat would be restored where possible and standard watershed management practices would be enforced. Water rights would be adjudicated and defined.

Wildlife

Inventory and monitoring of wildlife would continue at existing levels: (1) wildlife surveys of Rocky Mountain elk, mule deer, Rocky Mountain bighorn sheep, black-footed ferret, and raptors; (2) lek locations for grouse; (3) black-tailed prairie dog mapping; and (4) mourning dove counts.

Big game would be managed to achieve target levels in the 1986 EIS record of decision: 2.5 elk per square mile, 10 mule deer per square mile, and 160 bighorn sheep. This includes a more restrictive rifle season for mule deer in some State hunting districts as compared to the State season.

Predator control coordinated by the U.S. Department of Agriculture, Wildlife Services, would occur on a limited basis, but mountain lion hunting and predator hunting or trapping would not be allowed. Limited coyote hunting would be allowed from mid-October through March 1.

Threatened and Endangered Species and Species of Concern

The black-footed ferret recovery effort would continue including releasing animals, intensive monitoring, and disease and habitat management.

PUBLIC USE and EDUCATION

The Service would continue managing public uses to provide for a variety of wildlife-dependent opportunities and programs.

Hunting

Hunting programs would continue for wild ungulates (elk, deer, and pronghorn), upland birds, waterfowl, and coyote (limited hunting). Shooting of nongame species, trapping, and shed-antler hunting would all be prohibited. All other wildlife would be protected. The Service would cooperate with USACE on providing deer hunting opportunities for persons with disabilities. Facilities such as the accessible hunting blind would be maintained or upgraded.

Fishing

State regulations would apply. The Service would continue to allow fishing opportunities in accordance with the compatibility determination (appendix C) and MFWP regulations.

Wildlife Observation, Photography, Interpretation, Environmental Education, and Outreach

Limited programs would be offered and include the educational bus tour, school visits, and refuge personnel at the fair booth. Facilities such as the auto tour route, elk-viewing area, and other kiosks would be maintained. Seasonal refuge personnel would staff the interpretive center at Fort Peck Field Station.

Access

About 670 miles of road and trails would remain open with limited, seasonal closure of some roads when necessary. The following activities would be allowed: ATV use on public roads providing they are licensed, bicycling on numbered roads including seasonally closed roads, horseback riding, and public planes that could land only on water or ice as determined by USACE and the refuge's aircraft landing plan. Camping would be allowed throughout the refuge, and vehicle access would be allowed to campsites within 100 yards of a road.

Recreation Sites

The Service would work with USACE on management of boat ramps. About nine ramps have access to water.

Commercial Recreation

Eleven outfitting permits would continue to be offered for hunting, and unregulated commercial fishing and guided fishing would continue to be allowed. Commercial outfitting for coyote hunting would be prohibited. [Note: USACE has primary jurisdiction over Fort Peck Lake and is the lead agency in managing commercial activities on the lake and other USACE-managed lands.]

WILDERNESS

The Service would continue to manage the 20,819-acre UL Bend Wilderness (see figure 7) in the UL Bend Refuge as a class 1 air shed. About 155,288 acres of proposed wilderness within 15 units of the Charles M. Russell Refuge (see figure 7) would be managed in accordance with Service policy. Roads in proposed wilderness units would remain closed except for roads that provide access to private lands within the refuge. Within 2 years, the Service would complete the study of all units that meet the wilderness criteria (see appendix E) and submit final recommendations to the Service directorate and Secretary of the Department of the Interior.

*Figure 7 follows
(two foldout pages)*

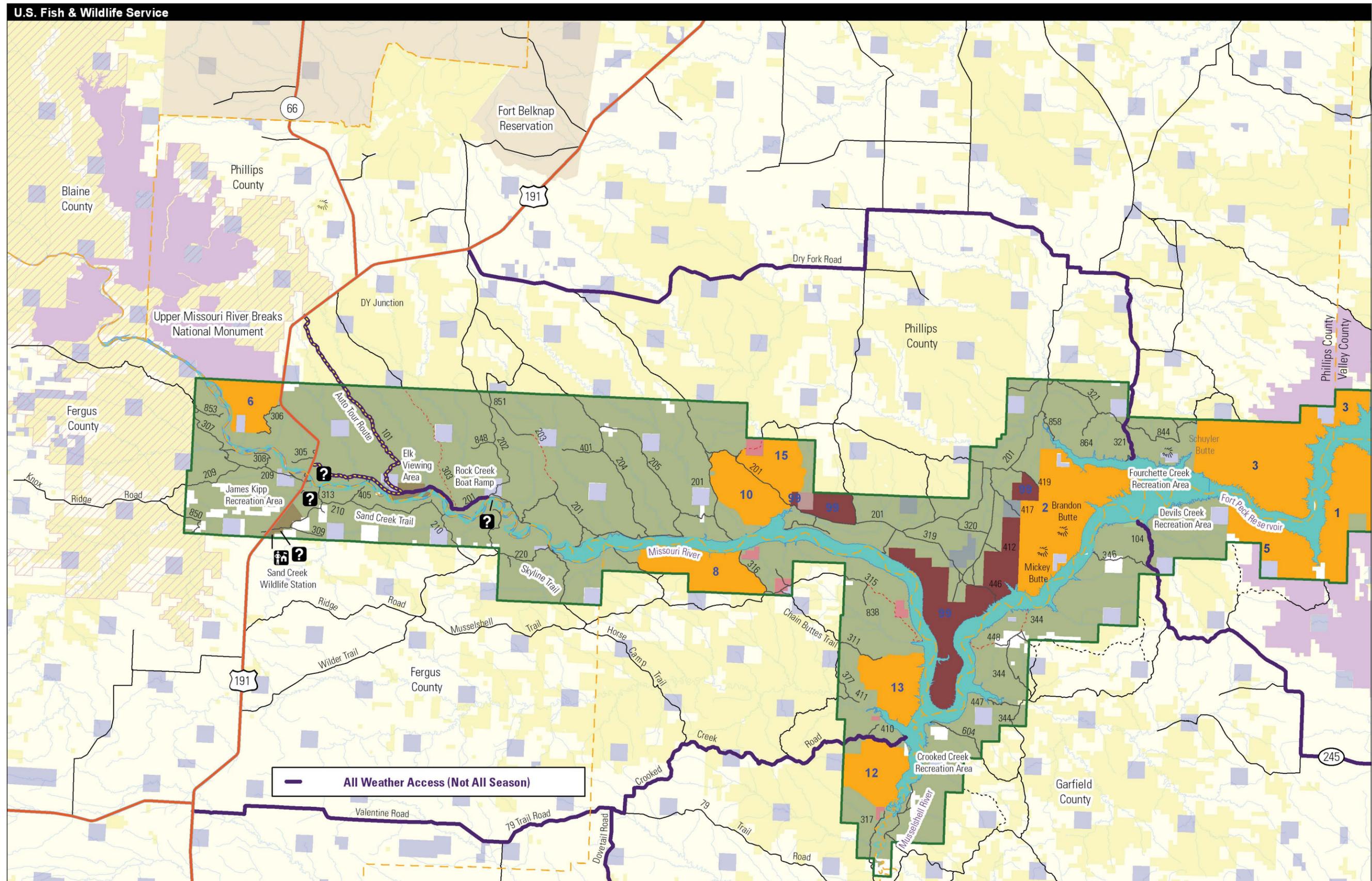


Figure 7. Map of management under CCP alternative A for the Charles M. Russell and UL Bend Refuges.

Figure 7 (alternative A, west)

CULTURAL and PALEONTOLOGICAL RESOURCES

Cultural resources are sites, buildings, structures, and objects that are the result of human activities and that are more than 50 years old. They include prehistoric, historic, and architectural sites; artifacts; historical records; and traditional cultural properties including traditional use areas for Native Americans that may or may not have material evidence. Paleontological resources include fossils of both animals and plants.

Cultural Resources

Cultural resources would be identified, and significant resources would be protected in accordance with the National Historic Preservation Act and other relevant laws. Some old homesteads would continue to be maintained but others would not. Known gravesites would be protected and the cultural resource inventory would be maintained. The Service would maintain closures of roads through sensitive areas. A refuge history brochure would be provided.

Paleontological Resources

The Service would continue to issue permits to institutions that investigate paleontological resources from a scientific perspective. Permits would not be issued for recreational paleontology requests that do not follow a scientific study design. All permits would continue to meet compatibility requirements and the regulations for the Paleontology Resource Protection Act.

REFUGE OPERATIONS and PARTNERSHIPS

The vision and goals would be met through commensurate refuge operations and the refuge's collaboration with many partners.

Refuge Operations

The refuge relies on personnel, equipment, and facilities to carry out both the day-to-day operations along with the long-term programs.

Personnel. Personnel would be kept at current levels.

Equipment and Facilities. Equipment and facilities would be maintained at current levels. (Same as alternative B.)

Minerals. The mineral withdrawals for locatable minerals (diatreme gems) on the UL Bend Refuge (permanent) and the Charles M. Russell Refuge (20-year withdrawal) would remain in effect.

Partnerships and Collaboration

The Service would maintain existing partnerships with Federal and State agencies, counties, conservation districts, adjacent private landowners, local communities, and others.

3.5 SUMMARY of ALTERNATIVE B (Wildlife Population Emphasis)

The Service would manage the landscape, in cooperation with partners, to emphasize the abundance of wildlife populations using (1) balanced natural ecological processes such as fire and herbivory (grazing and browsing) by wild ungulates, and (2) responsible farming practices or tree planting. Wildlife-dependent public uses would be encouraged, and economic uses would be limited when they compete for habitat resources. Figure 8 depicts the management of resources and public use for alternative B.

HABITAT and WILDLIFE MANAGEMENT, THREATENED and ENDANGERED SPECIES and SPECIES of CONCERN, RESEARCH and SCIENCE, and FIRE MANAGEMENT

Goals for the topics above are intricately linked in managing habitat, wildlife, and water resources. The elements below reflect these relationships for alternative B.

Habitat

The Service would actively manage and manipulate habitat, thus creating a diverse plant community of highly productive wildlife food and cover plants. The management emphasis would be on habitat for specific target or focal species of wildlife in separate parts of the refuge, largely based on the species recommendations in Olaus Murie's 1935 biological assessment. Murie talked about the refuge's habitat potential to support a variety of wildlife species such as elk, bighorn sheep, and bison to name a few. The Service would consolidate the 65 habitat units; subsequently, the refuge staff would write new HMPs based on field station boundaries and habitat evaluation and management for each target or focal species. The Service would work with others to develop methods to monitor and evaluate target species and habitat needs. (Refer to section 3.8 for descriptions of focal, target, and sentinel species.)

Desired habitat conditions may be created using natural ecological processes, such as fire, grazing by wildlife, or flooding or through management practices, such as agricultural plantings and managed fire. For example, the dense understory of juniper, ponderosa pine, and Douglas-fir in forested coulees (ravines) could be thinned, which would lessen the likelihood of wildfire moving into the overstory and possibly eliminating mature forest stands.

An aggressive approach to reduction of invasive plants in the river bottoms would be based on pri-

orities. Work would include using prescribed fire, spraying with herbicides, and planting wildlife food crops to clear invasive plants. In addition, the Service would collaborate with others to combat invasive plants in shoreline habitat. Mechanical means could be used to improve shoreline habitat for fish, birds, or other wildlife. Where feasible and combined with research, the Service would restore the functioning condition of riparian areas and preserve fire refugia.

Livestock Grazing. The Service would carry out a prescriptive grazing regime, designating the use of livestock grazing with written directions to achieve specific desired outcomes, across most of the refuge (refer to section 3.8, “Habitat,” for a full definition and description). Within 4–7 years, prescriptive livestock grazing would be carried out on 50–75 percent of the refuge, and this progression would be continued over 15 years. Interior fencing would be removed if necessary. The refuge boundary would be fenced to exclude common pastures and allow the Service to conduct management treatments for achieving the habitat objectives. The use of enclosures and prescriptive grazing would be increased where needed to exclude livestock from river bottoms or other riparian areas with the exception of developed water gaps if found appropriate and compatible with habitat management objectives.

Wildland Fire. The Service would increase the use of prescribed fire—any fire ignited by management actions to meet specific objectives. Increased monitoring would be used to measure and understand the implications of prescriptive livestock grazing and prescribed fire.

The Service would work with USACE and other partners to address the wildland–urban interface at the Pines Recreation Area and other USACE recreation areas. Wildfire would be used to protect, maintain, and enhance resources and, where possible, be allowed to function in its natural ecological role.

Invasive Species. There would be an increased effort to reduce invasive plants by converting former croplands that are now infested with invasive plants (more than 3,000 acres) to food plots for wildlife. The Service would emphasize visitor awareness about invasive plants and invasive aquatic wildlife, such as the zebra mussel, through education along with increasing the weed-seed-free requirements for outfitters or permittees and increasing enforcement, if necessary.

Climate Change. Based on climate change predictions and following Service and departmental policies and initiatives, the Service would identify (1) species of plants that are likely to be first to decline, (2) animals that are associated with these plant species includ-

ing insects, birds, and mammals, and (3) species of plants and animals that could increase. Additionally, the Service would design science-based, long-term monitoring protocols to document changes in plant and animal composition or health due to climate change. The Service would coordinate with adjoining agencies and partners to immediately alleviate declines, if needed, using tools such as prescriptive grazing, prescribed fire, or flooding. The Service would cooperate on national and international projects to maintain biological diversity, integrity, and environmental health on a global basis.

In addition to the climate change elements in alternative A, the Service would do the following: (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 more teleconferencing instead of meetings; (6) encourage staff to be more energy efficient (such as turning off lights, recycling, and turning down heat); and (7) study and promote the carbon sequestration benefits of the refuge.

(Same as alternatives C and D.)

Water Resources

In addition to the water resources elements in alternative A, the Service would work to restore water quality for fish and wildlife habitats and populations by addressing soil erosion from overgrazing, roads, or other sources (such as contamination from recreational or economic uses including human use of camping areas or excessive livestock use of streams). There would be efforts to retain ground cover throughout the refuge to increase ground waterflow into streams and to reduce runoff and soil erosion, thus protecting riparian area corridors.

The Service would acquire water rights associated with buying inholdings and would obtain senior upstream water rights only when approached by a landowner or current water right holder.

Wildlife

Through cooperation and collaboration with MFWP and adjoining landowners, the Service would use wildlife- and habitat-based objectives and strategies that consider natural densities, social structures, and population dynamics at the landscape level. The Service and these cooperators would mutually agree on population levels that can be tolerated by adjoining landowners and provide for quality recreational experiences without negatively affecting habitat or other wildlife species. The Service would collaborate with others to manage wildlife to benefit all species in and around the refuge. Actions would include using hunting to improve habitat, developing conservation easements, or other incentives to benefit species diversity and ecological integrity.

*Figure 8 follows
(two foldout pages)*

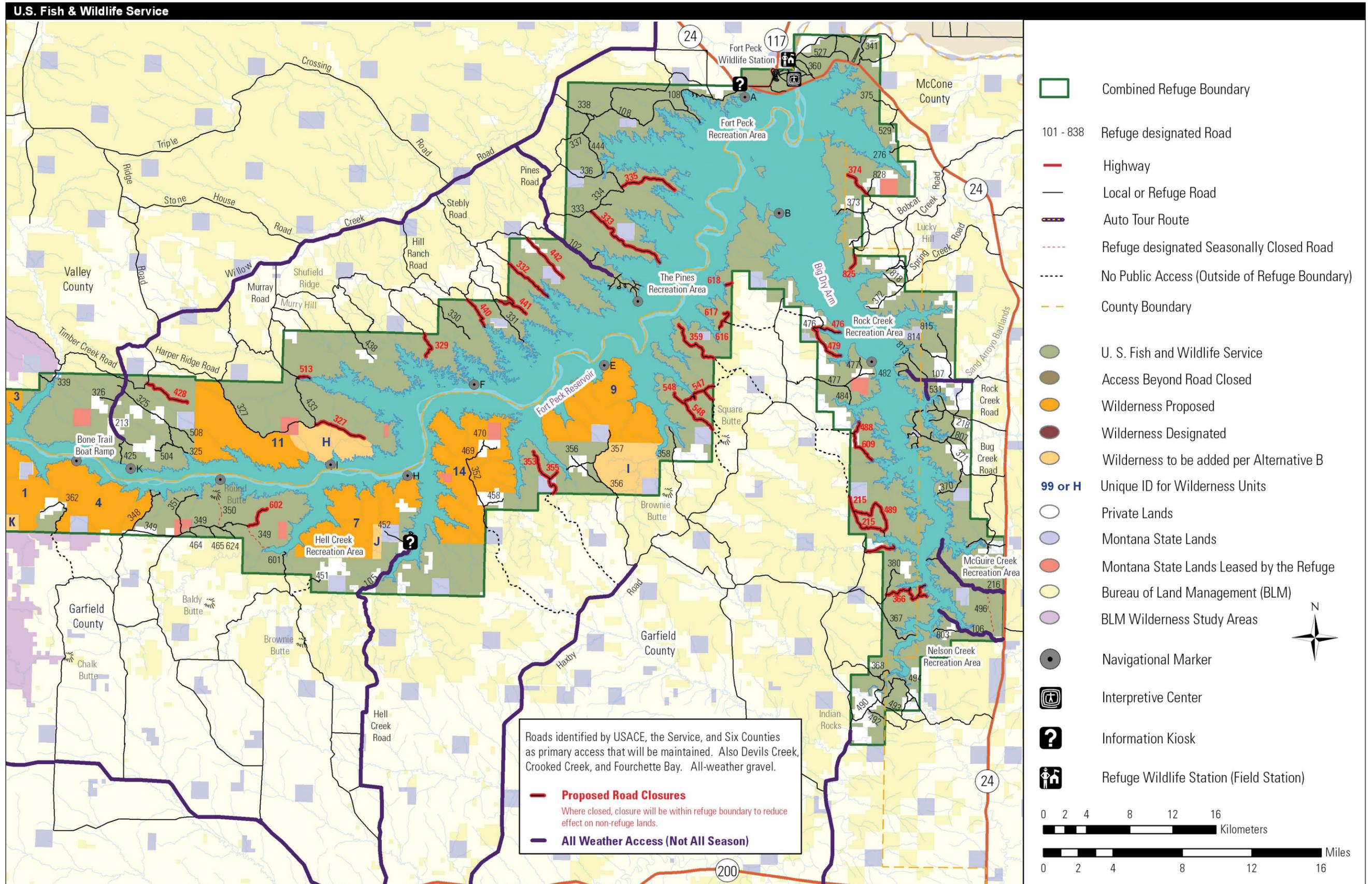


Figure 8 (alternative B, east)

Reintroductions. The Service would identify habitat suitable for Rocky Mountain bighorn sheep and establish new populations based on modeling and MFWP transplant criteria. The Service would seek to restore and increase native fish populations in the Missouri River and its tributaries and in artificially developed impoundments (existing or new).

Threatened and Endangered Species and Species of Concern

The Service would 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.

The Service would 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. With approved MFWP management plans and in cooperation with MFWP and others, the Service would consider reintroduction of more black-footed ferrets, swift foxes, black-tailed prairie dogs, pallid sturgeons, and bighorn sheep into the landscape. Predators would be managed as an important component of the wildlife community, and predator management by the U.S. Department of Agriculture would be stopped.

PUBLIC USE and EDUCATION

In addition to the elements for public use and education in alternative A, the Service would encourage the wildlife-dependent opportunities and elements described below. The Service would not allow new secondary recreational uses unless they facilitate one of the wildlife-dependent recreational uses.

Hunting

The Service would work with others to provide opportunities for quality hunting as a management tool that maintains sustainable populations of big game and improves habitat for nongame species.

Fishing

The Service would work with others to provide opportunities for quality fishing that maintain sustainable populations of game and nongame fish.

Wildlife Observation, Photography, Interpretation, Environmental Education, and Outreach

Environmental education and interpretation programs would be created based on wildlife biology and habitat requirements. The Service would work

with more partners to expand interpretive and educational opportunities and update the signage, Web site, and other interpretive media and facilities as needed. More opportunities would be provided for persons with disabilities where needed. The Service would collaborate with others to develop a science center at Sand Creek Field Station.

Access

The Service would manage access to benefit and increase wildlife populations and promote harvest opportunities. The Service would close about 106 miles of road and some access. The Service would work with partners (Federal and State agencies, counties, and others) to develop a travel plan and secure access to the refuge through other lands. Nonmotorized access would be promoted, but the Service would consider allowing motorized access on existing roads only for game retrieval and restricting access on a seasonal basis to sensitive areas by river and road. ATV use would be monitored on numbered trails and managed if there was documented disturbance of wildlife or visitors. The Service would monitor boat use and determine if disturbance is an issue, and then the Service would work with cooperators and users to identify solutions for limiting disturbance to wildlife along the river corridor.

Recreation Sites

Vehicular camping would be managed to fit the associated use. For example, paddlefish fishing lends itself to concentrated camping versus big game hunting and dispersed camping. Backcountry camping would be allowed. The Service would ensure that camping does not severely affect surrounding habitat.

Commercial Recreation

The Service would collaborate with USACE to permit commercial fishing operations, including fishing tournaments, through USACE's permit process. More commercial backcountry outfitting permits would be developed for hunting to accomplish habitat and wildlife objectives.

WILDERNESS

In addition to the wilderness elements in alternative A, the Service would make recommendations to expand or adjust existing proposed wilderness units by 25,869 acres in Alkali Creek, Antelope Creek, Crooked Creek, East Seven Blackfoot, Mickey Butte, Sheep Creek, Wagon Coulee, West Beauchamp Creek, and West Hell Creek to conserve and promote their wilderness qualities and characteristics. These expansions or adjustments are called wilderness study areas (see figure 8 and appendix E).

CULTURAL and PALEONTOLOGICAL RESOURCES

Cultural resources and paleontological resources would be protected as identified in alternative A.

Cultural Resources

In addition to the protection elements in alternative A, the Service would 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 stepdown plan would be completed. Oral histories would 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 would be explored, and any artifact collections would be located and properly curated. There would be increased protection of cultural and paleontological sites through law enforcement and public education.

(Same as alternative D.)

Paleontological Resources

For paleontological resources, elements would be similar to alternative A, except the refuge would 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.

REFUGE OPERATIONS and PARTNERSHIPS

The vision and goals would be met through refuge operations and the refuge's collaboration with many partners.

Refuge Operations

The refuge relies on personnel, equipment, and facilities to carry out both day-to-day operations and long-term programs.

Personnel. In addition to elements in alternative A, the Service would increase staff to include an outdoor recreation planner, an added full-time law enforcement officer, and a fire technician at the Fort Peck Field Station.

Equipment and Facilities. Same as alternative A.

Minerals. In addition to elements in alternative A, the Service would seek permanent withdrawal of all minerals including oil and gas and other leasable and saleable minerals on all refuge lands and future acquisitions.

Partnerships and Collaboration

In addition to the partnerships and collaboration elements in alternative A, the Service would review

the refuge's partnerships and adapt them as needed based on new management direction. Staff would coordinate with USACE on lands that could be transferred to the Service for primary jurisdiction. The Service would continue to explore opportunities to collaborate with partners on wildfire suppression, use of prescribed fire, and habitat manipulation. Staff would seek more partnerships and money to support endeavors such as increased control of invasive species or for initiation of a Friends group. For a full list of existing and potential partners, refer to section 3.11.

(Same as alternative C.)

3.6 SUMMARY of ALTERNATIVE C (Public Use and Economic Use Emphasis)

The Service would manage the landscape, in cooperation with partners, to emphasize and promote the maximum, compatible, wildlife-dependent public uses and economic uses while protecting wildlife populations and habitats to the extent possible. Damaging effects on wildlife habitats would be minimized while using a variety of management tools to enhance and diversify public and economic opportunities. Figure 9 depicts the management of resources and public use for alternative C.

HABITAT and WILDLIFE MANAGEMENT, THREATENED and ENDANGERED SPECIES and SPECIES of CONCERN, RESEARCH and SCIENCE, and FIRE MANAGEMENT

Goals for the topics above are intricately linked in managing habitat, wildlife, and water resources. The elements below reflect these relationships for alternative C.

Habitat

In addition to the habitat elements in alternative A, the Service would generally manage habitats to provide more opportunities for wildlife-dependent recreation. In places, the refuge staff would manage for plant communities that could necessitate a compromise between providing wildlife food and cover and livestock forage needs. Where needed, fencing and water gaps would be used to manage livestock use and prevent further degradation of riparian habitat. Camping areas would be managed to limit expansion and further degradation of riparian habitat. Similar to alternative A, the Service would monitor residual cover to measure forage availability.

*Figure 9 follows
(two foldout pages)*

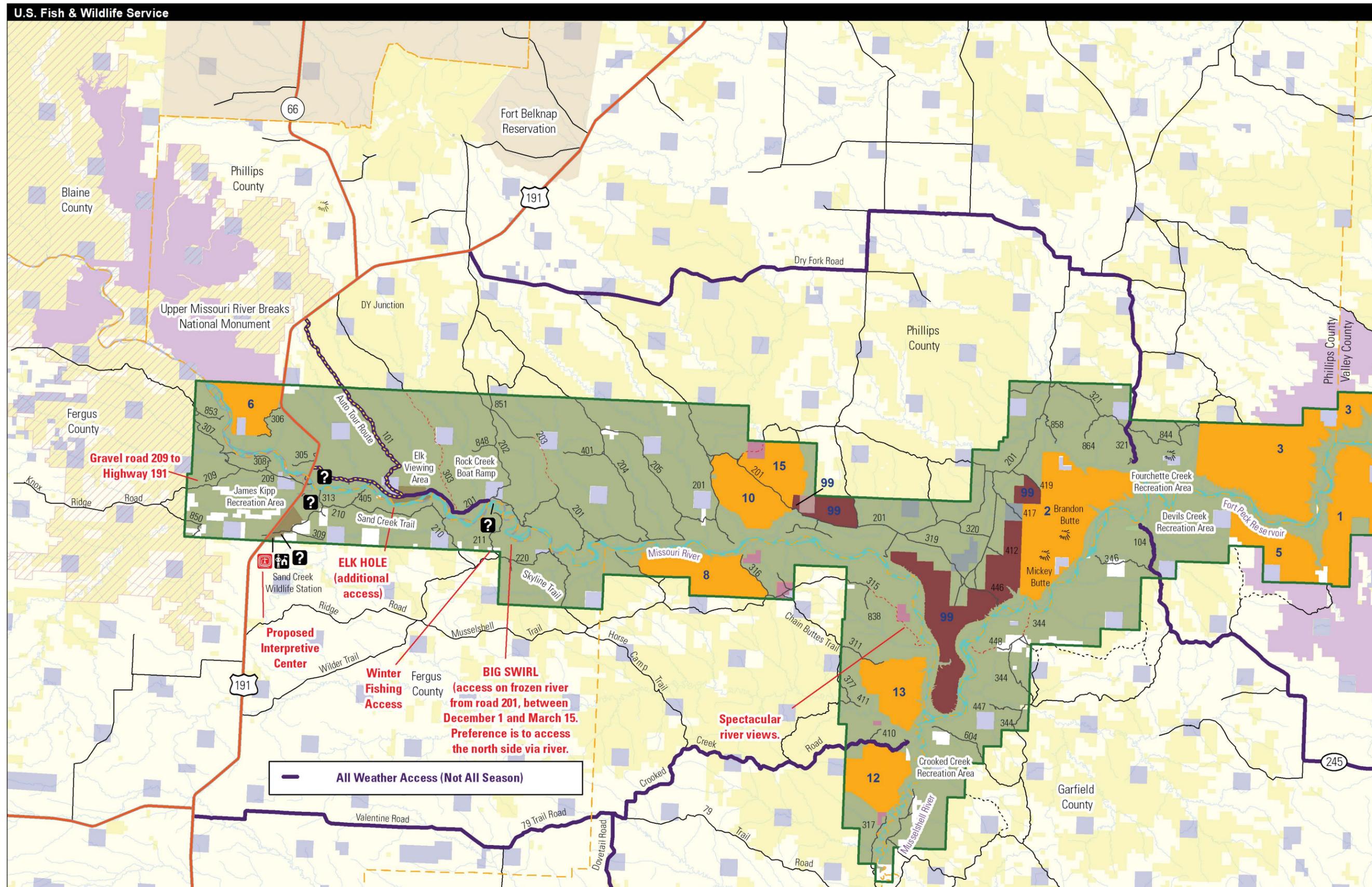


Figure 9. Map of management under CCP alternative C for the Charles M. Russell and UL Bend Refuges.

Figure 9 (alternative C, west)

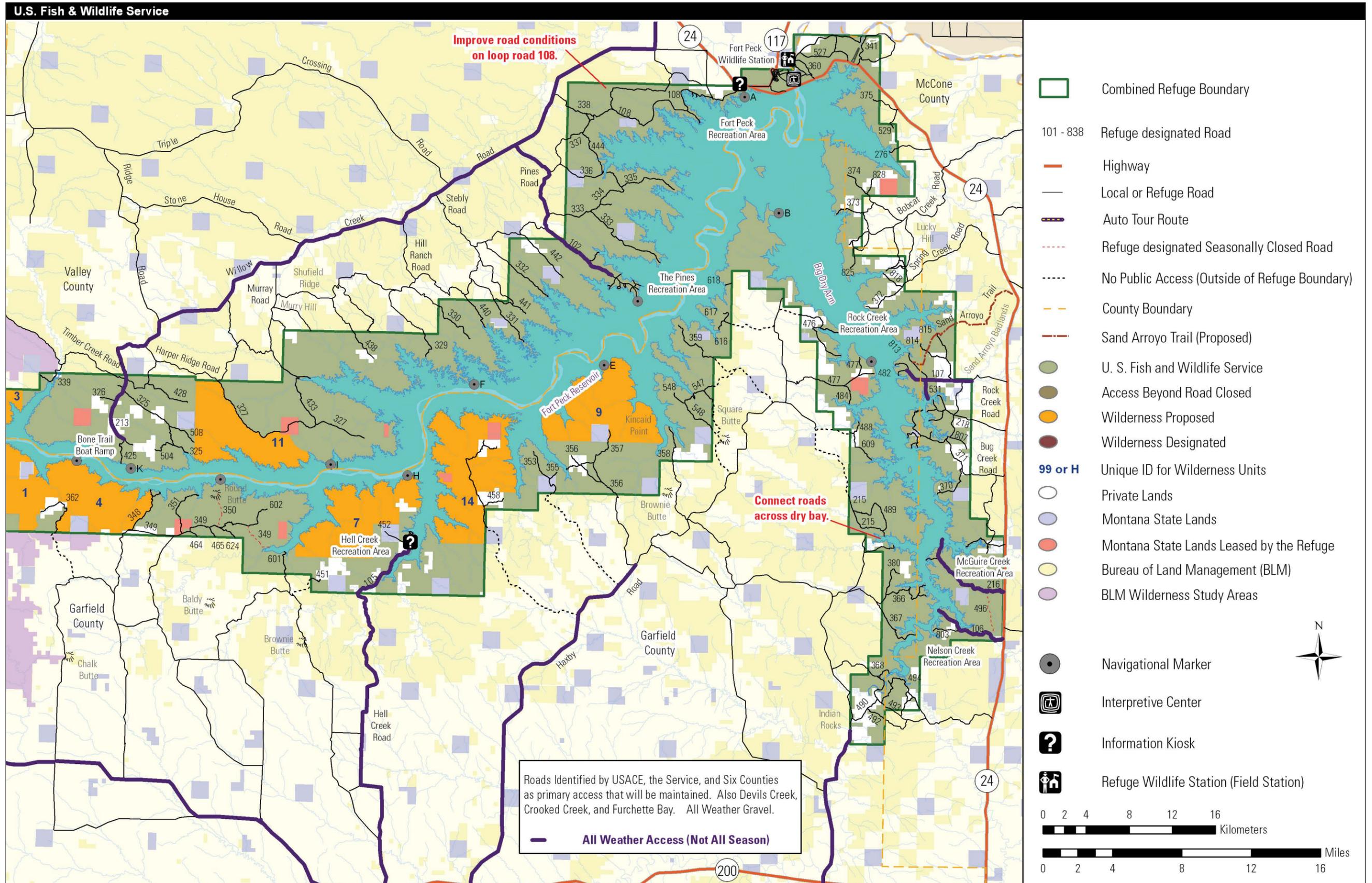


Figure 9 (alternative C, east)

Livestock Grazing. The Service would gradually move to a prescriptive livestock-grazing program when current grazing permits become available due to ranches changing ownership (this would not include generational transfer; refer to section 3.8, “Habitat,” for a full definition and description). If monitoring revealed that populations of the first-to-decline, grazing or browsing, sentinel plant species (refer to appendix F) were not viable, a balanced reduction in permitted livestock numbers and in wild ungulate numbers would occur. Similarly, prescribed fire would be used to enhance wildlife habitat and improve forage for livestock.

Wildland Fire. The Service would work with DNRC to make forage available on the refuge to replace forage on State lands that is reduced due to use of prescribed fire in a burn unit containing refuge land and State land. Aggressive initial attack would be used in identified habitat units to minimize economic loss from wildfire. Wildland fire would be used as a mechanism for natural succession in habitat units. To minimize the fuel load, more use of prescriptive grazing could be necessary.

Invasive Species. Similar elements as for alternatives B and D. The Service would work with partners to increase efforts to reduce the acreage of invasive species and measure trends of other species not currently classified as noxious.

Climate Change. Same as alternatives B and D.

Water Resources

In addition to elements in alternative A, the Service would allow for natural and constructed water sources for livestock use and public fishing and hunting. Future water developments would be allowed on a site-specific basis and consideration of effects (positive and negative) to all resources. The Service would adhere to any other regulatory or permitting requirements and would balance water quality restoration with public use and economic needs.

Wildlife

Through collaboration with MFWP and others, the Service would keep a balance between numbers of big game (elk, deer, and pronghorn) and livestock to sustain habitats and populations of big game and sharp-tailed grouse. Similar balancing could be necessary when managing for nongame or migratory bird populations and livestock needs. For example, it could be necessary to balance prairie dog populations and habitat needs with public and economic uses like livestock grazing or with other wildlife population needs.

The staff would work with partners to increase fish populations in the Missouri River and its tributaries and in artificially developed impoundments or

to create new impoundments for fish populations and livestock water.

At the landscape level, the emphasis would be on public and economic uses, and the Service would work with others to identify and secure public access to the refuge, manage all ungulate species to benefit all wildlife species, and work to promote private conservation easements.

Reintroductions. Suitable habitat for Rocky Mountain bighorn sheep would be identified, and a new population would be established in accordance with suitability models and MFWP transplant criteria.

Threatened and Endangered Species and Species of Concern

Threatened and endangered species would be protected, but there would be less intensive manipulation of habitat for those species. Similar to alternative B, a grizzly bear management plan would be developed in accordance with Federal and State regulations and plans to address potential immigration of this species to the refuge.

PUBLIC USE and EDUCATION

The Service would emphasize and maximize opportunities for wildlife-dependent use, as described below.

Hunting

Working with MFWP to improve habitat, the Service would maximize hunting opportunities by expanding (1) programs to include new species and traditional or niche (primitive weapon) hunting, (2) the mule deer season, and (3) predator hunting. Additionally, there would be an expanded program offering opportunities to young people to go hunting. Trapping could be allowed.

Fishing

Increased fishing access would be provided to areas that are no longer accessible due to the changing level of Fort Peck Lake. The Service would consider permitting vehicular access to shorelines for ice fishing in the winter. More fishing opportunities would be created by stocking select reservoirs and holding fishing events for young people and fishing groups.

Wildlife Observation, Photography, Interpretation, Environmental Education, and Outreach

The Service would create programs based on popular activities such as hunting, fishing, birding, camping, photography, and all other wildlife-dependent activities. Curriculum-based activities would focus on threatened and endangered species, reintroduced species, restoration activities, and aquatic species including invasive aquatic species.

New areas for wildlife viewing would be identified, and ecotourism opportunities would be increased. The Service would work with partners to develop an interpretive center at Sand Creek Field Station, construct an interpretive trail near the Sand Arroyo area, and increase the interpretation of paleontological resources.

To encourage more children to visit, the refuge would consider sponsoring geocaching (a hobby in which objects are hidden outdoors for people to find using Global Positioning System [GPS] positions posted on the Internet). While virtual geocaching would be allowed, physical geocaching would not be allowed on refuge lands.

In addition, programs for troubled youths would be increased.

Access

Refuge access would be managed to benefit public and economic uses. The Service would consider expanding access (establishing new roads or trails) in some areas along with seasonally closing other areas, such as those around Fort Peck, to protect habitat and to provide for a diversity of experience. Access to boat ramps would be improved. The Service would promote nonmotorized access but would consider allowing motorized access on existing seasonally closed roads for game retrieval only. The Service would evaluate creating more trails that are open for bicycle use. Working within existing policies, livestock permittees would be allowed to manage infrastructure and stock within habitat units, or the Service would consider designating administrative use-only roads for livestock management where appropriate and allowed by policy and laws.

Recreation Sites

The Service would collaborate with other agencies to provide facilities and services that enable people of all abilities to enjoy the education and recreation opportunities at the refuge.

New campsites and campgrounds would be considered, if needed. For example, the Service would evaluate the need for designated horse camps or campsites along the lake.

Commercial Recreation

Commercial recreation would be permitted if it contributes to the refuge purposes or the mission of the Refuge System. The Service would increase opportunities for appropriate and compatible commercial recreation, such as promotion of ecotourism tours and experiences on the refuge. Outfitting permits would be increased, and the Service would ensure this does not negatively affect public hunting. The Service would coordinate with USACE on commercial activities occurring on Fort Peck Lake and the Missouri River where USACE has primary jurisdiction.

WILDERNESS

Wilderness would be managed similar to alternative A. The Service would not make recommendations to expand wilderness protection in any units on the refuge.

CULTURAL and PALEONTOLOGICAL RESOURCES

Cultural resources and paleontological resources would be protected as identified in alternative A.

Cultural Resources

In addition to elements in alternatives A, B, and D, the Service would increase education-oriented ecotourism opportunities (nonconsumptive). The refuge staff would develop brochures and kiosks that interpret cultural resources and work with others to identify or stabilize cultural resources. There would be more use of interpretive signs, but archaeological sites would not be identified.

Paleontological Resources

The Service would increase educational opportunities and permits for universities. Documentaries and classes would be promoted. The Service would consider buying inholdings for protection.

REFUGE OPERATIONS and PARTNERSHIPS

The vision and goals would be met through refuge operations and the refuge's collaboration with many partners.

Refuge Operations

The refuge relies on personnel, equipment, and facilities to carry out both day-to-day operations and long-term programs.

Personnel. In addition to elements in alternative A, the Service would 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.

(Same as alternative D.)

Equipment and Facilities. In addition to elements in alternative A, the Service would expand facilities at Jordan Field Station and provide more office space at Jordan and Sand Creek Field Stations. A bunkhouse would be built at Fort Peck Field Station and an interpretive center at Sand Creek Field Station.

Minerals. Same as alternative B.

Partnerships and Collaboration

Same as alternative B.

3.7 SUMMARY of ALTERNATIVE D (Ecological Processes Emphasis, Preferred Alternative)

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. Economic uses would be limited when they are injurious to ecological processes. Figure 10 depicts the management of resources and public use for alternative D.

HABITAT and WILDLIFE MANAGEMENT, THREATENED and ENDANGERED SPECIES and SPECIES of CONCERN, RESEARCH and SCIENCE, and FIRE MANAGEMENT

Goals for the topics above are intricately linked in managing habitat, wildlife, and water resources. The elements below reflect these relationships for alternative D.

Habitat

Where feasible, the Service would 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 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 would include a concerted

manipulation of habitats or wildlife populations (prescribed fire and grazing and hunting) through coordinated objectives. Eventually, the Service would favor more passive approaches using fire, grazing, or flooding, which require less manipulation and money.

The Service would maintain plant diversity and health using fire in combination with wild ungulate herbivory (wildlife feeding on plants) or prescriptive livestock grazing, or both. The objective would be twofold: (1) ensure viable populations of sentinel plant species (species that decline first when management practices are injurious); and (2) ensure the viability of focal bird species (species that are representative of a broader group of species that share similar conservation needs).

Livestock Grazing. The Service would remove interior fences to facilitate management of environmental processes including patch burning and long-distance movement of animals. Generational transfer of permits would continue; however, the Service would 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); refer to section 3.8, “Habitat,” for a full definition and description.

Wildland Fire. The Service would restore the natural fire regime through an increased use of prescribed fire to increase the viability of fire-dependent plant species. The Service would burn patches of varying size and within the historical fire-return intervals on a rotational basis. This technique would 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. Fur-



Redosier Dogwood

thermore, some areas could need intensive manipulation with mechanical and hand restoration tools. The Service would minimize the use of fire in other areas to protect species of concern like the greater sage-grouse.

The Service would 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 would evaluate each wildfire to determine the management response and whether the wildfire could be used in the patch-burning program.

Invasive Species. Similar to elements in alternatives A, B, and C, the Service would work with many partners to combat invasive plants and encourage growth of native vegetation. When feasible, the Service would 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 would be evaluated for safety and effectiveness as a way to reduce the use of chemical controls for treatment of invasive plant infestations.

Climate Change. Same as alternatives B and C.

Research

Research and monitoring would be designed to understand the interaction between fire, grazing, plant response, wildlife populations, and other ecological factors. The Service would 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 revealed that adequate populations of sentinel plant species were not viable, changes in livestock permitting such as reduced AUMs or retired permits would be initiated.

Water Resources

In addition to the water resources elements in alternative A, the Service would 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 would refer to riparian area research and publications for guidance on improving water quality in identified areas. Additionally, the Service would assess the uses and needs of current reservoirs and remove those no longer needed for livestock or wildlife.

Wildlife

In collaboration with MFWP and others, the Service would 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.

The Service would 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 would collaborate with others to prevent species from being listed, primarily through restoring biological diversity, integrity, and environmental health across the landscape.

Predator control by the U.S. Department of Agriculture, Wildlife Services, would be stopped, and predators would be managed to benefit the ecological integrity of the refuge.

Reintroductions. Similar to wildlife elements in alternatives B and C, the Service would 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.

At a landscape scale, the Service would 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.

Threatened and Endangered Species and Species of Concern

In addition to the elements for threatened and endangered species and species of concern in alternative B, populations of the black-tailed prairie dog would be expanded to maintain or increase the health and diversity of all species' populations where prairie dogs are a critical component.

PUBLIC USE and EDUCATION

The Service would 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

*Figure 10 follows
(two foldout pages)*

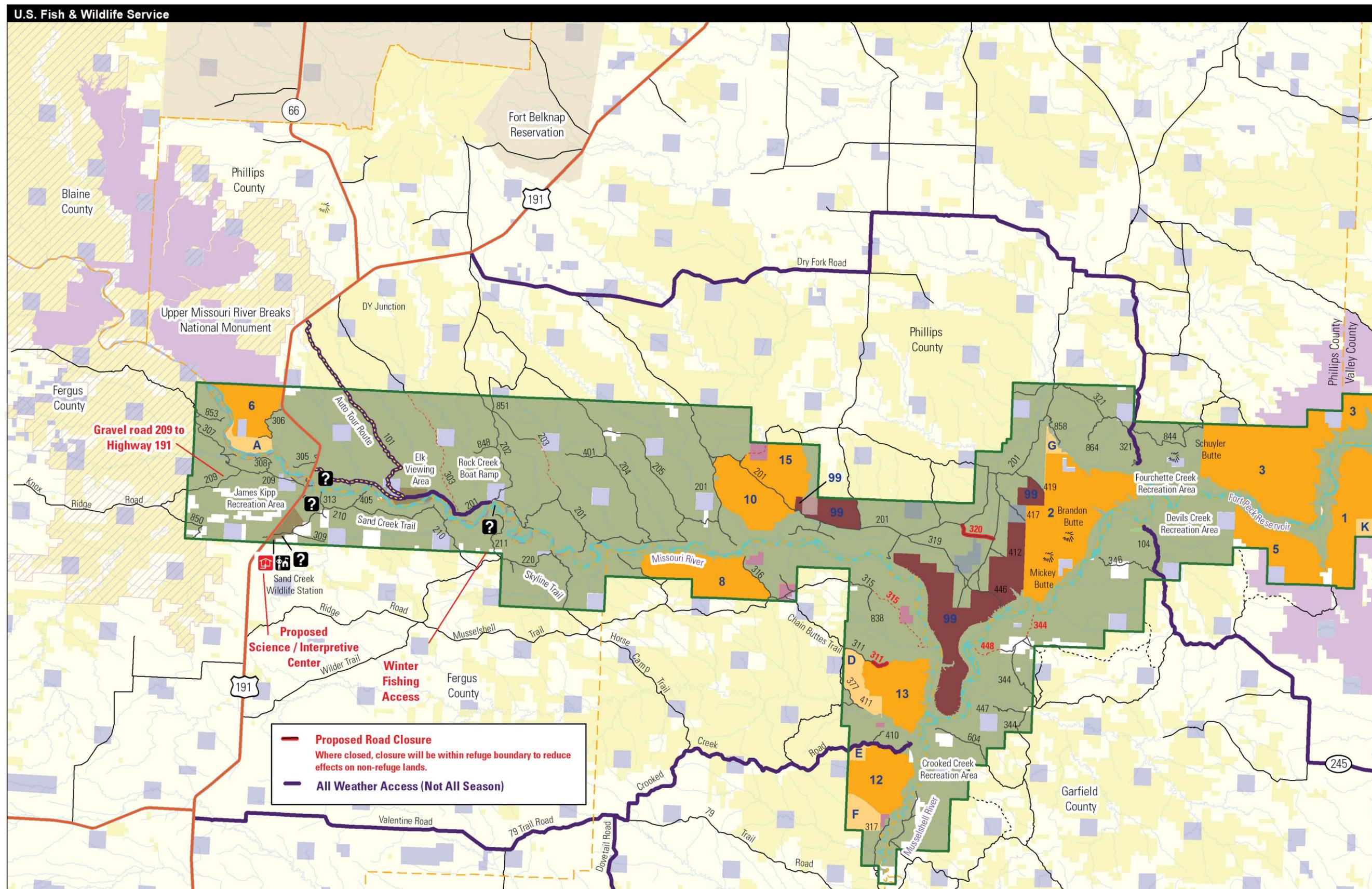


Figure 10. Map of management under CCP alternative D for the Charles M. Russell and UL Bend Refuges.

Figure 10 (alternative D, west)

- provision of reliable and reasonable opportunities to experience wildlife
- provision of facilities that are accessible and blend into the natural setting

Hunting

Pursuant to Service policies and Federal laws and regulations, the Service would 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 would 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. The Service would allow opportunities for limited, compatible, and appropriate hunting and trapping.

Fishing

The Service would cooperate with other agencies to enhance fishing opportunities while maintaining game species and other species.

Wildlife Observation, Photography, Interpretation, Environmental Education, and Outreach

Environmental education and interpretation programs would incorporate the Service's conservation goals in the themes, messages, and activities. The Service would provide opportunities for wildlife observation and photography across diverse habitats that show the full spectrum of plant and animal species found in the area.

Access

Refuge access would be primarily managed to benefit natural processes, but some improvements would be made to provide quality visitor experiences. Initially, the Service would 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 would be applied. Other closures or modifications could be necessary after further review of the refuge's road program. This would encourage free movement of wildlife, permit prescribed fire or wildfire suppression activities, and increase effective harvest of wild ungulates. The Service would 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).

Working with USACE and other agencies, the Service would monitor boat use along the Missouri River to determine use levels and whether wildlife disturbance, particularly during hunting season, was an issue. The Service would then work with cooperators and users to manage access where needed to limit disturbance to wildlife along the river corridor. Motorized vehicle use would be monitored on numbered trails and managed if there is documented disturbance to wildlife or visitors.

Bicycles would be restricted to numbered roads only including seasonally closed roads. The Service would provide facilities and services that enable people of all abilities to enjoy the educational and recreational opportunities available on the refuge.

Recreation Sites

Facilities would be upgraded and designed to meet accessibility standards. Camping needs would be evaluated as use changes on the refuge, and adaptive management (refer to figure 11) would be used to address camping demand, for example, harden the frequently used sites to minimize erosion and effects on habitat. Camping would be limited to within 100 yards of numbered routes.

Commercial Recreation

The Service would 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.

WILDERNESS

In addition to the wilderness elements in alternative A, the Service would 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 10 and appendix E).

CULTURAL and PALEONTOLOGICAL RESOURCES

Cultural resources and paleontological resources would be protected as identified in alternative A.

Cultural Resources

Same as alternative B.

Paleontological Resources

Similar to alternative B.

REFUGE OPERATIONS and PARTNERSHIPS

The vision and goals would be met through proportionate refuge operations and the refuge's collaboration with many partners.

Refuge Operations

The refuge relies on personnel, equipment, and facilities to carry out both the day-to-day operations along with the long-term programs.

Personnel. Same as alternative C.

Equipment and Facilities. In addition to elements in alternative A, the Service would expand facilities at Jordan Field Station and provide more office space at Jordan and Sand Creek Field Stations. A bunkhouse would be built at Fort Peck Field Station. The Service would collaborate with others to develop a science and interpretive center at Sand Creek Field Station.

Minerals. Same as alternative B.

Partnerships and Collaboration

In addition to the partnerships and collaboration elements in alternatives B and C, the Service would seek ways to highlight refuge resources including the use of promotional materials.

3.8 OBJECTIVES and STRATEGIES

As discussed in sections 3.1 and 3.3 above, the alternatives stemmed from the planning goals identified in chapter 2. This section describes the specific objectives that would achieve the goals and meet the emphasis of each alternative. Objectives are concise statements of what needs to be achieved; how much, when, and where it would be achieved; and who would be responsible. 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 begin following the record of decision for the final CCP and will occur over 15 years.

Objectives provide the basis for determining strategies, monitoring refuge accomplishments, and evaluating success in meeting the goals. Strategies are specific tools or techniques used to carry out the objectives. An explanation, or rationale, for each objective describes how and why the objective's actions are important to achieving the associated goal in conjunction with the alternative's emphasis.

Each goal title is listed below, followed by the associated objectives, rationale, and strategies for each of the four alternatives, A–D. Where an objec-

tive or strategy is similar or the same as for another alternative, this has been noted and for conciseness it is generally not repeated.

ORGANIZATION of the OBJECTIVES and STRATEGIES

The goals are intricately linked in managing habitat, wildlife, and water resources; therefore, the objectives for all these goals are grouped in this section under two topics, habitat and wildlife.

The habitat objectives are split into four vegetation categories: upland, river bottom, riparian area and wetland, and shoreline. There are other objectives for the major factors that influence habitat: invasive species, prescribed fire, wildfire, and climate change.

While the habitat objectives would 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 bighorn 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 threatened and endangered species and species of concern are for the following species: black-footed ferret, least tern, pallid sturgeon, piping plover, grizzly bear, black-tailed prairie dog, greater sage-grouse, mountain plover, burrowing owl, sicklefin chub, and sturgeon chub.

FOCAL, TARGET, and SENTINEL SPECIES

It is important to understand the designations for species the Service 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 would also support western meadowlark, but an area that supports western meadowlark would 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 huntable 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.



USFWS

Refuge staff monitor plants on the refuge.

OBJECTIVES for HABITAT and WILDLIFE

HABITAT—UPLAND

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.

Prescriptive livestock grazing, as described below, is one of the strategies the Service uses, where appropriate, to achieve upland habitat objectives.

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 could 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.

Each alternative would 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 habitat management plans 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.

Chapter 1, section 1.2, has more information on the Service's biological integrity policy. Chapter 4, section 4.3, describes the history of livestock grazing on the refuge and upland vegetation monitoring.

Objectives for Upland Habitat, Alternative A

In large part, existing habitat objectives and strategies are based on the decisions resulting from the record of decision on the 1986 resource management plan and EIS for the refuge (FWS 1986). Although many actions have been carried out, under alternative A the upland habitat would be managed accord-

ing to direction set by this earlier plan. The 1986 plan blended objectives and strategies, and these were separated to the extent practical to more closely follow the below format used in current CCPs. Rationale statements were pulled from the 1986 plan or are based on direction stemming from the plan.

Upland A1. Over 15 years, continue to manage refuge habitats in the 65 habitat units (see figure 16 in chapter 4) that were originally established by BLM for grazing purposes and that were based on habitat management plans (HMPs) developed in the early 1990s.

Rationale for Upland A1. Each HMP describes wildlife habitat issues and provides specific management actions—such as grazing seasons of use, prescribed fire, planting, and rest—to correct problems from grazing if necessary. These actions would continue to be coordinated with BLM in joint pastures; the plans recognized that BLM and the Service have different management objectives for livestock grazing (FWS 1986).

Upland A2. By 2013, increase the quantity and quality of deciduous shrubs using prescribed fire on about 1,900 acres and on 7,700 acres by 2028.

Upland A3. By 2013, plant shrubs on about 100 acres and on 500 acres by 2028.

Upland A4. Over 15 years, continue planting shrubs on about 25–30 acres per year.

Rationale for Upland A2–A4. Habitat analysis shows that deciduous shrub species are declining in both in abundance and vigor on the refuge (see chapter 4, section 4.3), and historical accounts indicate shrubs were once more abundant than current conditions. HMPs would determine the best means of reestablishing shrubs in each habitat unit: management actions would require adjustments in grazing, prescribed fire, and planting, in that order. Shrubs would be planted to reestablish a seed source for natural revegetation, and it is estimated that this would involve about 25 acres per year depending on the success of grazing adjustments and prescribed fire. Following prescribed fire or planting, grazing would not be allowed until plants are successfully established.

The specified number of AUMs is based on what would have been permitted if all grazing permittees exercised their full permitted AUMs. Since implementation of the 1986 record of decision, several ranches have sold. Furthermore, livestock grazing permits do not transfer with the sale of a ranch (FWS 1982; *Schwenke v. Secretary of the Interior*, 720 F.2d 571, Ninth Circuit Court of Appeals, 1983).

The 1986 record of decision called for livestock grazing to be substantially reduced to improve habitat conditions for wildlife. Each habitat unit (see figure 16 in chapter 4) was examined in terms of existing range conditions, slope, water, and soil limitations. Concurrently, the Service evaluated wildlife habitat conditions by habitat unit and noted deficiencies. In most areas where evaluation showed existing livestock–wildlife conflicts, limitations of slope, water,

and soil were the reason for the necessary grazing change. In the remaining areas, grazing adjustments allowed the achievement of applicable wildlife objectives. This process found that light grazing (0- to 35-percent utilization) coupled with various seasons of use would achieve the diversity of habitat conditions mandated by the refuge goals and objectives. Most livestock grazing would continue on a seasonal basis (winter, spring, summer, fall, or combination of seasons), although spring turn-in dates would be later and grazing would be reduced to light stocking levels. Early spring use would be ended.

The use of livestock grazing as a management tool would provide habitat conditions to benefit particular wildlife species. In years of below-average forage production due to drought, fire, insects, or other natural causes, grazing permits might be suspended in whole or in part to minimize damage to habitat and wildlife resources.

About 425 miles of fence have been constructed between 1986 and 2009, and more fence may be required. Fence would be constructed where necessary to achieve objectives; the location of fences would be decided after consultation among the concerned parties.

About 34 percent of the refuge is now considered to be managed prescriptively (see figure 16 in chapter 4). Based on the rate of change since 1990 when habitat management plans were initially completed, it is estimated that, within 15 years, 50 percent or more of the refuge’s habitat units would be managed prescriptively.

Strategies for Upland A1–A4 Many of these strategies are the tools selected in the record of decision from the 1986 EIS.

- By 2013, fence at least one habitat unit. Fence other parts of the boundary if problems arise with unauthorized livestock use. Construct only a limited amount of interior fencing.
- Over 15 years, continue a gradual move toward prescriptive grazing (on 50 percent or more of the refuge). Make the transition only when units become available through sale of a ranch to a third party or habitat evaluations are completed, or both, and when prescriptive grazing is identified as necessary to meet wildlife or habitat objectives. (Refer to the prescriptive grazing text box for a definition and description.)
- Over 15 years, use grazing at current levels to keep existing plant communities at desired habitat conditions at light livestock grazing levels.
- Over 15 years, conduct a monitoring program to figure out if more changes in grazing would need to be made on specific areas not responding to upland management.

- Construct fences where necessary to achieve agency objectives, with locations to be decided after consultation among the concerned parties from when HMPs were written.
- Construct fences in the best and most practical locations.
- Construct boundary fence to be 42 inches high and three-strand with 12 inches between wires. In areas where pronghorn would likely encounter fences, place the bottom wire 18 inches above the ground and use smooth wire (Paige 2008).
- Potentially locate new water facilities or apply grazing systems designed to meet objectives for both the Service and BLM in suitable common pastures.
- Upgrade habitat evaluation criteria as information becomes available.
- Continue inventorying and monitoring wildlife and habitat at existing levels including monitoring of residual cover and sentinel plants.
- Establish sampling techniques to monitor at prescribed intervals the long-term changes in wildlife habitat and range conditions. Use different treatments for habitat if evaluations show that wildlife objectives were not met.
- Phase out cooperative farming and haying along bottomlands of the Missouri River. Use lure cropping (planting crops to draw elk to those areas) on the refuge's west end to decrease elk depredation on adjoining private croplands. Install about 6 miles of fence (900 acres) to protect selected riparian areas from livestock and enhance shrub reproduction.
- End sheep grazing on the refuge unless needed on a prescriptive basis to manipulate vegetation.
- Continued to emphasize big game management, annual livestock grazing, fencing, invasive species control, and water development.

Objectives for Upland Habitat, Alternative B

The Service would manage the upland grassland-shrub mosaic and conifer-grassland mosaic with prescriptive grazing and prescribed fire. The management emphasis would be on single target wildlife species or focal bird species in separate uplands of the refuge, largely based on the recommendations of Olaus Murie's original biological assessment (refer to chapter 4). Management criteria would focus on the food, protection, and water needs of each target wildlife species or focal bird species (refer to bird objectives, which follow habitat objectives, for a description of focal bird species). Where needed, using artificial food resources would be provided to promote wildlife populations. Refer to the prescriptive grazing explanation in the introduction for "Habitat—Upland" objectives.

Upland B1. Within 3 years, develop new HMPs for target or focal bird species (primarily elk, pronghorn, and sharp-tailed grouse) that are defined in Olaus Murie's 1935 biological assessment (refer to chapter 4). Base HMPs on habitat units that are ecologically similar. Develop specific habitat evaluation and management plans for each sentinel and target species or focal bird species.

Upland B2. Within 3 years, in cooperation with universities, the Natural Resources Conservation Service (NRCS), and other partner scientists and statisticians, continue to develop and modify methods to identify, inventory, and monitor habitat needs and management actions for target species or focal bird species.

Upland B3. Over 15 years on 30–50 percent of the refuge, improve overall habitat conditions based on HDPs and sentinel plant monitoring where 70-percent residual cover is achieved with viable populations of sentinel plant species by managing herbivory through time and place (to achieve 25–50 percent of selected populations of sentinel species that reach the height and fruit-bearing potential in locations without physical protection on all four sides of plants).

Upland B4. Within 5 years, work with range ecologists and biostatisticians to establish a protocol to assess wildlife habitat conditions. Every 7–10 years, monitor habitat health to evaluate conditions for meeting wildlife needs.

Upland B5. Over 15 years, maintain existing densities or populations of fire-intolerant big sagebrush on fire refugia to support sage-dependent species in each of the habitat units to restore shrub diversity in the shrub-steppe uplands.

Rationale for Upland B1–B5. Much of the focus for the upland objectives is based on the earliest assessment of the refuge and surrounding area. In August 1935, Olaus J. Murie, a renowned wildlife biologist for the U.S. Biological Survey (eventually the U.S. Fish and Wildlife Service), traveled to the proposed game range and filed his Report on the Fort Peck Migratory Bird Refuge (Murie 1935). This report was the first biological assessment of the existence and abundance of plants and wildlife species. Murie documented the abundance of many plants—yellow pine or ponderosa pine, cottonwood, willow, juniper, grasses including grama grasses, buffaloberry, and snowberry—along with wildlife species including mule deer, white-tailed deer, pronghorn, black-footed ferret, coyote, and sharp-tailed grouse. Additionally, Murie identified species (elk, bison, and Audubon bighorn sheep) for which he found evidence of earlier occupation, and he discussed whether they could or should be reintroduced. Murie's biological assess-



Dave Menke / USFWS

Upland habitat is important to the lazuli bunting.

ment would be used to inform the basis for the target wildlife species or focal bird species emphasized under alternative B.

While several habitat units have recovered from past abuse, current monitoring has identified several units that are not meeting their stated habitat objectives as identified in 1986 EIS and associated HMPs. Alternative B would remove annual livestock grazing from the refuge in all habitat units that are fenced separately from surrounding lands. Only prescriptive grazing would be permitted; the transition would occur within 4–7 years of plan implementation. Continuing construction of the refuge boundary fence would be a priority so that all refuge lands would have the potential for best wildlife management practices. Removal of interior fencing would also be a priority due to the ending of annual grazing; interior fences would be removed from units enrolled into prescriptive grazing to facilitate the movement of all ungulates. Prescriptive grazing practices could then be applied to larger areas if needed. Fence removal and construction would be an ongoing process that would take time and would need to be prioritized. As a

result, the Service estimates that only 75 percent of the refuge would convert to prescriptive grazing; however, if money and resources allowed, more areas would be converted over 15 years.

Reducing the number of HMPs and developing HMPs along field station boundaries or units that are ecologically similar would increase efficiency in managing for a prescriptive grazing and fire regime. The habitat needs (food, water, and cover) for each target or focal species would be provided across large landscapes. Managing in larger habitat blocks instead of 65 fenced units would (1) allow for increased long-distance animal movement (animals move greater distances to seek the best forage due to patch burns), and (2) enable the refuge to target the differing habitat needs (food, cover, and water) of each target species.

Wildlife population surveys and habitat surveys would show improving or worsening conditions for focal wildlife populations. Additionally, surveys would provide measures of the success of habitat treatments using the HDP method and procedures developed to monitor the food, protection, and water needs of each focal wildlife species. The HDP method records 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 a measure of residual cover remaining after livestock grazing has occurred.

Sentinel plant species (refer to appendix F) 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.

Viable populations should include large collections of sentinel plants that are mature and bearing abundant fruit or seeds, young plants recently sprouted from seed, and all intermediate stages. While sentinel species would not be emphasized under this alternative, they would still be included. Service personnel are working with Oklahoma State University, WEST, Incorporated, and NRCS to develop monitoring techniques for sentinel plants. This work would identify the key sentinel plant species for fire and herbivory, evaluate various survey techniques, and develop methods for measuring changes in populations and robustness. Refer to the rationale under alternative D for more discussion about sentinel plants.

Strategies for Upland B1–B5

- Within 4–7 years, develop a prescriptive livestock-grazing plan for 50–75 percent of the refuge in all locations where boundary fences or cooperative agreements with wildlife conservation partners exist.
- Over 15 years, fence 50–75 percent of the unfenced refuge boundary or the boundary established with wildlife conservation partners.
- Over 15 years, evaluate the success of management treatments with population surveys or habitat surveys (height–density plots [HDPs] or sentinel plants [refer to appendix F], or both). Develop adaptive management strategies (refer to section 3.12 and figure 11) if wildlife populations or habitats are not responding as anticipated.
- Within 2 years, determine the habitat needs and current conditions for focal wildlife species on specific sites.
- Continue to work with range ecologists and use existing knowledge from current monitoring to develop adaptive management strategies as new information is acquired.
- Continue current HDP readings and conduct HDP surveys to measure residual cover within 25–50 percent of the areas currently absent of livestock.
- Within 3 years, develop new HMPs based on recommendations found in Olaus Murie’s field notes. In HMPs, include effective implementation of new management strategies (such as prescriptive grazing, prescribed fire and wildfire return, habitat monitoring and enhancement, and food plots) that promote desired habitat conditions.
- Within 4–7 years, carry out prescriptive grazing, prescribed fire, and habitat restoration and consider the use of artificial food resources to promote wildlife populations with emphasis on single-species management based on recommendations in Olaus Murie’s original biological assessment.
- In cooperation with universities, NRCS, and other partner scientists and statisticians, continue to develop and modify methods to identify, inventory, and monitor sentinel plant species.
- Identify areas for implementing pyric herbivory to restore historical fire-return intervals and the fire–grazing interaction including concentrated herbivory coupled with long periods of abandonment (rest) to increase the amount and diversity of palatable plants to reduce selectivity for sentinel species.
- If monitoring for the population viability of herbivory-sensitive sentinel plant species within a unit shows a declining population, take the following actions: (1) stop prescriptive livestock

- grazing in the unit; and (2) cooperate with MFWP to manage elk, deer, and bighorn sheep to meet objectives in MFWP’s management plans for the Missouri River Breaks. Where monitoring shows habitat conditions and sentinel plants are stable, work with MFWP to manage for higher deer and elk populations (refer to objectives for big game).
- Evaluate success of habitat treatments by using HDPs and sentinel plant monitoring in permanently established trend sites to assess the population viability of all plant species and structural heterogeneity of the landscape.
- Over 15 years, remove 25–50 percent of the interior fences where prescriptive grazing is fully implemented and construct refuge boundary fences where absent, on priority basis. Possibly expand boundary fences to include partner lands that share the same objectives and strategies.
- Hire seasonal employees for fence removal and professional fence builders for boundary fence construction of remaining fences (the remaining boundary fences are located in the most difficult terrain).
- Implement prescriptive grazing across 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. Because it is possible that prescriptive grazing practices on Service lands may negatively affect current permittees that graze BLM, DNRC, and other Service lands, work with DNRC as budgets allow to mitigate any loss of revenue by assuming leases on these pastures. (Same as C and D).
- Manage with MFWP the total ungulate effects collectively rather than each species alone.

Objectives for Upland Habitat, Alternative C

The Service would manage the present habitat units to improve habitat condition with domestic and wild ungulates as defined by NRCS ecological site condition and management guidelines.

Upland C1. Within 7 years, develop new HMPs (based on factors such as soil characteristics, historical fire occurrence, grazing, and field station boundaries) in cooperation with NRCS. Within HMPs, include fencing for better livestock distribution, water development, prescriptive grazing, and other management techniques designed to improve habitat condition. (Refer to the prescriptive grazing explanation in the introduction for “Habitat—Upland” objectives.)

Upland C2. Within 3–6 years, in cooperation with NRCS, conduct ecological site evaluations on habitat units with boundary fences that permit control over livestock numbers and management. Continue cur-

rent HDP surveys and conduct surveys in 50 percent of the areas currently absent of livestock to measure residual cover.

Upland C3. Over 15 years, develop pyric herbivory (relying on fire and wildlife grazing interaction) programs for habitat units where boundary fences or cooperative agreements with wildlife conservation partners exist and where physical features allow for efficient use of fire as a management tool.

Upland C4. 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 3.12 and figure 11). Adhere to the Service's information quality guidelines and peer review of scientific information (FWS 2011a). (Same as Upland D3.)

Upland C5. Over 15 years, improve habitat conditions, based on HDPs and sentinel plant monitoring, on 20–40 percent of the refuge. Manage habitat conditions for a minimum of 70-percent residual cover and viable populations of sentinel species where 30–60 percent of selected sentinel species populations are able to reach height and fruit-bearing potential in locations without physical protection on all four sides of plants.

Upland C6. 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). (Same as Upland D4.)

Upland C7. Over 15 years, increase both the population viability and a 1- to 5-percent increase in coverage by winterfat, saltbush, grey rubber rabbitbrush, and other fire-adapted sentinel species on sites with remnants of these species.

Upland C8. 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). (Same as Upland D6.)

Upland C9. Over 15 years, increase both the population viability and a 1- to 5-percent increase in cov-

erage by purple prairieclover, white prairieclover, dotted gayfeather, purple coneflower, stiff sunflower, and other sentinel forb species as appropriate to sites with remnants of these species across 5–10 percent of the refuge.

Rationale for Upland C1–C9. Alternative C would keep livestock in habitat units that are currently permitted to local, family ranch operations. Some highly nutritious plant species such as saltbush, white prairieclover, and golden currant are highly preferred by both livestock and wild ungulates. These same plant species are also important to pollinators, birds (for seeds and insects), and other wildlife species. Livestock and wild ungulates are competitive for sentinel plant species, the first to decline from herbivory. To preserve and restore biodiversity to the extent possible, wild ungulate numbers may need to be reduced.

HMPs would include fencing for better livestock distribution, water development, rotational grazing, and other management techniques designed to improve range condition.

As habitat units become vacant (no livestock), they may be combined with other vacant or permitted units to carry out a prescriptive grazing program, prescribed fire, or other habitat restoration tools to achieve excellent range condition, based primarily on the health of the grass community. Range condition would be improving if range communities were kept at, or moving toward, an ecological site condition rating of high (NRCS 2003). Ecological sites that are similar to the historical or potential community have a higher condition rating than dissimilar sites. Ecological sites are based on soil, moisture, and vegetation potentials of different parts of the landscape.

Strategies for Upland C1–C9

- Over 15 years, carry out a prescriptive grazing program on up to 50 percent of the refuge by continuing the practice of holding grazing permits as ranches sell their lands to outside parties.
- Within 3–6 years, determine the species of plants first to decline (sentinel species) due to herbivory and fire and due to lack of herbivory and fire in areas absent of livestock. Continue current HDP surveys and conduct HDP surveys within 50 percent of the areas currently absent of livestock to measure residual cover.
- In cooperation with universities, NRCS, and other partner scientists and statisticians, continue to develop and monitor methods to identify, inventory, and monitor sentinel plant species.
- Over 15 years, carry out a prescriptive grazing program on about 50 percent or more of the habitat units by continuing the practice of holding grazing permits as ranches sell their lands to outside parties.

- Improve the population viability of herbivory-sensitive sentinel plant species in three ways: ungulate number control, prescribed fire, and periods of rest.
- If monitoring for the population viability of herbivory-sensitive sentinel plant species shows a declining population, cooperate with MFWP to manage deer, elk, and bighorn sheep to meet the objectives in MFWP's management plans for the Missouri River Breaks.
- Manage all species of ungulates (wild and domestic) collectively and work cooperatively with others to address the effects of all ungulates rather than address each species alone. Where annual livestock grazing is permitted, compensate for the livestock forage use where and when possible by reducing the wild ungulate population levels.
- In habitat units with prescriptive livestock grazing only, manage the landscape with pyric herbivory to restore historical fire-return intervals and the fire-grazing interaction.
- In habitat units with prescriptive livestock grazing only, use 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 (to achieve population viability of all species and structural heterogeneity of the landscape) with a focus on sentinel plant species, HDPs, and population viability analysis at permanently established trend sites.
- As HMPs for prescriptive grazing are developed for vacant habitat units, remove interior fences within the units where only prescriptive livestock grazing is permitted and construct refuge boundary fences where absent. Potentially expand boundary fences to include partner lands that share the same objectives and strategies. Coordinate the construction of boundary fences to facilitate a move to a prescriptive grazing program with BLM, DNRC, and local ranches.
- Hire seasonal employees for fence removal and professional fence builders for boundary fence construction of remaining fences, which are located in the most difficult terrain.
- Implement prescriptive grazing across 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. 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 miti-

gate any loss of revenue by assuming leases on these pastures. (Same as B and D.)

Objectives for Upland Habitat, Alternative D

The Service would promote ecological resilience, restore the pyric herbivory, promote animal movement with long periods of abandonment to reduce plant species selectivity, and increase landscape species and structural heterogeneity, and improve wildlife diversity. The objectives also address the goals identified in the Service's Climate Change Strategic Plan (FWS 2010c). 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 would complement the Service's efforts toward bird conservation and protecting and enhancing threatened and endangered species and species of concern (refer to chapter 1, section 1.4). 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 objectives for birds that follow the habitat section and section 4.3 in chapter 4).

Upland D1. 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 Upland D7 and its rationale for a definition of success. Refer to the prescriptive grazing explanation in the introduction for "Habitat—Upland" objectives.)

Upland D2. 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 D3. Same as Upland C4.

Upland D4. Same as Upland C6.

Upland D5. 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. (See the end of Upland D7 for criteria for successful implementation.)

Upland D6. Same as Upland C8.

Upland D7. 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 habitat of the focal bird species identified in the bird objectives.

Successful implementation of Upland D5–D7 objectives would be 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 D1–D7. As described under alternative B, 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 alternative D 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 would 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 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 (Myserud 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).



Jeff McMillan / USDA-NRCS PLANTS Database

Maximilian Sunflower

As part of the actions needed to improve the resiliency of the refuge's habitats, alternative D emphasizes restoration of the environmental processes, plants, and animals that have been damaged. This alternative calls strongly for the 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 would be measured with sentinel species. More discussion on sentinel plants is in chapter 4, section 4.3. A list of the sentinel species is in appendix F.

When declining trends are found or when competition for resources results in habitat damage, livestock numbers would 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. Much of the fencing work that remains is in rugged terrain, and the work would need to be prioritized. As money and resources allowed, the refuge would continue to convert to prescriptive grazing over 15 years.

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 18 in chapter 4 shows the fire frequency intervals found on the refuge. This map would 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. See the bird objectives below for more literature about focal birds.

Upland health would be restored on the refuge by reestablishment of historical fire-return intervals and the historical fire–grazing interaction. There would 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 would protect sagebrush areas that are important for greater sage-grouse (refer to prescribed fire objectives below).

Inventory and monitoring procedures would focus on sentinel plant species and focal bird species that have been most severely affected. Monitoring would also include the grasses and other plants to ensure that all species' populations are viable.

Strategies for Upland D1–D9

- Within 2–4 years, fully determine the species of plants that are first to decline and the cause of the decline (refer to appendix F for the list of existing sentinel species). Tie habitat monitoring to focal bird species monitoring (for more information, refer to bird objectives below; chapter 4, section 4.3; and appendix F).
- 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, continue 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 would 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. (Same as C and D).

- 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.

HABITAT—RIVER BOTTOM

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 4). 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 would consist of a healthy native plant community including those that would have 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.

Objectives for River Bottom Habitat, Alternative A

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.

River Bottom A1. Over 15 years, continue working with partners and pursuing outside funding to restore native plants to river bottoms.

Rationale for River Bottom A1. A healthy diverse native plant community in the river bottoms would 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 nonnative species and create many more niches than that of monoculture food plots or invasive plants.

Restoring river bottoms with native species would 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 would promote resilience and resist invasive species invasions in the future.

Strategies for River Bottom A1

- Start five to seven small, bottomland, restoration projects over 15 years.
- Continue to restrict livestock from all bottomlands.

Objectives for River Bottom Habitat, Alternative B

Similar to upland objectives for alternative B, three bird species, all migratory birds, were selected as focal species 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 the bird objectives for alternatives B and D below; chapter 4, section 4.3; and appendix F.

River Bottom B1. 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 for food plot potential. Develop a comprehensive plan that identifies methods and timeframes for completing each phase.

River Bottom B2. Within 2–4 years, work with NRCS and cooperators to develop treatment plans for each bottomland, which address equipment needs, grants, partnerships, and a farming plan and identify types of food plots to be planted at each site to maximize game populations.

River Bottom B3. Within 3–5 years, begin implementing the approved management plan on the first river bottom on the priority list.

River Bottom B4. Over 15 years, complete a minimum of 30–40 percent of the identified projects for invasive plant removal. If time, personnel, and funding allows, start one new river bottom per year until all identified bottoms have a food plot present.

River Bottom B5. Over 15 years, continue to monitor and spot treat all invasive plants that may become established after removal of invasive plants is completed.

Rationale for River Bottom B1–B5. An aggressive approach toward removing invasive plants would be taken. Work would include burning, discrete spraying with herbicides and planting wildlife food crops to clear invasive plants (Anderson 1985). An herbicide such as Roundup® would be used initially to kill invasive grasses such as smooth brome and quackgrass. Following this, a broadleaf herbicide could be used if needed, unless invasive grasses encroach again. A short-term grazing application could be nec-

essary in areas where herbicides cannot be used or where it would be beneficial to control invasive species (FWS 2011b). When the bottoms are treated and replanted to wildlife food crops, they would attract elk, deer, upland birds, and waterfowl. Wildlife numbers should increase with food plots and, therefore, allow for more hunting opportunities.

Strategies for River Bottom B1–B5

- Plant the lower priority bottoms to nongenetically modified organism alfalfa or grain crops to remove invasive plants and provide wildlife value.
- 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 would 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.

Objectives for River Bottom Habitat, Alternative C

River Bottom C1. Within 4–6 years, identify all river bottoms in need of invasive plant removal and develop plans for each. Include use of cooperative farmers to complete invasive plant removal work using a variety of methods including seeding of native plants and possible nongenetically modified organism crops

such as alfalfa or other cereal grain (use Roundup® initially to treat an area before planting).

River Bottom C2. Over 15 years, complete 50–60 percent of the identified projects for invasive plant removal (to restore these areas to healthy, native plant communities that are essential for wildlife habitat and resistance to invasive plant invasions; Colorado State Parks 1998).

Rationale for River Bottom C1–C2. The Service would rely on partnerships with cooperative farmers to restore the river bottoms. The use of cooperative farmers with the necessary equipment and knowledge would allow the Service to treat more areas in less time and with fewer refuge resources. Initially, there could be a short-term increase in the use of chemicals like Roundup® to kill invasive grasses like smooth brome or quackgrass, but this would soon be eliminated so plants would not build up a resistance to it. Other herbicides like Milestone™ would be used for spot spraying. Only nongenetically modified organism crops would be allowed for planting, due to the likelihood of weeds becoming resistant to treatment. The number of weed removal projects would depend on the number of local farms interested in entering into cooperative farming contracts with the refuge. Short-term livestock grazing could be used in areas where herbicides cannot be used or where it would be beneficial to control invasive species (FWS 2011b).

The refuge would reinstate farming on river bottoms for up to 15 years so local individuals could get an economic benefit from the crops produced while weed seeds were eliminated. A contract inspector would be hired to discuss options with contractors and ensure that the terms of the special use permit were being followed.

Wildlife and people would benefit from the reduction in invasive plants and the eventual return of a healthy native plant community.

Strategies for River Bottom C1–C2

- Continue restricting domestic livestock grazing in the river bottoms.
- Continue invasive plant removal of river bottoms already in progress.
- Solicit interested parties to farm river bottoms in need of invasive plant removal, and, if money permits, hire a biological technician knowledgeable in invasive plant removal work to oversee all removal of these plants in river bottoms.
- After invasive plant removal plans are developed, solicit and identify individuals and cooperators interested in farming the river bottoms in need of invasive plant removal and develop cooperative farming contracts (contracts to contain acceptable methods to be used for invasive plant

removal of river bottoms, for example, the area to be plowed on each individually identified river bottom, herbicides acceptable for use, crops that can be planted, invasive plant reduction necessary, time tables for replanting native seed mixtures, and penalties to be incurred if the contract is not fulfilled).

- Identify the native plant mixture to be planted at the end of the contract and use penalties if the contractor defaults on the contract.
- Maintain roads and repair access roads to river bottoms as needed (some may be service roads only).
- On the third year, contract holders begin reducing the invasive plants present by spraying or plowing predetermined areas and by planting them with mutually agreed-on crops (crop production becomes the property of the contract holder following compatibility determination).
- Use ecological site descriptions prepared by NRCS as a baseline for determining grass and forb planting mixture, but change as necessary to promote sustainable big game populations. Purchase seed mixture for planting by a contractor or cooperator.
- On contract completion, plant native shrubs and trees and protect the new plantings from browsing with exclosures until they are able to grow out of the browse zone.
- Over 15 years, monitor and spot treat all invasive plants that may become established.

Objectives for River Bottom Habitat, Alternative D

Similar to upland objectives for alternative D, three 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 the bird objectives for alternatives B and D below; objectives for threatened and endangered species and species of concern below; chapter 4, section 4.3; and appendix F.

River Bottom D1. Similar to B1, except food plots would not be used for restoration, but work could be contracted.

River Bottom D2. 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 D3. Within 3–5 years, begin implementing the approved restoration plan on the first river bottom on the priority list.

River Bottom D4. 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 D5. 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 D1–D5. The approach toward removing invasive plants in river bottoms would be slightly less aggressive than in alternative B and would be more gradually carried out. This is due to the expense and time needed to establish native 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.

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 would be highly competitive with nonnatives (Riley and Wilkinson 2007). NRCS' ecological site description has a complete list of native plants that most likely occurred on these sites (NRCS 2009).

Refuge staff would 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 D1–D5. Similar to B, except:

- 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.

HABITAT—RIPARIAN AREA and WETLAND

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). Considering the importance of riparian areas, the alternatives similarly emphasize the maintenance or restoration of healthy riparian zones.

Objectives for Riparian Area and Wetland Habitat, Alternative A

Alternative A would continue managing riparian areas according to actions or directions set in the 1986 EIS, even though many have already been implemented.

Riparian Area and Wetland A1. Over 15 years, continue managing migratory bird habitats (riparian areas) first for production and then for use during migration.

Riparian Area and Wetland A2. Over 15 years, continue improving and maintaining riparian habitat on the Missouri and Musselshell Rivers and other suitable riparian areas in good to excellent condition to benefit wildlife species such as elk, white-tailed deer, raccoons, beaver, waterfowl, kingbirds, mourning doves, American kestrels, and turkeys.

Rationale for Riparian Area and Wetland A1–A2. Keeping with the priorities and direction set by the 1986 record of decision through HMPs, livestock grazing would be managed to promote waterfowl habitat in good or excellent condition. Livestock ponds would be maintained and new ones constructed.

Fencing would 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.

A contractor was hired in 1995–97 to evaluate riparian conditions and was hired for the 2009 season to conduct a survey that reevaluated current riparian conditions and function and compared them to earlier surveys (Ecological Solutions Group 2009). Another contractor was hired to monitor the effects of the enclosure on Rock Creek (refer to chapter 4). Restoration practices such as shrub and tree plantings were started in Rock Creek/Bug Creek Habitat Unit, Hawley Creek and Telegraph Creek areas. A local group of farmers and ranchers along the Lower Musselshell River hired the same contractor to design a riparian area monitoring plan and gather baseline data from Mosby to the refuge at Fort Peck Reservoir. Additionally, USGS

conducted a 5-year study to gage streams on the refuge (Sando et al. 2009). Montana Department of Environmental Quality conducted water quality sampling on the refuge in 2006–07 (refer to chapter 4).

Strategies for Riparian Area and Wetland A1–A2. None.

Objectives for Riparian Area and Wetland Habitat, Alternative B

Similar to upland and river bottom habitats, 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. For more information about the objectives for these species, refer to the bird objectives for alternatives B and D below; objectives for threatened and endangered species and species of concern below; chapter 4, section 4.3; and appendix F. The following objectives are targeted toward improving riparian area and wetland conditions for all wildlife species on the refuge.

Riparian Area and Wetland B1. 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 85 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 95 percent of the reaches assessed as “functioning” (healthy) in the 2009 survey (Ecological Solutions Group 2009) at that level.

Riparian Area and Wetland B2. 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. (Same as Riparian Area and Wetland D2.)

Any stock pond removal would depend on the outcome of the adjudication of water rights through the Montana Reserved Compact Commission (refer to chapter 4, section 4.2, “Water Resources”). 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 B3. 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. (Same as Riparian Area and Wetland D3.)

Riparian Area and Wetland B4. 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). (Same as Riparian Area and Wetland C5 and D4.)

Riparian Area and Wetland B5. 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). (Same as Riparian Area and Wetland C6 and D5.)

Riparian Area and Wetland B6. 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 would be occurring (Paige 2008). (Same as Riparian Area and Wetland C7 and D6.)

Riparian Area and Wetland B7. Over 15 years, identify locations along riverbanks in need of stabilization and revegetation and restore 50 percent of those locations. Adhere to all regulatory permitting requirements.

Riparian Area and Wetland B8. Within 7–10 years, describe the habitat requirements of the focal species and carry out the habitat and population monitoring protocol on 25–50 percent of the river. Over 15 years, further develop the program on 50–75 percent of the refuge and ensure monitoring is tied to focal bird species as described under the bird objectives below.

Rationale for Riparian Area and Wetland B1–B8. The first priority for riparian area restoration would be 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 would vary depending on the condition and trend of the riparian-wetland habitat. Considerations should include the potential of 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 would 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 B1–B8

- 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 would evaluate 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.

Objectives for Riparian Area and Wetland Habitat, Alternative C

Riparian Area and Wetland C1. 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 60 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 85 percent of the reaches assessed as “functioning” (healthy) in the 2009 survey (Ecological Solutions Group 2009) at that level.

Riparian Area and Wetland C2. Within 10 years, evaluate current stock ponds and determine which ponds need to be rehabilitated or eliminated and determine if more ponds are needed to meet NRCS range conditions across the unit. For those reservoirs and stock ponds that cannot be removed due to species of concern, maintain or improve these areas for fishing or livestock use. (See strategies for pond management.)

Riparian Area and Wetland C3. Within 5 years, determine the potential of selected sites and desired plant community to stabilize streambanks and eliminate hoof bank-shearing.

Riparian Area and Wetland C4. Over 15 years on priority streams, raise the elevation of the present water table; improve or maintain water quality and quan-

tity; stabilize the streambanks; and establish proper stream channels, streambanks, and floodplain conditions and functions.

Riparian Area and Wetland C5. Same as Riparian Area and Wetland B4 and D4.

Riparian Area and Wetland C6. Same as Riparian Area and Wetland B5 and D5.

Riparian Area and Wetland C7. Same as Riparian Area and Wetland B6 and D6.

Riparian Area and Wetland C8. Same as Riparian Area and Wetland D7.

Rationale for Riparian Area and Wetland C1–C8. Similar to alternative B, except fewer miles of streams would improve to the next condition due to a slower transition to prescriptive grazing. Management of riparian resources is geared toward maximizing livestock grazing and recreation while keeping a balance with other needs. Service resources would be allocated with the priority on improving ponds for livestock and recreation, only indirectly benefiting wildlife. With those resources, more ponds could be established using pond management. Fewer resources under large river objectives would be available for revegetation, restoration, and monitoring. Also, no resources would go toward restoring natural hydrology of first-, second-, and third-order streams.

Historical grazing by large herds of wild 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 (Van Vuren 1981, Fuhlendorf et al. 2008) 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).

Strategies for Riparian Area and Wetland C1–C8. Same as B, plus:

- Monitor utilization annually, but determine progress in reaching long-term resource objectives (such as streambank stabilization, rebuilding of the streamside aquifer, and the reestablishment of beaver or fish habitat) over a longer period. Develop targets for riparian-wetland areas that would do the following:
 - maintain both herbaceous species and woody species, where present, in a healthy and vigorous state and promote their ability to reproduce and maintain different age classes in the desired riparian-wetland plant community
 - leave sufficient plant residue necessary to protect streambanks during runoff events and provide for adequate sediment filtering, and dissipation of floodwater energy

- be consistent with other resource values and objectives such as for aesthetics, water quality, water quantity, and wildlife populations
- limit streambank shearing and trampling to acceptable levels

- Stock ponds with predatory largemouth bass and prey species such as bluegill, yellow perch, golden shiners, or fathead minnows (stocking rates are 100 2-inch largemouth bass per acre and 500 1-inch bluegill per acre (FWS 1994b)). Protect populations for 5 years.
- Use techniques in “A Guide for Building and Managing Private Fish Ponds in Montana” (MFWP 2006a) to address water quantity and quality; watershed and soil analysis; design and construction including contour, depth, and water exchange; excavation; revegetation; stocking; and pond management.

Objectives for Riparian Area and Wetland Habitat, Alternative D

Similar to upland and river bottom, several focal bird species have been identified for monitoring the health of riparian and wetland areas: ovenbird, Cordilleran flycatcher, black-billed cuckoo, and western wood-pewee. Refer to the bird objectives for alternatives B and D below; objectives for threatened, and endangered species and species of concern below; chapter 4, section 4.3; and appendix F.

Riparian Area and Wetland D1. 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 D2–D3. Same as Riparian Area and Wetland B2–B3.

Riparian Area and Wetland D4. Same as Riparian Area and Wetland B4 and C5.

Riparian Area and Wetland D5. Same as Riparian Area and Wetland B5 and C6.

Riparian Area and Wetland D6. Same as Riparian Area and Wetland B6 and C7.

Riparian Area and Wetland D7. Over 15 years, provide alternate water sources for cattle away from riparian areas and sensitive upland sites, on a pri-

ority basis, where prescriptive grazing is needed to accomplish habitat objectives.

Riparian Area and Wetland D8. 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 D9. Over 15 years, restore natural hydrology of five first-, second-, and third-order streams that would normally flow into the Missouri and Musselshell Rivers.

Rationale and Strategies for Riparian Area and Wetland D1–D9. Similar to B, but slightly fewer miles may be improved due to a less aggressive schedule for implementing prescriptive grazing. All restoration would be incorporated into focal bird species monitoring.

HABITAT—SHORELINE

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.

Objectives for Shoreline Habitat, Alternative A

No objectives were developed for the 1986 EIS for shoreline management. Currently, the Service does not manage the shoreline but does cooperate with USACE in their efforts to treat invasive species along the shoreline.

Shoreline A1. 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. (Same as Shoreline B1, C1, and D1.)

Rationale for Shoreline A1. 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 would 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 would 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



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The spotted sandpiper uses shoreline habitat.

would continue to collaborate with USACE in treating saltcedar, both above and below the high water line. The invasive species discussion below has more details.

(Same as B, C, and D.)

Strategies for Shoreline A1. None.

Objectives for Shoreline Habitat, Alternative B

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. USACE has primary jurisdiction for management of the lakeshore.

Shoreline B1. Same as Shoreline A1, C1, and D1.

Shoreline B2. 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. (Same as Shoreline A2, C2, and D2.)

Rationale for Shoreline B1–B2. The actions would be similar to alternative A, but treating invasive species would be more aggressive.

Strategies for Shoreline B1–B2

- 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 funds 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 funds are 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.

Objectives for Shoreline Habitat, Alternative C

Shoreline C1. Same as Shoreline A1, B1, and D1.

Shoreline C2. As funding permits, cooperate with any potential partners—such as USACE, nongovernmental organizations, neighboring counties, and the State of Montana—in treating a minimum of 250 acres of invasive plant species per year that colonize Fort Peck Reservoir and Missouri River shorelines.

Rationale for Shoreline C1–C2. Same as A, except the Service would work with others to treat more areas of the shoreline.

Strategies for Shoreline C1–C2. Same as B.

Objectives for Shoreline Habitat, Alternative D

Shoreline D1. Same as Shoreline A1, B1, and C1.

Shoreline D2. Same as Shoreline B2.

Rationale and Strategies for Shoreline D1–D2. Same as B.

HABITAT—FIRE MANAGEMENT

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.

Prescribed Fire

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 that would accomplish 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.

Objectives for Prescribed Fire, Alternative A

Prescribed Fire A1. Continue with the 1986 record of decision strategy of treating existing plant communities with prescribed fire to achieve desired habitat conditions.

Rationale for Prescribed Fire A1. Habitat analysis shows some deciduous shrubs have diminished on the refuge, and historical accounts indicate shrubs were once more abundant than they are today. A combination of actions would be taken to improve the present situation; these actions could include adjustments in livestock grazing, burning, and planting.

Strategies for Prescribed Fire A1

- (From the 1986 EIS) Increase the quality and quantity of deciduous shrubs by prescribed burning 525 acres per year. Following burning or planting, allow no livestock grazing for 2–3 years or longer, if necessary, to ensure successful establishment of desired vegetation.

- Carry out a prescribed fire program to protect fragile habitats, valuable coniferous areas, important wildlife habitats, recreational developments, and other private and refuge developments.

Objectives for Prescribed Fire, Alternative B

Prescribed Fire B1. Within 2–4 years, revise the fire management plan.

Prescribed Fire B2. Within 5 years, determine priority units where prescribed fire would be used to meet the habitat needs of target species or focal bird species or where needed to reduce hazardous fuel. (Same as Prescribed Fire D2.)

Prescribed Fire B3. 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. (Same as Prescribed Fire D3.)

Prescribed Fire B4. Within 5–7 years, develop prescribed fire plans for the major habitat units.

Prescribed Fire B5. 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 would be adversely affected by prescribed fire and incorporate into the fire management plan. (Same as Prescribed Fire C4 and D5.)

Prescribed Fire B6. 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. (Same as Prescribed Fire C5 and D6.)

Prescribed Fire B7. 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. (Same as Prescribed Fire C6 and D7.)

Prescribed Fire B8. 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. (Same as Prescribed Fire D8.)

Rationale for Prescribed Fire B1–B8. See the rationale under “Habitat—Upland” for alternative B 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 would be protected from fire when possible. Within 1–2 years, refuge biologists would evaluate such areas and provide fire managers with a detailed map of the essential habitat to be protected, which would be taken into account in prescribed fire and wildfire plans. For example, prescribed fire would 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 would evaluate these areas for possible reduction of hazardous fuel and treat identified areas with prescribed fire or mechanical thinning, or both.

Similar to C, with exceptions described under alternative C. Same as D.

Strategies for Prescribed Fire B1–B8

- 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 would be additions to the current staff). These individuals would 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. (Same as D.)
- 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. (Same as D.)
- 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. (Same as C and D.)
- 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. (Same as C and D.)

- Contract a fire planner to develop plans pertaining to the use of wildland fire that would cover all burnable acres on the refuge. (Same as C and D.)
- 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. (Same as C and D.)
- 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. (Same as C and D.)

Objectives for Prescribed Fire, Alternative C

Prescribed Fire C1. Within 5 years, develop prescribed fire plans for habitat units with prescriptive livestock grazing to apply pyric herbivory management for sentinel plants.

Prescribed Fire C2. Within 15 years, initiate a prescribed fire program in habitat units where vegetation palatability and composition has been identified as fair to poor or where there are large amounts of



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A small, low-intensity prescribed fire in 2008.

hazardous fuel, or both, to improve range health and increase use of plant biomass by grazing ungulates.

Prescribed Fire C3. Over 15 years, work with partners and cooperators to reduce the risk of wildfire and negative economic effects to permittees by reducing the fuel load in habitat units through a combination of prescriptive livestock grazing and prescribed fire. Strike a balance between the needs of wildlife and improved forage for livestock.

Prescribed Fire C4. Same as Prescribed Fire B5.

Prescribed Fire C5. Same as Prescribed Fire B6 and D6.

Prescribed Fire C6. Same as Prescribed Fire B7 and D7.

Rationale for Prescribed Fire C1–C6. Similar to B, except there is more emphasis given to the economic effects of burning large units and units with active livestock grazing systems. Pastures without permit holders or where the permittee has taken voluntary non-use would be the primary criteria for selecting prescribed fire units.

Strategies for Prescribed Fire C1–C6. Same as B, plus:

- In cooperation with universities, partner scientists, and staff biologists, evaluate declining rangelands for the feasibility of using prescribed fire as a habitat management tool to improve range conditions and increase the use of plant biomass by grazing ungulates.
- Enhance the fire organization with an increase of fire staff and prescribed fire competency: two prescribed fire burn bosses (type 2) and five prescribed fire seasonal employees. These additions to current staff would write burn plans and carry out a prescribed fire program.
- Within 5 years, contract with private vendors for 2,000 acres of mechanical fuel reduction in old-growth forests that are prone to a fire frequency of 70–150 years, with emphasis on habitat units that have the highest risk of loss to catastrophic wildfire.

Objectives for Prescribed Fire, Alternative D

Prescribed Fire D1. Same as Prescribed Fire B1.

Prescribed Fire D2. 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 D3. Same as Prescribed Fire B3.

Prescribed Fire D4. 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 would be any negative effects on species or critical habitat.

Prescribed Fire D5. Same as Prescribed Fire B5.

Prescribed Fire D6. Same as Prescribed Fire B6 and C5.

Prescribed Fire D7. Same as Prescribed Fire B7 and C6.

Prescribed Fire D8. Same as Prescribed Fire B8.

Rationale for Prescribed Fire D1–D8. Same as B.

Strategies for Prescribed Fire D1–D8. Similar to B, except:

- 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 would (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 the bird objectives below).

Wildfire

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.

Objectives for Wildfire, Alternative A

Wildfire A1. Within 15 years, revise the fire management plan and carry out a fire program that provides for a response strategy for wildfire with the primary objective of protecting fragile habitats, valuable coniferous areas, critical wildlife habitats, recreational developments, and other private and refuge developments consistent with resource objectives.

Rationale for Wildfire A1. Wildfire is a natural component of a healthy ecosystem. The Service has long recognized the many ecological benefits of fire in restoring, maintaining, and enhancing refuge lands. Keeping this

capability is critical to the Service mission because most Service lands, including the refuge, evolved with fire as a natural disturbance. Not all wildfires are detrimental, nor should they be suppressed at all costs. It is important to evaluate wildfires for opportunities to use modified suppression tactics to promote natural processes.

Strategies for Wildfire A1

- Evaluate each wildfire to determine the safest and most economical and beneficial manner for suppression. This strategy may entail allowing a fire to burn toward natural barriers such as the river, lake, or bare clay ridges, while taking full suppression action on other areas of the fire (FWS 2004b). In addition, this strategy may result in a larger fire but could provide resource benefits.
- Aggressively suppress that part of any fire that threatens to burn off the refuge unless there is an agreement in place to do otherwise.

Objectives for Wildfire, Alternative B

Wildfire B1. 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. (Same as Wildfire D1.)

Wildfire B2. Within 10 years, develop maps to identify areas with the highest potential of success for reestablishment of fire on the landscape, using available scientific data on natural fire intervals, prescribed fire plans, and recent fire data.

Wildfire B3. 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. (Same as Wildfire C3 and D3.)

Wildfire B4. 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 would protect them as high-value resources (often called “point protection”). (Same as Wildfire C4 and D4.)

Wildfire B5. 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. (Same as Wildfire D5.)

Wildfire B6. 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. (Same as Wildfire D6.)

Wildfire B7. Within 1 year, identify areas of critical habitat for endangered species and species of concern that would be adversely impacted by fire. Fully suppress fires in these areas. (Same as Wildfire D7.)

Rationale for Wildfire B1–B7. 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 would 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 would help return natural processes to the Missouri River Breaks ecosystem. Wildfire management, in concert with a monitoring program and aggressive use of prescribed fire, would ensure the protection of areas with higher fire-return intervals.

The Service would 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 would 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 B1–B7

- Take necessary actions, according to an approved fire management plan, to maintain public and firefighter safety above all else. (Same as C and D.)
- 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. (Same as D.)

- Monitor the effects of fire on habitat and wildlife populations. (Same as D.)
- 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. (Same as D.)
- 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. (Same as D.)
- 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. (Same as D.)

Objectives for Wildfire, Alternative C

Wildfire C1. Within 2 years, revise the fire management plan to retain, improve, or expand the refuge's capabilities to protect refuge resources and assist in local fire management.

Wildfire C2. Over 15 years, manage wildfires to aggressively suppress to the smallest acreage in the most cost-effective manner.

Wildfire C3–C4. Same as Wildfire B3–B4 and D3–D4.

Wildfire C5. Within 2 years, review, update, and execute cooperative agreements with BLM, DNRC, the six counties, and nongovernmental organizations. Conduct an annual meeting to discuss the capabilities of each partner.

Rationale for Wildfire C1–C5. Although wildfire is a natural function in the refuge's ecosystems, it can also be the biggest threat to those ecosystems. Natural fire regimes have been altered extensively on the refuge and have been replaced by frequent, large, and intense wildfires. This alteration is due to humans. A subsequent effect has been the infestation of invasive plants such as cheatgrass, which cures earlier in the year than native bunchgrasses and can lengthen the fire season.

An effective fire management plan is crucial to the long-term conservation of refuge resources and protection of private property. The existing plan would require revision. Wildfires on the refuge could potentially have negative economic, habitat, and resource effects that could threaten life, property, and sensitive resources. Having adequate resources to contain and extinguish large fires is critical to the long-term preservation of natural, cultural, and recreational resources.

Strategies for Wildfire C1–C5

- Aggressively respond to wildfire by using the full range of suppression resources to keep fires at the smallest acreage possible and have at least 97 percent of the fires controlled within 24 hours of reported ignition. Use whatever means possible—such as heavy air tankers (retardant), single-engine air tankers (retardant, foam, or water), aviation personnel, smokejumpers, and hand crews—to ensure fires do not escape initial attack.
- Within 5 years, increase permanent and seasonal firefighting personnel by 50 percent.
- Within 5 years, increase the Sand Creek fire cache of firefighting equipment to an amount sufficient for the staff to respond to at least two major fires per year.
- Within 10 years, build fire caches at the Jordan and Fort Peck Field Stations to house fire engines and firefighting equipment sufficient to respond to suppression needs.
- Over 15 years, upgrade the fleet of fire engines by adding at least one new engine every 5–7 years to replace old engines, and add one engine.

Objectives for Wildfire, Alternative D

Wildfire D1. Same as Wildfire B1.

Wildfire D2. 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 D3–D4. Same as Wildfire B3–B4 and C3–C4.

Wildfire D5–D7. Same as Wildfire B5–B7.

Rationale for Wildfire D1–D7. Same as B.

Strategies for Wildfire D1–D7. Same as B, plus:

- 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.

HABITAT—INVASIVE SPECIES

Invasive species objectives apply to both woody and nonwoody invasive plants and aquatic invasives such as zebra mussels.

Objectives for Invasive Species, Alternative A

Invasive Species A1. 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. (Same as Invasive Species B1, C1, and D1.)

Rationale for Invasive Species A1. 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 would 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 A1. None.

Objectives for Invasive Species, Alternative B

Invasive Species B1. Same as Invasive Species A1, C1, and D1.

Invasive Species B2. Within 1–3 years, develop an integrated pest management plan (stepdown plan) for control of invasive plants. (Same as Invasive Species C2 and D2.)

Invasive Species B3. Within 5–7 years, map current infestations, and develop a strategy to achieve a 25-percent reduction in acres affected by noxious nonwoody plants. (Same as Invasive Species C3 and D3.)

Invasive Species B4. Over 15 years, achieve a 25- to 50-percent reduction in acres affected by noxious nonwoody plants. (Same as Invasive Species C4 and D4.)

Invasive Species B5. Within 5–7 years, target further encroachment of invasive woody plants (such as saltcedar and Russian olive) on Fort Peck lakeshores and bays. (Same as Invasive Species C5 and D5.)

Invasive Species B6. 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. (Same as Invasive Species C6 and D6.)

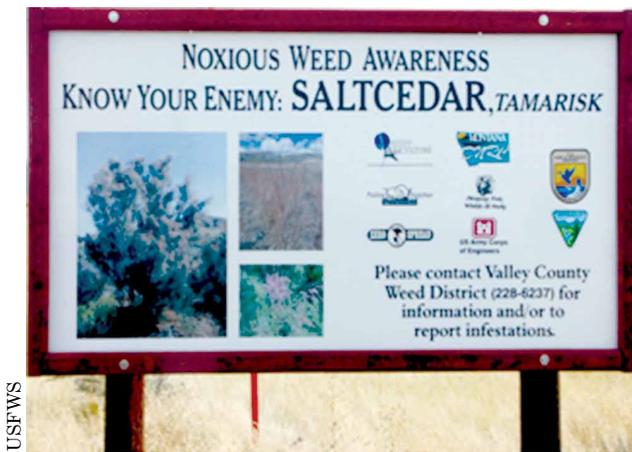
Invasive Species B7. Over 15 years, measure trends of invasive species not classified as noxious including Japanese brome, sweetclover, and cheatgrass. Implement adaptive management as appropriate. (Same as Invasive Species C7 and D7.)

Invasive Species B8. 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. (Same as Invasive Species C8 and D8.)

Invasive Species B9. Continue current educational and monitoring efforts in cooperation with MFWP and USACE (same as Invasive Species C9 and D9). Prevent further spread of aquatic invasive species through 2027.

Rationale for Invasive Species B1–B9. 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.



USFWS

Saltcedar is the most prolific invasive species found on the refuge.

Strategies for Invasive Species B1–B9

- 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, 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 would be more resilient to invasive plants.
- Use short-term livestock grazing applications (prescriptive) to treat infested areas (FWS 2011b).

Objectives for Invasive Species, Alternative C

Invasive Species C1. Same as Invasive Species A1, B1, and D1.

Invasive Species C2–C9. Same as Invasive Species B2–B9 and D2–D9.

Rationale for Invasive Species C1–C9. Same as B and D.

Strategies for Invasive Species C1–C9. Same as B, plus:

- Increase law enforcement of weed-free hay regulations.

Objectives for Invasive Species, Alternative D

Invasive Species D1. Same as Invasive Species A1, B1, and C1.

Invasive Species D2–D9. Same as Invasive Species B2–B9 and C2–C9.

Rationale for Invasive Species D1–D9. Same as B and C.

Strategies for Invasive Species D1–D9. Same as B.

HABITAT—CLIMATE CHANGE

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 Climate Change

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.

National Climate Change

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.

Climate Change Influence in the Great Plains

The refuge is located in the northwestern Great Plains. As in much of the rest of the Nation, the Great Plains 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. The final CCP will be in place in 2020.

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.

Objectives for Climate Change, Alternative A

Climate Change A1. 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.
- (Same as Climate Change B1, C1, and D1.)

Rationale for Climate Change A1. The Service would implement climate change objectives within the existing habitat management practices.

Strategies for Climate Change A1

- Continue maintaining a small wind turbine, recycling effort, 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.

Objectives for Climate Change, Alternative B

Climate Change B1. Same as Climate Change A1, C1, and D1.

Climate Change B2. 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. (Same as Climate Change C2 and D2.)

Rationale for Climate Change B1–B2. 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 would 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 would 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 would 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 would 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 would 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 would be developed through partnerships with the landscape conservation cooperative sphere of influence (refer to chapter 1, section 1.5).

The refuge would 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 would be 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 would 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 would 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 would focus much of the research on pyrogenic carbon sequestered in the soil from fire. Fire is also important for the climate resilience associated with diversity of species and succession (DeLuca and Aplet 2008, DeLuca et al. 2006, DeLuca and Sala 2006).

The refuge would 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 would include a focus on carbon sequestration, monitoring, and management and on climate sentinels, ecological-process sentinels, and resilience adaptation.

Strategies for Climate Change B1–B2

- 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.

Objectives for Climate Change, Alternative C

Climate Change C1. Same as Climate Change A1, B1, and D1.

Climate Change C2. Same as Climate Change B2 and D2.

Rationale and Strategies for Climate Change C1–C2. Same as B.

Objectives for Climate Change, Alternative D

Climate Change D1. Same as Climate Change A1, B1, and C1.

Climate Change D2. Same as Climate Change B2 and C2.

Rationale and Strategies for Climate Change D1–D2. Same as B.

WILDLIFE—BIRDS

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.

Objectives for Birds, Alternative A

The 1986 EIS identified the following objectives.

Birds A1. Maintain existing migration habitat for bald eagles and determine the feasibility of establishing a breeding population.

Birds A2. Improve and maintain habitat for sharp-tailed grouse and associated species in good to excellent condition in the ponderosa pine–juniper, juniper, and grass–deciduous shrub types to support (on suitable areas) 30 spring breeding birds per square mile (males and females) over 15 years when weather, predation life cycles, and other natural factors permit.

Birds A3. Improve and maintain riparian habitat on the Missouri and Musselshell Rivers and other suitable riparian areas in good to excellent condition to benefit waterfowl, kingbirds, mourning doves, American kestrels, and turkeys.

Birds A4. Over 15 years, maintain a minimum of two peregrine falcon eyries.

Birds A5. Over 15 years, improve waterfowl habitat so that it is in good to excellent condition on all suitable ponds.

Rationale and Strategies for Bird A1–A5. None.

Objectives for Birds, Alternative B

In 2005, the Service initiated the focal species strategy to better measure success in achieving its bird conservation priorities and mandates. The bird objectives are closely associated with the habitat objectives identified above.

Birds B1. 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. (Same as Birds C1 and D1.)

Birds B2. Within 8–15 years, repeat the bird atlas on the refuge and establish a permanent, refugewide bird-monitoring program and describe the sentinel plant associations and complete habitat requirements of 75 percent of priority focal bird species. Base the final list of focal bird species on the results of the bird atlas.

Birds B3. 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. (Same as Birds C3 and D3.)

Rationale for Birds B1–B3. 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



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Sharp-tailed grouse is one of the focal species for upland habitat.

Table 3. Focal bird species for uplands at the Charles M. Russell and UL Bend Refuges.

<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>

Table 3. Focal bird species for uplands at the Charles M. Russell and UL Bend Refuges.

<i>Breeding habitat*</i>	<i>Sentinel plant association</i>
BAIRD'S SPARROW	
<i>Associated bird species*</i> : ferruginous hawk, horned lark, clay-colored sparrow, Brewer's sparrow, western meadowlark, brown-headed cowbird	
<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	
HABITAT: Mixed native-grass prairie with scattered low shrubs (<25%) and residual vegetation; returns to burns after 3 years	FORBS: purple coneflower stiff sunflower dotted gayfeather white prairieclover purple prairieclover Maximilian sunflower
MICROHABITAT: Ungrazed to moderate grazing with high forb coverage	
NEST SITE: On the ground in tall vegetation, oftentimes at the base of shrubs	
FOOD: Insects and some seeds; insects gleaned from grass and forbs; forages on the ground between grass clumps	
WINTER FOOD and HABITAT: Not applicable	
GREATER SAGE-GROUSE	
<i>Associated bird species*</i> : No data available from the refuge	
<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	
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	FORBS: purple coneflower stiff sunflower dotted gayfeather white prairieclover purple prairieclover Maximilian sunflower SHRUBS: big sagebrush (fire sentinel)
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	
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	
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	
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	
SHARP-TAILED GROUSE	
<i>Associated bird species*</i> : mourning dove, vesper sparrow, grasshopper sparrow, western meadowlark	
<i>Species of concern lists</i> : Montana Partners in Flight	
HABITAT: Dense herbaceous cover and shrubs mixed with grass	FORBS: purple coneflower stiff sunflower dotted gayfeather white prairieclover purple prairieclover Maximilian sunflower SHRUBS and TREES: silver buffaloberry aspens peachleaf willow chokecherry
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	
NEST SITE: Under or near shrubs or small trees or thick and taller residual grass cover	
FOOD: Forbs, grasses, insects (ants crickets, moths, grasshoppers, and beetles), fruits, and flowers; forages in areas dominated by forbs and sparse grass cover	
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	

* *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 4. Focal bird species for river bottoms at the Charles M. Russell and UL Bend Refuges.

<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 5. Focal bird species for riparian areas and wetlands at the Charles M. Russell and UL Bend Refuges.

	<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 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		SHRUBS and TREES: plains cottonwood green ash Douglas-fir
CORDILLERAN FLYCATCHER	<i>Associated bird species*</i> : Unknown <i>Species of concern lists</i> : Montana Partners in Flight	
HABITAT: Forest on or near streams 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		SHRUBS and TREES: ponderosa pine Douglas-fir aspen plains cottonwood peachleaf willow
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 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		SHRUBS and TREES: chokecherry boxelder green ash plains cottonwood aspen peachleaf willow
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 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		SHRUBS and TREES: plains cottonwood green ash aspen

* 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).

were reviewed to determine birds of conservation concern that use this habitat during breeding, non-breeding, and migration. The refuge does not currently 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 3, 4, and 5) 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 would also support 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 invertebrates) 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, would 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 (Tscharntke 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 F) 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) communities. 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 would be the measures of success or failure. Refer to chapter 4, section 4.3, 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 3): 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 4)—were selected based on the following:

- nests on the refuge
- is identified as needing conservation action
- 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 5)—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 Birds B1–B3

- 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.

Objectives for Birds, Alternative C

Birds C1. Same as Birds B1 and D1.

Birds C2. Within 8–15 years, repeat the bird atlas on the refuge to help establish a permanent, refugewide, bird-monitoring program. Determine and describe sentinel plant associations and habitat needs of 50 percent of high-priority and focal bird species, which would be based on results of the bird atlas.

Birds C3. Same as Birds B3 and D3.

Birds C4. Within 5 years, determine greater sage-grouse and sharp-tail grouse distribution, nesting densities and nesting success in upland prairie areas of the refuge and relate these to the effects of management alternatives, such as burning and grazing, and sentinel species.

Rationale for Birds C1–C4. Same as B, plus designating sharp-tailed and greater sage-grouse as focal species for other grassland birds (Vodehnal and Hauffer 2007) because they are year-round residents and because they have relatively large home ranges and require vast acreages of quality grassland to sustain their populations. In February 2010, greater sage-grouse was listed as “warranted but precluded” under the Endangered Species Act (refer to chapter 4, section 4.3). Although sharp-tailed grouse are not currently listed on any agency status lists, historical records show a marked decrease in this species.

Greater sage-grouse and sharp-tailed grouse evolved with a diversity of ecological communities

that were formed by two main influences: (1) many different ecological sites; and (2) the disturbances, such as fire and grazing by native species, on these sites. Restoring and keeping these species, as well as other high-priority grassland species, means understanding, managing, and restoring these diverse grass and shrub ecosystems (Vodehnal and Haufler 2007).

Strategies for Birds C1–C4

- Conduct a refuge-wide 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 need is being met during each season of the year.
- Within 2 years, work with partners to refine the current monitoring program for greater sage-grouse and sharp-tailed grouse and continue yearly monitoring of both species.
- Within 5 years, determine, inventory, and monitor the needs for the current dancing ground and the nesting, brood-rearing, foraging, and fall–winter habitats for greater sage-grouse and sharp-tailed grouse on a year-round basis, including habitat and management information in each of the four general habitat types on the refuge.

Objectives for Birds, Alternative D

Birds D1. Same as Birds B1 and C1.

Birds D2. 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.

Birds D3. Same as Birds B3 and C3.

Birds D4. Same as Birds C4.

Rationale and Strategies for Birds D1–D4. Same as B.



USFWS

Endangered Black-footed Ferret

WILDLIFE—THREATENED and ENDANGERED SPECIES and SPECIES OF CONCERN

Threatened and endangered species of importance that are found on the refuge are black-footed ferret (endangered), least tern (endangered), pallid sturgeon (endangered), and piping plover (threatened). 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, and Sprague's pipit (candidate).

Objectives for Threatened and Endangered Species (TES) and Species of Concern, Alternative A

TES and Species of Concern A1 (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. (Same as TES and Species of Concern B1, C1, and D1.)

TES and Species of Concern A2 (black-footed ferret). Over 15 years, continue the black-footed ferret recovery effort including releasing animals, intensive monitoring, and disease and habitat management.

TES and Species of Concern A3 (black-footed ferret). Maintain viable prairie dog towns of no less than 5,000 acres and no more than 10,000 acres on suitable areas, with sizes and patterns desirable for black-footed ferrets.

Rationale and Strategies for TES and Species of Concern A1–A3. None.

Objectives for TES and Species of Concern, Alternative B

TES and Species of Concern B1 (black-footed ferret). Same as TES and Species of Concern A1, C1, and D1.

TES and Species of Concern B2 (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. (Same as TES and Species of Concern C2 and D2.)

TES and Species of Concern B3 (black-footed ferret). Continue the monitoring of the existing UL Bend population and consider additional releases of captive-reared ferrets. (Same as TES and Species of Concern C3 and D3.)

Rationale for TES and Species of Concern B1–B3 (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 would contribute 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 would collaborate with them on ferret recovery activities where possible.

(Same as D.)

Strategies for TES and Species of Concern B1–B3 (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 pro-



Piping Plover

Gene Nieminen / USFWS

vide 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 B4 (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. (Same as TES and Species of Concern D4.)

TES and Species of Concern B5 (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. (Same as TES and Species of Concern C5 and D5.)

Rationale for TES and Species of Concern B4–B5 (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. (Same as D.)

TES and Species of Concern B6 (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. (Same as TES and Species of Concern C6 and D6.)

TES and Species of Concern B7 (pallid sturgeon). Over 15 years, work cooperatively with partners to mon-

itor populations of pallid sturgeons. (Same as TES and Species of Concern C7 and D7.)

TES and Species of Concern B8 (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. (Same as TES and Species of Concern C8 and D8.)

Rationale for TES and Species of Concern B8 (grizzly bear). This refuge-specific plan is being developed in case grizzly bear naturally recolonize the refuge. The philosophy of the plan under this alternative would be to promote grizzly bear abundance, within ecological constraints, and to provide for recreational viewing opportunities. Grizzly bears would provide natural predation pressure on large ungulates and influence their movement around the refuge.

Strategies for TES and Species of Concern B8 (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 B9 (black-tailed prairie dog). Over 15 years, continue protection, restoration and expansion of black-tailed prairie dog populations refugewide to maximize occupancy of potential habitat. (Same as TES and Species of Concern C9 and D9.)

TES and Species of Concern B10 (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. (Same as TES and Species of Concern C10 and D10.)

TES and Species of Concern B11 (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. (Same as TES and Species of Concern D11.)

Strategies for TES and Species of Concern B9–B11 (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 B12 (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. (Same as TES and Species of Concern C12 and D12.)

Rationale for TES and Species of Concern B12 (greater sage-grouse). In 2010, the Service determined 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 the bird objectives 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 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 would continue to protect essential habitat, particularly important breeding areas during prescribed fire and wildfire operations (refer to habitat and fire management objectives and strategies above for more details). 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 chapter 4, section 4.3). A primary objective in the CCP is to reduce severe wildfires, increase plant diversity, and provide a mosaic of habitats. The habitat objectives and strategies described above would 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 would 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 would continue to be allowed. Additionally, the Service would work with other partners across the region to protect and enhance sage-grouse habitat.

Strategies for TES and Species of Concern B12 (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 B13 (mountain plover). Over 15 years, continue to promote prairie dog towns to provide habitat for mountain plovers and other prairie dog-dependent species. (Same as TES and Species of Concern C13 and D13.)

Strategies for TES and Species of Concern B13 (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 B14 (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. (Same as TES and Species of Concern C14 and D14.)

Rationale for TES and Species of Concern B14 (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). (Same as D.)

Strategy for TES and Species of Concern B14 (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 B15 (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. (Same as TES and Species of Concern D14.)

Rationale for TES and Species of Concern B1–B15. 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 sta-

tus species for management. Limited resources are allocated, in part, based on inventories of special status species and prioritization of management needs.

Consistent with the theme of alternative B, resources would 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.

(Same as D.)

Strategies for TES and Species of Concern B1–B15.

Same as C and D, except:

- 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 would 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 funds to hire more seasonal employees to conduct amphibian monitoring and turtle monitoring.
- See riparian area and wetland section above for strategies to improve riparian habitats that would benefit amphibians.

TES and Species of Concern B16 (Sprague's pipit). Over 15 years, map locations of Sprague's pipit found on the refuge. (Same as TES and Species of Concern C16.)

Rationale for TES and Species of Concern B16 (Sprague's pipit). In September 2010, the Service reviewed the conservation status of the Sprague's pipit to determine 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 would 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 non-native 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 would 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 B16 (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.

Objectives for TES and Species of Concern, Alternative C

TES and Species of Concern C1–C3 (black-footed ferret). Same as TES and Species of Concern A1, B1–B3, and D1–D3.

Rationale and Strategies for TES and Species of Concern C1–C3 (black-footed ferret). Same as B and D.

TES and Species of Concern C4 (least tern). On plan approval and depending on lake levels, work with USACE to maintain suitable least tern nesting habitats.

TES and Species of Concern C5 (piping plover). Same as TES and Species of Concern B5 and D5.

Rationale and Strategy for TES and Species of Concern C4–C5 (least tern and piping plover). Same as B and D, except:

- Do not restrict livestock grazing on beaches beyond current levels.

TES and Species of Concern C6–C7 (pallid sturgeon). Same as TES and Species of Concern B6–B7 and D6–D7.

TES and Species of Concern C8 (grizzly bear). Same as TES and Species of Concern B8 and D8.

TES and Species of Concern C9–C10 (black-tailed prairie dog). Same as TES and Species of Concern B9–B10 and D9–D10.

TES and Species of Concern 11 (black-tailed prairie dog). GPS map all prairie dog colonies on the refuge every 5 years.

Rationale and Strategies for TES and Species of Concern C9–C11 (black-tailed prairie dog). Same as B and D, plus:

- Continue attending Montana and local prairie dog management meetings and help MFWP carry out their conservation plans.

TES and Species of Concern C12 (greater sage-grouse). Same as TES and Species of Concern B12 and D12, except identify two leks near each field station suitable for public viewing (refer to public use objectives below).

TES and Species of Concern C13 (mountain plover). Same as TES and Species of Concern B13 and D13.

TES and Species of Concern C14 (sicklefin chub and sturgeon chub). Same as TES and Species of Concern B14 and D14.

Rationale and Strategies for TES and Species of Concern C14 (sicklefin chub and sturgeon chub). Same as B and D.

TES and Species of Concern C15 (general). Over 15 years, protect, conserve, and enhance populations of special status and their habitats. Give priority to species that are State- or federally listed. Expand on those opportunities to provide public view of special status species and other wildlife-dependent recreation.

Rationale for TES and Species of Concern C1–C15. Same as TES and Species of Concern B, plus there is less emphasis on habitat and population recovery and monitoring and more emphasis on getting the public involved in wildlife-dependent recreational activities associated with these special status species (see objectives for public use below). Given the emphasis in this alternative, fewer resources would be spent on species recovery, but the Service would fulfill the legal and policy requirements for these species and place more emphasis on public use and enjoyment of these species.

Strategies for TES and Species of Concern C1–C15

Similar to B, except there would be emphasis on public education.

TES and Species of Concern C16 (Sprague's pipit). Same as TES and Species of Concern B16.

Rationale and Strategies for TES and Species of Concern C16 (Sprague's pipit). Same as B and D.

Objectives for TES and Species of Concern, Alternative D

TES and Species of Concern D1–D3 (black-footed ferret). Same as TES and Species of Concern A1, B1–B3, and C1–C3.

TES and Species of Concern D4 (least tern). Same as TES and Species of Concern B4.

TES and Species of Concern D5–D10 (piping plover, pallid sturgeon, grizzly bear, and black-tailed prairie dog). Same as TES and Species of Concern B5–B10 and C5–C10.

TES and Species of Concern D11 (black-tailed prairie dog). Same as TES and Species of Concern B11.

TES and Species of Concern D12 (greater sage-grouse). Same as TES and Species of Concern B12 and C12.

TES and Species of Concern D13–D14 (mountain plover, sicklefin chub, and sturgeon chub). Same as TES and Species of Concern B13–B14 and C13–C14.

TES and Species of Concern D15 (general). Same as TES and Species of Concern B15.

Rationale for TES and Species of Concern D1–D15. Same as B, except maintenance, restoration and enhancement of special status species would be used to restore natural ecological processes, which is the theme of this alternative.

Strategies for TES and Species of Concern D1–D15

Same as B.

TES and Species of Concern D16 (Sprague's pipit). Same as TES and Species of Concern B16 and C16.

Rationale and Strategies for TES and Species of Concern D16 (Sprague's pipit). Same as B and C.

WILDLIFE—FURBEARERS and SMALL PREDATORS

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).

Objectives for Furbearers and Small Predators, Alternative A

No objectives currently exist for managing furbearers; under alternative A, there would be no objectives and strategies for managing these species.

Objectives for Furbearers and Small Predators, Alternative B

Furbearers and Small Predators B1. By 2016, work with partners to determine population levels and distribution of furbearers and small predators that currently occur on the refuge.

Furbearers and Small Predators B2. 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. (Same as Furbearers and Small Predators D3.)

Furbearers and Small Predators B3. 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. (Same as Furbearers and Small Predators D7.)

Rationale for Furbearers and Small Predators B1–B3. Protection from harvest should result in maximum abundance, consistent with the focus of this alternative. 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 would 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 would 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 would help support a viable bobcat population in the Missouri River Breaks as areas around the refuge continue to be hunted.

Strategies for Furbearers and Small Predators B1–B3

- Maintain current protection and do not permit any harvest.
- Reintroduce swift fox. Fence areas to provide protection during the fox's reestablishment.
- Restore riparian communities in Missouri River tributaries to promote beaver, muskrat, river otter, and mink expansion.
- Increase law enforcement to reduce potential illegal bobcat take. (Same as D.)

Objectives for Furbearers and Small Predators, Alternative C

Furbearers and Small Predators C1. By 2014, before initiating harvest opportunities for furbearer species, develop and carry out a monitoring program to determine relative densities of regulated and unregulated furbearing species.

Furbearers and Small Predators C2. By 2016, determine minimum population levels to support sustainable harvest opportunities for furbearing species regulated by MFWP (muskrat, mink, bobcat, and beaver) consistent with providing a moderate-to-excellent opportunity for public viewing of these furbearer species.

Furbearers and Small Predators C3. Maximize sustainable harvest opportunities for furbearing species not regulated by MFWP (red fox, coyote, raccoon and badger; excluding least weasel, long-tailed weasel, and striped skunk), consistent with providing reasonable public opportunities for viewing of these furbearer species.

Rationale for Furbearers and Small Predators C1–C3.

Currently, the take of State-regulated furbearing species is not permitted on the refuge. Creating opportunity for sustainable use of these wildlife species would increase public and economic use.

Currently, for unregulated furbearing or small predator species, the take of these (with the exception of coyotes) is not permitted on the refuge. Creating opportunity for hunting and trapping of these wildlife species would increase public and economic use.

Strategies for Furbearers and Small Predators C1–C3

- Initiate studies and a monitoring program to determine populations, or indices of abundance, levels before initiating any action on opening any more furbearer species for harvest.
- Decide if trapping is appropriate and compatible with refuge purposes; if it is, complete trapping plans to allow trapping of MFWP-regulated furbearers on the refuge.
- Develop trapping plans for red fox, coyote, raccoon, and badger. Develop hunting plans for badger, raccoon, and red fox to allow the shooting of these species on the refuge.

Objectives for Furbearers and Small Predators, Alternative D

Furbearers and Small Predators D1. 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.

Furbearers and Small Predators D2. 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).

Furbearers and Small Predators D3. Same as Furbearers and Small Predators B2.

Furbearers and Small Predators D4. Within 10 years, have viable beaver populations in a minimum of two tributaries of the Missouri River on the refuge.



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American Badger

Furbearers and Small Predators D5. 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.

Furbearers and Small Predators D6. Within 1 year, end the taking of coyotes on the refuge by USDA Wildlife Services.

Furbearers and Small Predators D7. Same as Furbearers and Small Predators B3.

Rationale for Furbearers and Small Predators D1–D7. Same as B, except the Service would evaluate the harvest potential for furbearers and small predators to provide a wildlife-dependent recreational opportunity (refer to objectives under “Public Use—Hunting” below). A stable or growing population of furbearers and small predators would 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, would need to be prepared that would include a justification with population status, determination of harvest levels, and monitoring results. The proposal would be subject to additional public input and National Environmental Policy Act compliance.

U.S. Department of Agriculture (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. This activity would not be appropriate (603 FW1) under this alternative.

Strategies for Furbearers and Small Predators D1–D7

- 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. Reintroduce 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 bobcat take. (Same as B.)

- Maintain current oversight for those species already protected on the refuge. Allow hunting of red fox and coyotes.
- 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.
- Develop a standardized data sheet to collect information on furbearing animals that would be input into a newly designed database to establish a GIS layer for mapping their locations.

WILDLIFE—AMERICAN BISON RESTORATION

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 would 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 man-

agement 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 would 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 would 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.

Objectives for American Bison Restoration, Alternative A

There are no objectives under alternative A.

Objectives for American Bison Restoration, Alternative B

Bison B1. 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.

Bison B2. 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 would participate.

Bison B3. Within 1 year of framework development (see Bison B2), 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.

Bison B4. 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 B1–B4. Any reintroduction of wild bison would 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 would 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 would be associated with any such effort. Therefore, the approach under this alternative is to work cooperatively and collaboratively with others as a full partner in any proposal, with full engagement of the public.

The following strategies would be conducted concurrently with any proposal by MFWP for wild bison restoration in areas around the refuge.

Strategies for American Bison Restoration B1–B4

- 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.

(Same as D.)

Objectives for American Bison Restoration, Alternative C

Bison C1. Over 15 years, if wild bison are restored to areas outside the refuge and animals migrate into the refuge as State-managed wildlife species, adopt MFWP's management plan.

Rationale for American Bison Restoration C1. Under this alternative, the Service would not participate in an active restoration proposal for the refuge. This objective attempts to balance economic uses such as livestock grazing with wild bison restoration by not actively restoring wild bison on refuge lands, but by passively accepting wild bison as wildlife to be managed in accordance with MFWP management guidelines.

Strategy for American Bison Restoration C1

- Work with MFWP to manage habitat and population for any wild bison that migrate onto the refuge.

Objectives for American Bison Restoration, Alternative D

Bison D1–D4. Same as Bison B1–B4.

Rationale and Strategies for American Bison Restoration D1–D4. Same as B.

WILDLIFE—NORTHERN GRAY WOLF

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).

Objectives for Gray Wolf, Alternative A

Gray Wolf A1. Manage the northern gray wolf in cooperation with MFWP and in accordance with the State management plan and Service policy. (Same as Gray Wolf B1, C1, and D1.)

Rationale for Gray Wolf A1. Should the northern gray wolf naturally colonize the refuge, the Service would adopt the State's plan and follow Service policies in monitoring and managing the species. Hunting would 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. (Same as Gray Wolf B1, C1, and D1.)

Strategies for Gray Wolf A1

- 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.

(Same as B, C, and D.)

Objectives for Gray Wolf, Alternative B

Gray Wolf B1. Same as Gray Wolf A1, C1 and D1.

Rationale and Strategies for Gray Wolf B1. Same as A, C, and D.

Objectives for Gray Wolf, Alternative C

Gray Wolf C1. Same as Gray Wolf A1, B1, and D1.

Rationale and Strategies for Gray Wolf C1. Same as A, B, and D.

Objectives for Gray Wolf, Alternative D

Gray Wolf D1. Same as Gray Wolf A1, B1, and C1.

Rationale and Strategies for Gray Wolf D1. Same as A, B, and C.

WILDLIFE—BIG GAME

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.

Objectives for Big Game, Alternative A

The wildlife objectives and strategies listed for alternative A are the actions selected in the record of decision from the 1986 EIS. Alternative A would continue managing wildlife according to these actions; many have already been implemented. The 1986 EIS blended objectives and strategies, and these were separated to the extent possible to more closely follow the format used in current CCP documents.

Big Game A1 (elk). Over 15 years, maintain elk habitat in good to excellent condition, and improve security cover to a level capable of maintaining a population of 2.5 overwintering elk per square miles in the coniferous and closely associated grassland communities.

Big Game A2 (mule deer). Over 15 years, improve and maintain mule deer habitat on the refuge in sage-grassland, ponderosa pine-juniper, and grassland-deciduous shrub vegetative types in good to excellent condition to support over wintering populations of 10 deer per square mile, in a manner that would also benefit sharp-tailed grouse. (Note: 10 deer per square mile refers to the total estimated population, not the density of deer observed during aerial surveys as not all deer are detected). Continue harvest management efforts that strive to achieve a post-hunting-season, mature buck-to-doe ratio of at least 20:100 (mature is defined as bucks having four or more points on at least one antler).

Big Game A3 (pronghorn). Over 15 years, improve and maintain pronghorn winter habitat in good to excellent condition on suitable juniper and sage-grassland sites to support 1,500 wintering animals.

Big Game A4 (bighorn sheep). Over 15 years, continue to manage bighorn sheep populations and habitat to support a minimum of 160 observed animals with an average age of 7.5 years old for harvested rams.

Big Game A5 (bighorn sheep). Over 15 years, expand Rocky Mountain bighorn sheep into suitable habitat.

Rationale for Big Game A1–A5. The focal issue addressed in the 1986 EIS was livestock grazing and its effects on wildlife habitat (refer to chapter 2). Although some of the objectives from the 1986 EIS were accomplished and other objectives evolved after the EIS, the management emphasis on big game would continue (refer to chapter 4 for a discussion of current conditions). At the time of the 1986 EIS, many of the species specifically addressed were listed under the Endangered Species Act, but the Service felt it was

important to focus on some of the other ungulate species for maintaining balanced wildlife populations, supporting recreation, and contributing to the overall mission of the Refuge System.

Strategies for Big Game A1–A3.

- Continue to respond to inquiries and provide information about refuge hunting opportunities. (Same as B, C, and D.)
- 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. (Same as B, C, and D.)
- Continue to publish the refuge hunting regulations brochure to inform the public of hunting opportunities (including accessible opportunities) and refuge-specific regulations. (Same as B, C, and D.)
- Distribute the refuge's brochure more widely.
- Continue to prohibit mountain lion and predator hunting. (Same as B, C, and D.)
- Permit limited coyote hunting (mid-October through March 1).
- Continue to prohibit trapping.
- Require nontoxic shot for waterfowl hunting to reduce the incidental poisoning of nontarget wildlife. Continue to allow nontoxic or lead shot for upland gamebird and mourning dove hunting. (Same as C.)
- 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. (Same as B, C, and D.)

Objectives for Big Game, Alternative B

Big Game B1. Within 5 years, in cooperation with MFWP, develop and coordinate big game aerial surveys and research projects concerning basic ecology of all big game across the landscape surrounding the refuge.

Big Game B2 (elk and mule deer). Within 5 years of the plan's approval, work with MFWP to manage elk and mule deer populations at the highest levels possible without negatively affecting habitat or other wildlife species (refer to "Habitat—Upland" strategies for objectives B1–B8 if monitoring indicates habitat conditions are declining).

Big Game B3 (elk and mule deer). Over 15 years, manage harvest levels to result in herd sex and age ratios similar to a lightly harvested population. Manage elk harvest levels to achieve a ratio of 35–40 brow-tined bulls per 100 cows posthunting season. Manage mule deer harvest levels to achieve 35–40 adult bucks per

100 does posthunting season (all bucks older than 1.5 years old).

Big Game B4 (pronghorn). By 2015, develop winter and summer survey techniques to monitor pronghorn abundance and distribution with the aim of documenting use on the refuge by 1,500 pronghorn as called for in Executive Order 7509. (Same as Big Game C2.)

Big Game B5 (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. (Same as Big Game C3.)

Big Game B6 (bighorn sheep). Over 15 years, work with MFWP, landowners and cooperators to expand the huntable bighorn sheep population (at least 45 rams per 100 ewes with at least 30 percent of rams having a 3/4 curl and an average age of at least 6.5 years) in suitable and unoccupied habitat. (Same as Big Game C4.)

Big Game B7 (bighorn sheep). Over 15 years, manage harvest levels to result in herd sex and age ratios similar to a lightly harvested population and at the highest densities possible that do not negatively affect habitat or result in elevated risks to disease outbreaks. (Same as Big Game C5.)

Big Game B8 (bighorn sheep). Within 5–7 years, establish a huntable bighorn sheep population east of Timber Creek out onto Harpers Ridge. (Same as Big Game C6.)

Big Game B9 (bighorn sheep). Within 7–15 years, work with MFWP, cooperators, and private landowners to establish a huntable bighorn sheep population south of the Missouri River where there is about 200 square miles of suitable habitat, of which 90 percent is in public ownership (65 percent is on the refuge). (Same as Big Game C7.)

Big Game B10 (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.

Rationale for Big Game B1–B10. In 1935 Olaus Murie surveyed the Missouri River Breaks area to determine the potential for creating a refuge (refer to upland sections in chapters 3 and 4). Amid his many observations, Murie believed the west end of the refuge could support 2,000–2,500 elk, and he predicted that mule deer would continue to flourish in the pine uplands. He also believed that the 22,000-acre area on the south side of the refuge could support 400–500 bighorn sheep (Murie 1935). With this

alternative focused on maintaining abundant wildlife populations, management would focus on producing relatively large populations of big game relative to surrounding areas and expanding distribution where possible. The allowable abundance of big game animals would be determined by habitat monitoring that demonstrates any negative effects of big game on other species or their habitats.

Big game populations are highly dynamic and cover large areas in their daily and seasonal movements. Cooperation with landowners and wildlife managers is necessary to ensure that big game populations are healthy to support wildlife-dependent recreational activities. Coordination of surveys and research would ensure these populations would continue to be robust and provide the opportunity for sustained harvest. Research studies would focus on movement of animals, interaction with other ungulates, response to patch burns, browse availability, and use the data to build habitat suitability models.

Strategies for Big Game B2–B3 (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



Mule deer populations on the refuge fluctuate, and the Service has several units with more restrictive hunting regulations.

the refuge based on the ability of different areas to support big game. Regulate and monitor harvest levels. (Same as D.)

- 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 monitoring 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). (Same as C and D.)

Strategies for Big Game B4–B5 (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.

Strategies for Big Game B6–B9 (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.

Strategy for Big Game B10 (mountain lion)

- Maintain and monitor GPS and very high frequency (VHF) collars on 5–10 percent of the estimated lion population on the refuge.

Objectives for Big Game, Alternative C

Big Game C1 (elk and mule deer). Over 15 years, manage elk and deer populations at levels consistent with MFWP objectives, the capacity of adjacent private lands, and the tolerance of adjacent private landowners.

Big Game C2–C3 (pronghorn). Same as Big Game B4–B5.

Big Game C4–C7 (bighorn sheep). Same as Big Game B6–B9.

Big Game C8 (bighorn sheep). Over 15 years, manage population levels for rams and ewes as outlined in MFWP's conservation strategy for bighorn sheep.

Big Game C9 (mountain lion). Within 10 years, use population monitoring data to evaluate and implement, if warranted, a mountain lion hunt program.

Rationale for Big Game C1–C9. With the focus on recreation and public uses, management of big game resources is geared toward maximizing harvest and recreation opportunities while keeping a balance with other needs. MFWP management is geared toward achieving this objective (MFWP 2004).

Strategy for Big Game C1–C9

- Adopt MFWP population objectives and hunting seasons and regulations for those species for which harvest is currently allowed on the refuge. Adjust harvest levels in response to habitat conditions, sporting group desires, and social tolerance of adjacent landowners.

Strategies for Big Game C1 (elk and deer)

- Adopt MFWP adaptive mule deer harvest approach, basing conservative, standard or liberal harvest regulations on long-term average densities and fawn recruitment trends.
- Continue with chronic wasting disease monitoring. (Same as Big Game B and D.)

Objectives for Big Game, Alternative D

Big Game D1. 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.

Big Game D2 (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.

Big Game D3 (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.

Big Game D4 (mountain lion). Same as Big Game B10, except consider harvest if monitoring shows a limited harvest could be sustained (refer to objectives and rationale under “Public Use—Hunting”).

Rationale for Big Game D1–D4. 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 would be established through habitat management plans and tailored to regional habitat conditions, productivity, and other considerations. The objectives would 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 of this alternative, 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 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 section 4.5 in “Chapter 4—Affected Environment”). 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, would 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 would be 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, refer to figure 37 in “Chapter 4—Affected Environment”).

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.

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.

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.

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 would consider a limited harvest (refer to objectives for “Public Use—Hunting” and chapter 4, section 4.3). 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) would need to be prepared that would include a justification including the population status, determination of harvest levels, and monitoring results. The proposal would require compliance with National Environmental Protection Act.

Strategies for Big Game D1–D4. Similar to B, except:

- In collaboration with partners, use previous survey data and habitat modeling to tailor big game density objectives that reflect varied habitat capabilities.
- 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.

WILDLIFE—OTHER WILDLIFE

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.

Objectives for Other Wildlife, Alternative A

There are no objectives under alternative A.

Objectives for Other Wildlife, Alternative B

Other Wildlife B1. 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. (Same as Other Wildlife C1 and D1.)

Rationale for Other Wildlife B1. 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 would 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 would 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.

(Same as D.)

Strategies for Other Wildlife B1

- 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.

(Same as D.)

Objectives for Other Wildlife, Alternative C

Other Wildlife C1. Same as Other Wildlife B1 and D1.

Other Wildlife C2. Over 15 years, place a management emphasis on those species of fish, amphibians and reptiles that are of recreational interest.

Other Wildlife C3. Over 15 years, work with partners to enhance populations of paddlefish, and increase fishing opportunities by stocking livestock ponds and reservoirs that would support a fisheries.

Rationale for Other Wildlife C1–C3. Same as B and D plus, in 2006, recreational sport fishing to the refuge contributed 2.1 million dollars in revenue to local communities (Carver and Caudill 2007). Providing more fishing opportunities should increase recreational fishing visits to the area. Restoring riparian areas with native reptiles and amphibians would promote ecological health of the area. The secondary benefit of this restoration would promote diversity of other wildlife, which would lead to more wildlife-viewing opportunities.

Strategies for Other Wildlife C1–C3. Same as B and D.

Objectives for Other Wildlife, Alternative D

Other Wildlife D1. Same as Other Wildlife B1 and C1.

Rationale for Wildlife D1. Same as B.

Strategies for Wildlife D1. Same as B and C.



Silver Buffaloberry

OBJECTIVES for PUBLIC USE

PUBLIC USE—HUNTING

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 hunting compatibility determination in appendix C). 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. Trapping is not allowed, and recreational shooting of prairie dogs is prohibited.

Objectives for Hunting, Alternative A

Hunting A1. Within 2–5 years, develop a visitor services plan that includes a hunting plan. (Same as Hunting B1, C1, and D1.)

Hunting A2. Over 15 years, maintain current hunting programs for ungulates, upland birds, waterfowl, and coyote, and prohibit trapping.

Hunting A3. 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 A1–A3. 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 would continue to provide for many quality and diverse hunting experiences.

This alternative would continue with the existing strategies as long as they are deemed compatible with refuge purposes.

Strategies for Hunting A1–A3

- Continue to respond to inquiries and provide information about current refuge hunting opportunities. (Same as B, C, and D.)
- Continue yearly review of refuge hunting regulations to ensure clarity and to address any emerging issues or concerns, and give the public an opportunity to review and comment on any changes. (Same as B, C, and D.)
- Continue to publish and update the refuge hunting regulations brochure to inform the public of hunting opportunities, including accessible

opportunities, and refuge-specific regulations. (Same as B, C, and D.)

- Distribute the refuge brochure more widely. (Same as B, C, and D.)
- Continue to prohibit most predator hunting, except permit limited coyote hunting mid-October through March 1.
- 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. (Same as B, C, and D.)
- Continue to permit camping within 100 yards of roads to facilitate harvest opportunities. (Same as C and D.)

Objectives for Hunting, Alternative B

Hunting B1. Same as Hunting A1, C1, and D1.

Hunting B2. Over 15 years, continue to facilitate the hunting program by allowing access on open refuge roads, horseback riding, camping as designated under refuge rules, and boat access.

Hunting B3. Within 5 years, work with partners to create diverse, quality hunting opportunities that represent a diversity of all age classes. Within 5 years, 60–70 percent of hunters report a reasonable harvest opportunity and satisfaction with the overall experience.

Hunting B4. 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.

Hunting B5. 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.

Hunting B6. Over 15 years, maintain the furbearer hunting policies as found in alternative A: no trapping and wildlife is protected.

Hunting B7. Over 15 years, work with MFWP to increase hunting opportunities by opening additional populations (i.e., bighorn sheep that have expanded to new areas).

Rationale for Hunting B1–B7. Similar to A, except hunting activities are primarily focused on strategies associated with maximizing wildlife populations within the capacities of healthy habitats.

For many hunters, unique hunting opportunities on the refuge could be the result of mature bull elk in the 8- to 10-year class, where a population of mule deer that can reach 8 years and bighorn sheep that may reach the age of ten. Some natural fluctuations of population age structure would occur due to random events, but overall representative age classes would be available to refuge visitors. Some game animals of both male and female would be expected to die from old age.

Strategies for Hunting B1–B7

- 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 alternatives 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.
- 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.
- 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.
- 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.
- Through visitor contact and hunting information, encourage hunters to walk in to hunt.
- 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.
- 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.

Strategies for Hunting B2 (boat use and camping)

- Continue to monitor boat use for accessing hunting areas along the river. (Same as A, C, and D.)
- Working with USACE and others, begin monitoring the amount of boat access occurring in popular hunting areas. If monitoring shows that 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).
- Continue to permit minimally disturbing, pack-in and pack-out, backcountry camping throughout the entire refuge.
- Allow visitors to drive within 50 yards of public use roads to access campsites for wildlife-dependent recreational activities.
- Within 5 years, designate the most popular public use areas for camping and harden those sites to minimize erosion and negative effects on habitat.
- 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.
- Allow boat camping along the beaches of the lake-shore.
- Continue working with USACE to restrict boat camping on islands in the river.

Strategies for Hunting B4 (hunters with mobility impairments)

- 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.
- 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.

Objectives for Hunting, Alternative C

Hunting activities are primarily focused on those legitimate strategies that also provide an economic benefit to local communities.



Brett Billings / USFWS

Hunting is one of the most popular activities on the refuge.

Hunting C1. Same as Hunting A1, B1, and D1.

Hunting C2. 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.

Hunting C3. Within 5 years, in combination with achieving the habitat objectives already defined, work with partners to create hunting opportunities on the refuge that are not achieved on other public lands including harvesting big game animals that represent all age classes. Within 7 years, 70–85 percent of hunters report a reasonable harvest opportunity and satisfaction with the overall experience.

Hunting C4. Within 5 years, provide two additional hunting accesses for hunters with mobility impairments.

Hunting C5. Within 4 years, expand opportunities for young people (under 17 years old) to hunt with at least one new hunt each in areas 400, 600, and 700 that are available to only young hunters, in conjunction with MFWP.

Hunting C6. Over 15 years, if supported by a monitoring program, adopt MFWP harvest strategies and opportunities for hunting or trapping furbearing species regulated by MFWP (muskrat, mink, and bobcat) and not regulated by MFWP (red fox, coyote, raccoon, and badger; but excluding least weasel, long-tailed weasel, and striped skunk).

Hunting C7. Same as Hunting B7.

Rationale for Hunting C1–C7. Similar to A, except the refuge would look to expand opportunities for all

hunters including youth and hunters with mobility impairments. Increasing hunting and trapping opportunities on the refuge and promoting the refuge's hunting program would increase license sales for MFWP and boost economic activity in the surrounding communities. This could increase the value of leased private lands within and next to the refuge. Additionally, this could increase leases values of State lands within the refuge that can be acquired by outfitters who have a permit to work on the refuge.

Providing that monitoring supports allowing for a harvest, the Service would cooperate with MFWP to open up hunting or trapping opportunities for furbearer species both regulated (muskrat, mink, and bobcat) and unregulated (red fox, coyote, raccoon, and badger) that are not currently open to hunting or trapping. For big game, the Service would also cooperate with the State to maximize the number of cow elk tags when the numbers are above objective levels and not restrict antlerless tags for mule deer and white-tailed deer. As the bighorn sheep population expanded in areas where they were reintroduced, this would provide more harvest opportunities.

Through promotions and information, more hunters would be encouraged to hunt on the refuge, which in turn could provide for more economic benefit to the local communities. Although there could be more hunters than what is currently found in alternative A, it is anticipated that the vast majority would report satisfaction with their overall experience.

Strategies for Hunting C1–C7

- Adopt MFWP hunting seasons and regulations for species for which harvest is currently allowed

(except for mule deer) on the refuge (elk, white-tailed deer, pronghorn). Continue with a 3-week mule deer season until the buck-to-doe ratio identified in wildlife objectives is achieved. (Same as B.)

- Use annual wildlife surveys, hunter surveys, car count data, and trail-cams to monitor and evaluate hunting use. (Same as B.)
- Develop a policy for use of tree stands (less restrictive than B). Address the number of stands permitted and timeframe they can be up (how many days before, during, or after a hunt).
- Work with the State of Montana to establish a special, permitted, weekend hunt for elk and deer in all hunting districts that is available to only young hunters.
- Maximize cow elk tags when numbers are above population objectives, allowing A9/B12 to be valid on the refuge and not restricting antlerless mule deer and white-tailed deer tags on the refuge.
- Develop hunt plans to create harvest opportunities for those species present but not currently open for hunting (mountain lion, moose, and black bear), if biologically supported.
- If wolves arrive and establish a resident refuge population that a refuge biologist finds is hunt-able, consider establishing a limited wolf-hunting season.
- Increase outreach to hunters and create more outlets for promoting hunting opportunities to outside audiences.
- Create new partnerships, and maintain and expand existing partnerships, with hunters and hunter groups to increase awareness of hunting opportunities and habitat conservation.
- Require nontoxic shot for all bird hunting to reduce the incidental poisoning of nontarget wildlife.

Strategies for Hunting C2 (boat use and camping)

- Continue to monitor boat use for accessing hunting areas along the river. (Same as A, B, and D.)
- Within 5 years, designate and develop camping areas to accommodate the number of recreationists. Include conveniences such as location from the river for easier access, toilets, and possibly tie-downs for horse camps.
- Continue to restrict all camping to within 100 yards of a numbered route. (Same as A and D.)
- If an area is overly affected by camping, make temporary closures or create hardened access points. (Same as B.)
- Harden current camp areas along the river to prevent campsite “creep” into riparian areas.
- Cooperate with USACE to allow camping on river islands and along the lakeshore beaches.

- Within 5 years, evaluate the potential effects of camping on the islands along the Missouri River corridor.

Strategies for Hunting C4 (hunters with mobility impairments). Same as B, plus:

- Restrict access by others at specific times to increase harvest opportunities for hunters with mobility impairments.
- Allow motorized vehicle access on seasonally closed roads for hunters with mobility impairments.
- Provide priority to hunters with mobility impairments for use of the accessible blind.
- If a demand is identified, develop a second accessible blind.
- Plant crops to attract more wildlife and increase harvest opportunities.

Strategy for Hunting C5 (young hunters)

- Expand hunting opportunities for young people to hunting districts 417, 410, and 700 to recruit and promote a quality opportunity for young hunters (2015 biannual season setting process).

Strategies for Hunting C6 (trapping)

- Develop trapping plans to allow trapping of furbearers that are regulated by MFWP. Do not permit trapping of beaver and swift fox.
- Require furbearer trappers to tag traps with proper identification and report harvest within 30 days after the end of the season.
- Develop trapping plans to allow trapping of red fox, coyote, raccoon, and badger.
- Develop hunting plans for badger, raccoon, and red fox to allow shooting these species.
- Adjust current regulations to allow coyote hunting year-round.
- Provide outreach to all visitors to advise them of where trapping is allowed.

Objectives for Hunting, Alternative D

Hunting D1. Same as Hunting A1, B1, and C1.

Hunting D2. 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.

Hunting D3. 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.

Hunting D4. Same as Hunting B4.

Hunting D5. Same as Hunting B5.

Hunting D6. 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 D1–D6. 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. Under alternative D 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 would be essential to maintain healthy populations of resident wildlife and migratory birds (FWS 2006b), in part by achieving the habitat objectives identified previously. Additionally, there is interest of implementing new opportunities such as a hunt for mountain lions and the expansion of bighorn sheep populations for more hunting opportunities. The Service would consider allowing for limited, quality-oriented hunting opportunities of furbearers or mountain lion provided the populations are stable. For mountain lion, there would likely be a special drawing and only a few licenses would be issued. To open the refuge for a mountain lion hunt, a proposal (hunt plan) would need to be prepared that would include a justification including the population status, determination of harvest levels, and monitoring results. The proposal would require compliance under National Environmental Protection Act (refer to previous objectives for big game and chapter 4, section 4.3).

It is also 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 would spark interest in hunting and hopefully lead to recruitment of more young refuge supporters.

There is also a 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.

The refuge is isolated and many hunters feel that camping is necessary to ensure a quality hunt. Under this and the other alternatives, camping would be continue to be allowed; however, efforts would be made to minimize any habitat and wildlife disturbances that result from camping.

Strategies for Hunting D1–D6. Same as B, except:

- Allow no planting of domestic crops to lure big game.
- 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.
- Allow backpack camping throughout the refuge unless specifically closed.

PUBLIC USE—FISHING

Fishing is allowed on the refuge. 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.

Objectives for Fishing, Alternative A

Fishing A1. Over 15 years, continue to follow State fishing regulations. (Same as Fishing B1, C1, and D1.)

Fishing A2. Over 15 years, continue to cooperate with MFWP to regulate paddlefish fishing.

Rationale for Fishing A1–A2. 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 chapter 4, section 4.5), 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 would continue into the future and would provide for an increased diversity of opportunities for anglers to gain understanding of the importance of native fisheries while taking part in angling activities.

In this alternative, fishing activities are primarily focused on continuing existing strategies and coordinating future fisheries management with MFWP.

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). Fishing contributes to the local economies through the rental of hotel rooms, eating at restaurants, buying of supplies and fuel.

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 would pack 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).

Another popular activity, ice fishing is currently allowed on the Missouri River and Fort Peck Lake.

Strategies for Fishing A1–A2

- 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.

Objectives for Fishing, Alternative B

Fishing B1. Same as Fishing A1, C1, and D1.

Fishing B2. 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. (Same as Fishing C2 and D2.)

Fishing B3. 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. (Same as Fishing C3 and D3.)

Fishing B4. 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. (Same as Fishing C4 and D4.)

Fishing B5. 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. (Same as Fishing C5 and D5.)

Rationale for Fishing B1–B5. As with A, the Service would continue to cooperate and work with MFWP, USACE, and the counties in providing access for anglers. However, under alternative B the Service would 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. In the past, it has been considered for protection under the Endangered Species Act, but currently is not a listed species (MFWP 2009c).

The opportunity to expand and develop a closer partnership with MFWP and others would benefit the refuges' goal to introduce youth to the Refuge System.

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 Code of Federal Regulations, Part 31.13). Other regulations govern all commercial uses on refuges. USACE and State currently manage commercial 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.

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 B2 (paddlefish)

- 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.

Strategies for Fishing B3 (sport fishing)

- 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.
- 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.

Strategies for Fishing B4 (young anglers)

- 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.

Strategies for Fishing B5 (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.

Objectives for Fishing, Alternative C

Fishing C1. Same as Fishing B1 and D1.

Fishing C2–C5. Same as Fishing B2–B5 and D2–D5.

Rationale for Fishing C1–C5. Similar to B, except that the Service would work with partners on ways to increase fishing opportunities for economic benefit for the community (providing they are found compatible).



Paddlefish

Brett Billings / USFWS

Strategies for Fishing C2 (paddlefish). Same as B and D, plus:

- Evaluate opportunities for commercial egg harvesting.

Strategies for Fishing C3 (sport fishing). Same as B and D, plus:

- Work with MFWP and USACE to evaluate brood ponds to determine if they could provide opportunities for youth and accessible fishing.
- Explore opportunities for creating more motorized access for ice fishing during the winter (Elk Hole or the Big Swirl) by providing access from the south side of the river or Timber Creek. Allow no access from the river or shoreline.
- Seek partnerships or alternative funding for establishment of more fishing access points.

Strategies for Fishing C4 (young anglers). Same as B and D.

Objectives for Fishing, Alternative D

Fishing D1. Same as Fishing B1 and C1.

Fishing D2–D5. Same as Fishing B2–B5 and C2–C5.

Rationale and Strategies for Fishing D1–D5. Same as B, plus:

- 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. Allow no access from the river or shoreline.

PUBLIC USE—WILDLIFE OBSERVATION, PHOTOGRAPHY, and INTERPRETATION

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 refuge 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. The strategies have been broken out by specific type of program, such as wildlife observation, self-guided activities, and guided activities.

Objectives for Wildlife Observation, Photography, and Interpretation, Alternative A

Wildlife Observation, Photography, and Interpretation A1. Over 15 years, maintain existing wildlife observation and interpretive facilities and programs to support approximately 40,000 visitors who participate in these activities.

Rationale for Wildlife Observation, Photography, and Interpretation A1. Nonconsumptive uses such as photography, observation, and interpretation are estimated to account for over 40,000 visits to the refuge (Carver and Caudill 2007). Facilities that support these activities include the Fort Peck Visitor Center, contact stations at Sand Creek and Jordan, interpretive displays, auto routes, overlooks and observation platforms, and informational kiosks.

Visitors drawn to the refuge for nonconsumptive activities have found birding and wildlife observation to be the most important activities, which are facilitated with the auto tour route, and walking interpretive trails. During the fall when the elk are in rut, the Slippery Ann Elk Viewing Area enables visitors to see hundreds of elk, and during peak times, on average as many as 175 vehicles have been counted entering the viewing area. In September 2008, traffic counters on the auto tour route counted approximately 390 vehicles or a vehicle every 2.3 minutes from 6:00 a.m. to 8 p.m. (refer to "Chapter 4—Affected Environment"). Visitors also tend to observe and photograph wildlife collaterally at the same time they take part in other wildlife-dependent activities (hunting and fishing). The auto tour route gives visitors excellent opportunities to view birds and other wildlife.

Under alternative A, the refuge would maintain the same level of services for these activities.

Strategy for Wildlife Observation, Photography, and Interpretation A1

- Maintain or upgrade existing facilities, signs, Web site, brochures, exhibits, and other programs. Adhere to Service standards.

Objectives for Wildlife Observation, Photography, and Interpretation, Alternative B**Wildlife Observation, Photography, and Interpretation B1.**

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 B4 and B5 (refer to table 6 in section 3.13 below about stepdown plans). (Same as Wildlife Observation, Photography, and Interpretation C1 and D1.)

Wildlife Observation, Photography, and Interpretation B2.

Within 5 years and as part of objective B1 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 B3.

Within 5 years, hire an outdoor recreation planner for the refuge (refer to objectives for refuge operations).

Wildlife Observation, Photography, and Interpretation B4.

Over 15 years, increase participation in wildlife observation, photography, and interpretive activities by 5–10 percent annually (approximately 2,000–4,000 visits).

Wildlife Observation, Photography, and Interpretation B5.

Over 15 years, improve the quality and increase the number of programs or facilities for wildlife observation, photography, and self-guided and staff-dependent interpretation by approximately 5–10 percent (from alternative A). Base this on the visitor services plan and possibly include observation blinds or facilities, trails, signs, a science center at the Sand Creek Field Station, or other programs.

Rationale for Wildlife Observation, Photography, and Interpretation B1–B5.

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.

Successful implementation of the habitat management improvements identified under uplands, river bottoms, riparian areas, and shorelines would

provide for a greater diversity of wildlife available for observation, photography, and other interpretive programs. Initially most of the refuge's resources would be spent at improving habitat conditions on the refuge and, as a result, it would likely take 15 years to fully develop and carry out a program that would result in modest increases in visitation.

Simultaneously, the refuge would seek to close 106 miles of existing road and increase proposed wilderness units (refer to the sections on access and wilderness for specifics). The visitor services plan would identify where modest improvements could be made (for example, building a lek blind) to attract visitors seeking wildlife observation or birding opportunities. A critical component in accomplishing the objectives and strategies is having an outdoor recreation planner on staff as currently, there is not a person dedicated to the overall recreation, interpretive, and education program. Additionally, a visitor survey would enable the refuge to have a better estimate of the number of visitors coming to the refuge to take part in nonconsumptive activities and identify the issues and needs for future facilities such as parking areas and observation areas.

Constructing more facilities for wildlife watching such as blinds, trails, or designating another road on the refuge would draw in visitors who are seeking that opportunity. It would 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 B1–B5 (wildlife observation and photography)

- 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.
- Construct one to three additional facilities (blinds, trails, or tour routes) to support wildlife observation, and follow accessibility standards. (Refer to objectives and strategies for “Refuge Operations.”)

Strategies for Wildlife Observation, Photography, and Interpretation B1–B5 (interpretation)

- 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.
- 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 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.

Objectives for Wildlife Observation, Photography, and Interpretation, Alternative C

Wildlife Observation, Photography, and Interpretation C1. Same as Wildlife Observation, Photography, and Interpretation B1 and D1.

Wildlife Observation, Photography, and Interpretation C2. Same as Wildlife Observation, Photography, and Interpretation B2 and D2.

Wildlife Observation, Photography, and Interpretation C3. Within 5 years, hire two outdoor recreation plan-

ners for the refuge (refer to objectives for "Refuge Operations").

Wildlife Observation, Photography, and Interpretation C4. Over 15 years, increase participation in wildlife observation, photography, and interpretive activities use by about 20–50 percent on the refuge (approximately 8,000–20,000 more visitors annually).

Wildlife Observation, Photography, and Interpretation C5. Over 15 years, improve the quality and increase the number of programs or facilities for wildlife observation, photography, and self-guided and staff-dependent interpretation by approximately 5–15 percent (from alternative A). Base this on the visitor services plan and possibly include observation blinds or facilities, trails, signs, an interpretive center at Sand Creek Field Station, or other programs and facilities.

Rationale for Wildlife Observation, Photography, and Interpretation C1–C5. MFWP states that nature-related tourism and recreation are growing trends nationally, regionally, and within the State of Montana (MFWP 2009e). Wildlife viewing is in the top two reasons for travel to the State in all "travel countries" within the State. Although Yellowstone and Glacier National Parks and other areas along the Rocky Mountain Front account for the greatest expenditures for travel and tourism, the demand for wildlife viewing is expected to increase nationally and in the Rocky Mountain west, and demand will almost be double that of supply (MFWP 2008b, 2009e).

With these trends, the Service believes under alternative C it would be realistic to significantly increase participation in nonconsumptive activities over 15 years. For example, birdwatching is growing faster than any other form of outdoor recreation, and providing facilities like viewing blinds that enhance viewing experiences represent an investment in that economy as well as in creating a conservation constituency (Colorado Division of Wildlife 2007). To increase the numbers by about 20–50 percent, (up to 20,000 more visits), the refuge would need to invest in more viewing facilities and programs (for example, blinds or improving access). An interpretive center at Sand Creek Field Station, developed in partnership with others, could draw more visitors to the refuge. The Service would also need to increase the awareness of the refuge as a place to visit. Additionally, the Service would improve access into several areas (for example, potentially gravel Knox Ridge Road and establish a trail on the eastern edge of the refuge (Sand Arroyo).

Similar to alternative B, within 5 years a visitor experience survey would be started and a visitor services plan would be written to take a more comprehensive look at the overall program and facil-

ities needs. Two outdoor recreation planners would be hired (Lewistown and Fort Peck Field Stations), and these positions would be critical to achieving these objectives.

Strategies for Wildlife Observation, Photography, and Interpretation C1–C5 (wildlife observation and photography).

Same as B, plus:

- Host bird identification events in conjunction with International Migratory Bird Day in May and other special events.
- Explore new areas to promote for wildlife observation and photography opportunities.
- Where feasible, develop a simple map within each visitor center where visitors can record what they saw and where (for example, a laminated refuge map that people can write on with a dry-erase marker).
- Construct two to five accessible facilities (blinds, trails, or tour routes) including a lek blind (refer to objectives and strategies for “Refuge Operations”).
- Design and map birdwatching trails for public use. Work with partners to establish an 8-mile Sand Arroyo trail along the eastern boundary of the refuge in cooperation with BLM and others (4 miles would be on Service land; see figure 9).

Strategies for Wildlife Observation, Photography, and Interpretation C1–C5 (interpretation). Same as B, plus:

- Develop a tour map with geological and biological information for the refuge.
- Develop a portable tabletop exhibit.
- Enhance, update, and improve exhibits at the Fort Peck Interpretive Center.
- Explore open-captioning audio–visual in providing accessible exhibits.
- Develop materials such as exhibits and pamphlets, as well as educational programs, that explain the region’s conservation priorities and the refuge resources.
- Improve visitor contact areas at the Sand Creek, Fort Peck, and Jordan Field Stations. Make brochures always available.
- Update the Web site and incorporate changing interpretive content into the design.
- Start grouse-viewing programs and provide blinds for public use.
- Expand elk-viewing opportunities in other locations.
- Develop, sign, and map an additional interpreted auto tour route.
- Complete exhibits and natural plant landscaping at the refuge headquarters in Lewistown and at the three field stations. Ways to do this follow:
 - Establish native plant gardens with interpretive information.
 - Add interpretive information to all office artifacts and mounts.



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Refuge staff member conducting an interpretive field trip on the refuge.

- Coordinate with the Fort Peck Interpretive Center on natural landscaping and interpretive programs.
- Actively publicize and take part in three events such as National Wildlife Refuge Week or Migratory Bird Day.

Objectives for Wildlife Observation, Photography, and Interpretation, Alternative D

Wildlife Observation, Photography, and Interpretation D1. Same as Wildlife Observation, Photography, and Interpretation B1 and C1.

Wildlife Observation, Photography, and Interpretation D2. Same as Wildlife Observation, Photography, and Interpretation B2 and C2.

Wildlife Observation, Photography, and Interpretation D3. Same as Wildlife Observation, Photography, and Interpretation C3.

Wildlife Observation, Photography, and Interpretation D4. 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 D5. 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 10 percent (from alternative A). 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 D1–D5. Similar to B, habitat improvements to uplands, river bottoms, riparian areas, and shorelines could increase opportunities for viewing and photographing wildlife. The Service would 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 would provide for quality-based experiences. Although quality is difficult to define precisely, and it means something different for every visitor, developing an experience-based approach that provides for the diverse interests of visitors, while operating within the capabilities of the resources (Manfredo 2002), would 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 percent would require a moderate investment in facilities and programs. As with alternative C, 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.

Strategies for Wildlife Observation, Photography, and Interpretation D1–D5. Same as B, plus:

- 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 a bird guide map to target birder audiences and provide more sophisticated, quality interpretive opportunities.
- 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 10).
- Consider the State section north of Slippery Ann for facilities.

PUBLIC USE—ENVIRONMENTAL EDUCATION

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.

Objectives for Environmental Education, Alternative A

Education A1. Over 15 years, maintain limited educational programs.

Rationale for Environmental Education A1. Most of the schools in the six counties surrounding the refuge are located far from the refuge making field trips difficult due to time constraints and budgets. The refuge staff provides classroom presentations when requested but there is not an outdoor recreation planner on staff or refuge-specific curricula. Fort Peck and Jordan Field Stations' staffs have participated with other agencies in annual environmental camps. There is an education trunk available for loan to the school through the Fort Peck Interpretive Center.

Strategy for Environmental Education A1

- Continue to offer the educational bus tour, school visits, and staffing the fair booth.

Objectives for Environmental Education, Alternative B

Education B1. Within 5–7 years, expand the quantity of the environmental education programs (on- and off-refuge) by about 5 percent (identify program elements in the overall visitor services plan for all public uses). (Refer to table 6 in section 3.13 below about stepdown plans).

Rationale for Environmental Education B1. 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.

Similar to the objectives for wildlife observation above, the first action under alternative B 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. Given that very limited environmental education programming exists, with more staff, there would be a moderate increase in the quantity of environmental education programs. The programs would focus on wildlife biology and habitat requirements and would modify existing curricula to highlight refuge issues. Because environmental education is curriculum-based and labor intensive, initial efforts would be limited to Fort Peck and Lewistown Field Stations when an outdoor recreation planner is hired.

Strategies for Environmental Education B1

- 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.
- Annually offer two teacher workshops to all interested school districts in central and eastern Montana to promote refuge-based (local community) and regional-based information.
- 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, 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.

Objectives for Environmental Education, Alternative C

Education C1. Within 5–10 years, expand the quantity of environmental education programs (on- and off-refuge) by about 25 percent (identify program elements in the visitor services plan). (Refer to table 6 in section 3.13 below about stepdown plans).

Rationale for Environmental Education C1. Similar to B except, because public use is emphasized under this alternative, the refuge environmental education program would be substantially expanded and would focus on threatened and endangered species, reintroduced species, and restoration activities. Existing curricula would be modified to highlight these issues and several new curricula would be developed in compliance with State standards.

Because it would be more labor intensive, more staff would be needed (two identified; refer to objectives for “Wildlife Observation, Photography, and Interpretation”).

Strategies for Environmental Education C1. Same as B, except:

- Annually offer five teacher workshops to school districts in central and eastern Montana promoting refuge-based (local community) and regional-based information.
- Within 5–7 years, provide refuge-taught environmental education programming at no less than five school visits per year.
- Over 15 years, work with partners to create up to three environmental education curricula, unique to the refuge, and modify existing environmental education curricula tailored to the refuge. Include potential topics such as prairie streams, use of fire, prairie plants and wildlife, invasive plants, paleontological resources, climate change, and threatened and endangered species.
- Request that researchers working at the refuge share information they collected through presentations at schools.
- Hire two outdoor recreation planners (as part of public use program). (Same as D.)
- Seek out partnerships with the Office of Public Instruction to encourage expansion of environmental education programs in local schools.
- Build on existing relationships with schools for both onsite and offsite programming.
- Refuge staff or volunteers present at job education days at local high schools.
- 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). (Same as C.)

PUBLIC USE—OUTREACH

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.

Objectives for Outreach, Alternative A

Outreach A1. Over 15 years, continue outreach activities at current levels. (Same as Outreach B1.)

Rationale for Outreach A1. Currently, outreach activities include public presentations, news releases, weed tours, county commissioner meetings, and meetings with nongovernmental organizations to talk about refuge programs and activities.

Strategies for Outreach A1

- Occasionally take part in State and local events such as State, county, and school career fairs.
- 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.

Objectives for Outreach, Alternative B

Outreach B1. Same as Outreach A1.

Outreach B2. Within 10 years, build greater awareness and appreciation for the Service and refuge resources, with a resulting 5-percent increase in requests for information, visitation, and Web site hits.

Outreach B3. Within 5 years, engage outside audiences (such as interested groups, the public, or visitors) in at least two meetings, presentations, or open houses per year.

Rationale for Outreach B1–B3. The refuge would increase its outreach efforts through active participation in local events and meetings or by developing a Friends group (a nongovernmental organization that

Objectives for Environmental Education, Alternative D

Education D1. 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). (Refer to table 6 in section 3.13 below about stepdown plans.)

Rationale for Environmental Education D1. Similar to B, except there would be a moderate increase in the environmental education program, with an emphasis on quality. The programs would 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 would be included. Existing curricula would be modified to highlight these issues and at least one new curriculum would be developed in compliance with State standards.

Strategies for Environmental Education D1. Same as B, plus:

- 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.

specifically works on behalf of furthering the refuge or Refuge System's goals). The outreach message would be focused on the refuge's goal of increasing wildlife resources. Increased efforts toward outreach should result in modest increases in results for information about the refuge from current levels.

For example, improving the quality and content of the refuge's Web site would be 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 B1–B3

Same as A, plus:

- 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.
- Annually conduct two 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.
- Develop an outreach plan as part of the visitor services plan (refer to table 6 in section 3.13 below about stepdown plans).
- Work with the Montana tourism department to promote the refuge and its resources.

Objectives for Outreach, Alternative C

Outreach C1. Within 10 years, build greater awareness and appreciation for the Service and refuge resources, with a resulting 15-percent increase in requests for information, visitation, and Web site hits.

Outreach C2. Within 5 years, engage outside audiences such as interested groups, the public, and potential visitors in at least five meetings, presentations, or open houses per year.

Rationale for Outreach C1–C2. Similar to B, except there would be a greater emphasis on outreach for both communicating wildlife and habitat goals as well as for increasing visitation to the refuge.

Strategies for Outreach C1–C2. Same as B, plus:

- Develop a Friends group immediately on completion of the CCP and a second volunteer group focused on advocating for the refuge.
- Use the Internet to complete four to six of the following activities:
 - 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.
- Annually conduct five information-sharing events, such as interviews and writing articles with the media (newspaper, TV, and radio), chambers of commerce, congressional contacts, and tourism outlets.

Objectives for Outreach, Alternative D

Outreach D1. 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 D2. 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 D1–D2. Similar to C, except outreach would 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. There would be less emphasis on maximizing the number of visits and more emphasis on the quality of the public use programs.

Strategies for Outreach D1–D2. Same as B, plus:

- 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.

PUBLIC USE—ACCESS

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. ATVs and motorcycles must be street-legal. 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 further discussion of monitoring boat access). Aircraft may not land on the uplands of the refuge. Landing of fixed-wing aircraft is permitted at specific locations on Fort Peck Reservoir (refer to chapter 3, section “3.2 Elements Common to All Alternatives” and to chapter 4).

Objectives for Access, Alternative A

Access A1. Over 15 years, keep about 670 miles of roads and trails open (see figure 7) and maintained to existing standards.

Access A2. Within 3–5 years, work with partners to develop a comprehensive travel management plan. (Same as Access B2, C2, and D2.)

Access A3. Over 15 years, allow for public access as currently designated by refuge regulations.

Rationale for Access A1–A3. To limit erosion and protect plants and wildlife, mechanized vehicles are allowed only on numbered refuge roads that are designated as open. Some seasonal road closures could occur, but generally access would remain as it currently exists.

Under all alternatives including alternative A, the Service would develop a comprehensive travel plan, which would also dovetail with the visitor services plan for alternatives B, C, and D.

Strategies for Access A1–A3

- Institute seasonal closures on a limited basis. Continue to permit horseback riding, ATV use on public roads, and bicycling on numbered roads (including seasonally closed roads).
- Permit public planes to land only on water or ice as determined by USACE’s plan.
- Keep roads closed in proposed wilderness units.

Objectives for Access, Alternative B

Access B1. Within 3–5 years, analyze all forms of access to determine what effect access has on wildlife populations, habitat conditions, and cultural resources.

Access B2. Same as Access A2, C2, and D2.

Access B3. Over 15 years, work with counties to reconfigure the refuge road system, closing about 106 miles of roads or sections of roads that no longer provide a public benefit or do not help achieve habitat objectives.

Access B4. Within 5 years, identify safety hazards and partners to routinely maintain the refuge road system. (Same as Access C4 and D4.)

Rationale for Access B1–B4. 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 “Chapter 4—Affected Environment”). 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 refuge 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 4). 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).

With the emphasis on increasing wildlife populations under alternative B, the Service would look to close about 106 miles of road (see figure 8). This would increase the size of undisturbed habitat blocks on the refuge and could benefit wildlife as a whole. It also could reduce the spread of invasive plants carried in by vehicles. Closures would not occur before fully analyzing harvest strategies in cooperation with MFWP or other public access concerns. Access to private land would not be affected by any road closures. The following roads (by road number) would be closed based on the criteria listed (some roads meet multiple criteria and appear more than once below):

- For protection of wilderness values—306, 311, 315, 318, 327 (east end), 410, 411, 412, 420, 452, and 838
- To increase blocks of undisturbed habitat or reduce negative wildlife effects—219, 308, 309, 311, 315, 320, 327, 329, 332, 333, 335, 353, 359, 366 (east end), 366 (includes 621 and 622), 374, 401, 405, 410, 411, 412, 416, 417, 428, 440, 441, 442, 476, 479, 542, 543, 548, 602, 825, 838, and 864
- For protection of riparian areas—308, 405, and 420
- To address safety or maintenance issues—219, 302, and 513
- Where there is no defined legal public access—215, 353, 355, 359, 365, 476, 479, 488, 489, 547, 548, 609, 616, 617, and 618
- Where the area is easily accessible from off the refuge or from another road—309, 320, 355, 416, 420, 440, 441, 513, 548, 616, and 618

Strategies for Access B1–B4

- 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.

Objectives for Access, Alternative C

Access C1. Within 3 years, evaluate all access points and possible new access points and determine methods for increasing access to the refuge.

Access C2. Same as Access A2, B2, and D2.

Access C3. Over 15 years, work with partners to improve the road system to improve access (see figure 9).

Access C4. Same as Access B4 and D4.

Rationale for Access C1–C4. Several options would be explored to improve public access. There would be few additional road closures (see figure 9), although seasonal closures could still be needed for wildlife protection. Generally, the Service would work with the counties and other partners to improve the road system (for example, additional road maintenance on some roads, or by graveling). Some existing roads would be evaluated to figure out if road improvements could be made without significantly affecting wildlife (such as Knox Ridge and Turkey Joe roads). Many users have expressed the desire for increased access during the winter months to popular ice-fishing areas like Swirl, Elk Creek, and Timber Ridge, and these areas would be evaluated for safety and other factors. The Service would also look at whether the elk-viewing area could be expanded or use spread out to other areas to reduce congestion and improve the visitor experience during the fall viewing season.

Strategies for Access C1–C4. Same as B, plus:

- Improve access by diverting refuge money and staff to purchase rights-of-way for graveling all-weather roads; creating more parking for persons with disabilities; developing trailheads, vehicle parking areas, and camping sites; and providing equestrian facilities.

- When it is determined that a form of access has no negative effect on wildlife populations, consider increasing or improving that access.
- Within 5 years, evaluate all roads that end at the water's edge to figure out if it is feasible to construct boat ramps for water access.
- Increase access to the lake and river for fishing and other uses by identifying roads that lead to the water's edge.
- Increase opportunities to access wilderness by creating parking lots next to proposed wilderness units.
- Work with counties and others to upgrade added all-weather roads to and on the refuge (for example, Knox Ridge and Turkey Joe).
- Evaluate the opportunity for motorized vehicles on the lake and river during winter (for example, ATVs and snowmobiles) and consider providing seasonal access to desirable winter fishing holes such as those at Swirl, Elk Hole, and Timber Creek.
- Institute seasonal use of the roads where appropriate.
- Improve roads next to proposed wilderness units to enhance wilderness recreation and value (for example, Soda Creek, Beauchamp, and Harpers Ridge).
- Work with partners to improve the elk-viewing area and create more pulloffs or viewing areas along the road system to facilitate wildlife observation.
- Evaluate the demand for multimodal accessibility.
- Within 10 years, designate and post closed roads within the refuge and wilderness study areas as hiking trails open to the public. Delineate on the current refuge map the location of these closed roads for guidance and accessibility.
- Determine the extent of road use and the types of use.
- Maintain directional signage and improve the wayfinding system as needed.

Objectives for Access, Alternative D

Access D1. Within 3 years, evaluate access points and determine improvements that can be made to enhance ecological processes on the refuge.

Access D2. Same as Access A2, B2, and C2.

Access D3. 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 pre-

scribed fire activities, harvest wild ungulates, provide for quality wildlife-dependent recreation, or allow other activities that contribute to overall improved ecological health (see figure 10 in section 3.7). Once the transportation plan is completed, close or modify more roads as necessary.

Access D4. Same as Access B4 and C4.

Rationale for Access D1–D4. Alternative D strikes a balance between providing for the improved access that some refuge users desire, managing big game populations to improve habitat, and meeting MFWP harvest objectives while ensuring that 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 would be assessed in consideration of harvest strategies and other public uses and would be identified during development of the transportation plan. There would be moderate increases in providing for nonconsumptive uses, and improved access and facilities could be important in facilitating these activities. The Service would consider allowing motorized access on some closed roads (outside of wilderness areas) for game retrieval only. If conditions warrant, other improvements or closures would be considered.

The following roads (by road number) would 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 would 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 D1–D4. Same as B, plus:

- 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.

PUBLIC USE—RECREATION SITES

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 chapter 1, section 1.9). The following objectives address areas that the Service manages.

Objectives for Recreation Sites, Alternative A

Recreation Sites A1. Over 15 years, work cooperatively with USACE to further define or improve existing Service recreation areas.

Rationale for Recreation Sites A1. The 1992 Fort Peck Lake Master Plan identified 18 recreation areas around the lake. These are mostly managed by USACE with a few outgranted to MFWP, BLM, Petroleum County and the Service. Seven of these 18 (Downstream campground, Fort Peck West, The Pines, James Kipp, Crooked Creek, Hell Creek, and Rock Creek on the Big Dry Arm) are classified as intensive use. Intensive use means these areas may have concession operations, resort, and quasi-public development (camping loops, picnic tables and shelters, play areas and landscaping). Other intensive use areas are less developed. The remaining areas are defined as low intensity. Development in low intensity areas is limited to facilities that promote or allow public use but do not greatly alter the natural character of the area. Facilities allowed include trails, parking areas, boat ramps, vault toilets, picnic tables, and fire rings.

Camping areas that the Service manages are Slippery Ann, Rock Creek, Turkey Joe, Withrow Bottoms, Jones Island, and Rocky Point. Where opportunities arise, the Service would work with USACE to further define these areas to prevent the campsites from spreading into adjacent habitat. These are primitive areas with a vault toilet where the public camps while hunting or fishing. In addition, there are the primitive Bear Creek and Bob Cat areas that have no facilities.

Strategies for Recreation Sites A1. None.

Objectives for Recreation Sites, Alternative B

Recreation Sites B1. Within 5 years, work with USACE to further define or improve existing Service recreation areas. (Similar to Recreation Sites C1 and D1.)

Rationale for Recreation Sites B1. 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 would be affected largely due to visitors being dispersed across a wider area.

Strategies for Recreation Sites B1

- 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 would meet the needs of those requiring special accommodations.
- Evaluate current recreational facilities and restrictions for user friendliness and ecological effects.

Objectives for Recreation Sites, Alternative C

Recreation Sites C1. Similar to Recreation Sites B1 and D1.

Rationale for Recreation Sites C1. Same as B, except more improvements would be made to improve the experience.

Strategies for Recreation Sites C1. Same as B, plus:

- To improve the experience, consider the possibility of expanding into already disturbed land around the existing recreational area and improving existing recreation facilities, for example,

more restrooms and landings accessible to people with disabilities.

Objectives for Recreation Sites, Alternative D

Recreation Sites D1. Similar to Recreation Sites B1 and C1.

Rationale for Recreation Sites D1. Same as B, except there would be more improvements made under alternative D than B but fewer than under alternative C.

Strategies for Recreation Sites D1. Same as B, plus:

- Consider improving existing facilities to improve the overall refuge experience.

PUBLIC USE—COMMERCIAL RECREATION

Commercial uses are any economic use of a national wildlife refuge. Other commercial uses are cooperative farming, haying, timber harvest, commercial fishing, and grazing. Outfitting is another example of a commercial use. 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.

Objectives for Commercial Recreation, Alternative A

Commercial Recreation A1. Over 15 years, limit the annual number of outfitter hunting permits to 11.

Rationale for Commercial Recreation A1. Commercial guiding and outfitting services have been and would continue on the refuge under a special use permit. These activities primarily are associated with hunting. Currently, fishing outfitting, fishing tournaments, and commercial fishing are not covered by special use permit. All commercial activities on the refuge require a permit as identified by Title 50, Code of Federal Regulations.

Strategy for Commercial Recreation A1

- Continue to prohibit commercial outfitting for coyote hunting.

Objectives for Commercial Recreation, Alternative B

Commercial Recreation B1. 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. (Same as Commercial Recreation D1.)

Rationale for Commercial Recreation B1. Same as A, plus 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 would 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 would request to be a cooperating agency.

Strategies for Commercial Recreation B1

- Evaluate all commercial uses on the refuge for possible effects on wildlife populations.
- 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.

Objectives for Commercial Recreation, Alternative C

Commercial Recreation C1. Same as Commercial Recreation B1.

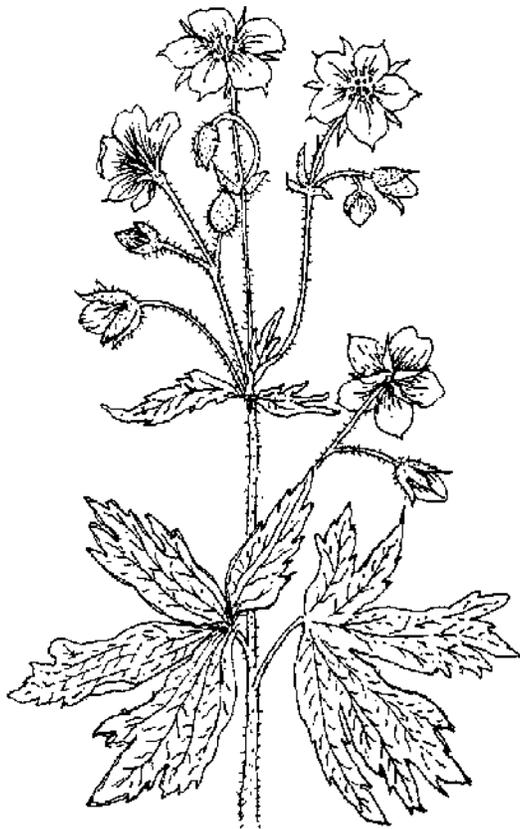
Commercial Recreation C2. Within 5 years, implement a wilderness guide and retrieval permit to promote harvest of surplus game animals in proposed wilderness units.

Rationale for Commercial Recreation C1–C2. Permits would continue to allow outfitting throughout the refuge and not designate specific areas of use. A new type of outfitting permit would be created to encourage hunters to harvest surplus game animals in the

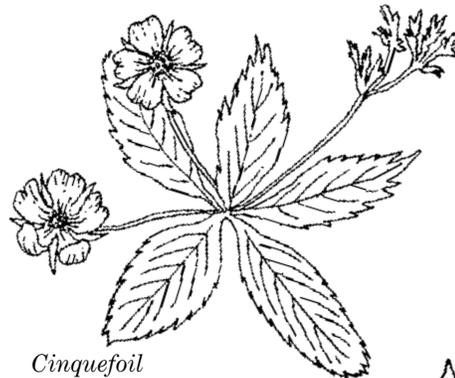
proposed wilderness units. These roadless areas provide security habitat for a variety of wildlife. These outfitting permits would promote harvest of cow elk that would help to reduce local populations. This would also create an economic opportunity to local outfitters and provide for a quality recreational experience for hunters that choose to hunt with a guide.

Strategies for Commercial Recreation C1–C2. Same as B, plus:

- Expand commercial outfitting (for example, paleontological prospecting, trail rides, birding, youth-challenge adventures, fishing, and hunting) by issuing more annual permits.
- Authorize extended camping when requested to facilitate commercial use.



Geranium
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Cinquefoil
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Lupine
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- Promote commercial outfitting through media outlets on an annual basis.
- Collaborate with others to promote ecotourism opportunities on the refuge and throughout the Missouri River Breaks.
- Create a new outfitting permit for guiding and game retrieval in proposed wilderness units.

Objectives for Commercial Recreation, Alternative D

Commercial Recreation D1. Same as Commercial Recreation B1.

Rationale and Strategies for Commercial Recreation D1
Same as B, except:

- 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.

OBJECTIVES for WILDERNESS

There are 20,819 acres in the UL Bend Wilderness and 155,288 acres of proposed wilderness within 15 units on the Charles M. Russell National Wildlife Refuge. Service policy requires a review of proposed wilderness including making recommendations on whether more acreage could be added or other changes should be made (refer to “Appendix E—Wilderness Review and Summary”). The alternatives consider different approaches for managing the proposed wilderness within the refuge.

Objectives for Wilderness, Alternative A

Wilderness A1. Over 15 years, continue to manage the 20,819-acre UL Bend Wilderness as a class I air shed. (Same as Wilderness B1, C1, and D1.)

Wilderness A2. Within 2 years, complete the wilderness study and submit recommendations to the Service Directorate and Secretary for the Department of the Interior. (Same as Wilderness B2, C2, and D2.)

Wilderness A3. Over 15 years, continue to manage about 155,288 acres of proposed wilderness within 15 areas of Charles M. Russell National Wildlife Refuge in accordance with Service policy.

Wilderness A4. Continue the practice of allowing the use of game carts in proposed wilderness units. (Same as Wilderness B4, C4, and D4.)

Rationale for Wilderness A1–A4. The UL Bend Wilderness (Public Law 94–557) and the proposed wilderness units are managed according to the Wilderness Act of 1964. The act requires wilderness be managed in a natural condition, with 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 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. The refuge manager conducts a minimum requirements analysis before taking any action that may affect wilderness character. In general, the manager would not modify habitat, species population levels, or natural ecological processes in refuge wilderness unless doing so maintains or restores ecological integrity that has been degraded by human influence or is necessary to protect or recover threatened and endangered species.

Strategies for Wilderness A1–A4. None.

Objectives for Wilderness, Alternative B

Wilderness B1–B2. Same as Wilderness A1–A2, C1–C2, and D1–D2.

Wilderness B3. Over 15 years, expand or adjust existing proposed wilderness units by 25,869 acres in Antelope Creek, West Beauchamp Creek, Crooked Creek, Alkali Creek, East Seven Blackfoot, West Hell Creek, Sheep Creek, Wagon Coulee, and Mickey Butte to conserve and promote wilderness qualities and characteristics of the units. Refer to any expansion or adjustment as a wilderness study area until formally transmitted to Congress (figure 8 and appendix E).

Wilderness B4. Same as Wilderness A4, C4, and D4.

Rationale for Wilderness B1–B4. Alternative B places the greatest emphasis on increasing or maximizing wildlife populations. One of several key considerations in evaluating the tangible and intangible aspects of wilderness character as described in the Wilderness Stewardship Policy (FWS 2008c) is providing “environments for native plants and animals” (refer to “Appendix E—Wilderness Review and Summary”). Maintaining or increasing wilderness along with closing roads could increase security for wildlife, reduce habitat fragmentation, and provide other positive benefits for wildlife. Following the wilderness review (appendix E), and in consideration of the wildlife emphasis under alternative B, none of the existing proposed wilderness units were recommended for reduction and in 10 units acreage would be expanded.

Strategies for Wilderness B1–B4

- 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).

Objectives for Wilderness, Alternative C

Wilderness C1–C2. Same as Wilderness A1–A2, B1–B2, and D1–D2.

Wilderness C3. Same as A3.

Wilderness C4. Same as Wilderness A4, B4, and D4.



Proposed wilderness units on the refuge provide secure habitat for wildlife like these bighorn sheep.

Rationale for Wilderness C1–C4. Alternative C has the greatest emphasis on promoting wildlife-dependent uses and economic uses while protecting wildlife populations and habitat to the extent possible. Few roads would be proposed for closure under this alternative, and access would be improved in some areas.

Following the wilderness review conducted for the draft CCP and EIS (appendix E), and in consideration of the emphasis on public and economic uses, the Service would not expand or adjust any wilderness unit.

Strategies for Wilderness C1–C4. Same as B.

Objectives for Wilderness, Alternative D

Wilderness D1–D2. Same as Wilderness A1–A2, B1–B2, and C1–C2.

Wilderness D3. 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 characteris-

tics 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 (figure 10 and appendix E).

Wilderness D4. Same as Wilderness A4, B4, C4.

Rationale for Wilderness D1–D4. Alternative D has an emphasis toward restoring the biological diversity, integrity, and environmental health of the refuge while providing for quality wildlife-dependent uses. Similar to alternative B, keeping the wilderness designation, in combination with closing some roads would increase security for wildlife, reduce habitat fragmentation, invasive species infestations, and provide other positive wildlife benefits, which are important considerations in restoring ecological processes.

Eight units totaling 19,942 acres would be expanded because they possess the outstanding wilderness tangible and intangible aspects as described in the Service's wilderness policy.

Strategies for Wilderness D1–D3. Same as B and C.

OBJECTIVES for CULTURAL and PALEONTOLOGICAL RESOURCES

CULTURAL RESOURCES

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.

Objectives for Cultural Resources, Alternative A

Cultural Resources A1. Over 15 years, continue to identify and protect cultural resources in accordance with Federal laws and policies. (Same as Cultural Resources B1, C1, and D1.)

Rationale for Cultural Resources A1. 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. (Same as B, C, and D.)

Strategies for Cultural Resources A1

- Identify historic homesteads to maintain.
- Protect all known gravesites, and maintain the cultural resource inventory.

Objectives for Cultural Resources, Alternative B

Cultural Resources B1. Same as Cultural Resources A1, C1, and D1.

Cultural Resources B2. Within 5 years, develop a step-down plan for the preservation and protection of cultural resources on the refuge. (Same as Cultural Resources C2 and D2.)

Cultural Resources B3. Within 5 years, identify areas with a high or moderate likelihood of having historic properties. (Same as Cultural Resources C3 and D3.)

Cultural Resources B4. Within 10 years, survey the moderate and high areas for cultural resources to identify most of the historic properties. (Same as Cultural Resources C4 and D4.)

Cultural Resources B5. Over 15 years, compile a comprehensive cultural resource overview that describes the nature and extent of past cultural resource inves-

tigations, the types of resources known at the refuge, and the interpretive context for these resources. (Same as Cultural Resources C5 and D5.)

Cultural Resources B6. Over 15 years, develop interpretive materials that explain the refuge's cultural resources. (Same as Cultural Resources C6 and D6.)

Cultural Resources B7. Over 15 years, develop a system for archiving historic items (including documents, photographs, maps and artifacts) in accordance with Department of the Interior policies. (Same as Cultural Resources C7 and D7.)

Cultural Resources B8. 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. (Same as Cultural Resources C8 and D8.)

Rationale for Cultural Resources B1–B8. Same as A, plus 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 would allow staff to better consider cultural resources in planning and would 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 historic 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 would outline specific threats to the resources and the ability of future studies to address regional research questions. It would 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 Resources B1–B8

- 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.
- 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.
- 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.

Objectives for Cultural Resources, Alternative C

Cultural Resources C1. Same as Cultural Resources A1, B1, and D1.

Cultural Resources C2–C8. Same as Cultural Resources B2–B8 and D2–D8.

Rationale for Cultural Resources C1–C8. Same as B, except with the emphasis of promoting wildlife-dependent uses, the strategies would reflect an additional emphasis on interpretation and education.

Strategies for Cultural Resources C1–C8. Same as B, plus:

- Create more cultural resource educational and interpretive materials. (Same as D.)
- Develop brochures and kiosks that interpret cultural resources. (Same as D.)
- Collaborate with organizations such as Earth Watch or the Passport in Time program to encourage professionals to work with volunteers to identify or stabilize resources.
- Use interpretive signs to interpret an area (but not a specific location).

Objectives for Cultural Resources, Alternative D

Cultural Resources D1. Same as Cultural Resources A1, B1, and C1.

Cultural Resources D2–D8. Same as Cultural Resources B2–B8 and C2–C8.

Rationale for Cultural Resources D1–D8. Same as B, plus there would be less emphasis on promoting public uses than under alternative C and more of an emphasis on providing quality experiences, but the objectives would be essentially the same. The strategies would slightly differ from alternative B and would include education and interpretation materials.

Strategies for Cultural Resources D1–D8. Same as B, plus:

- Create more cultural resource educational and interpretive materials. (Same as C.)
- Develop brochures and kiosks that interpret cultural resources. (Same as C.)

PALEONTOLOGICAL RESOURCES

Many paleontological resources have been excavated from the refuge. Among the most recognizable dinosaur fossils finds to come from the refuge include *Tyrannosaurus rex*, *Triceratops*, *Albertosaurus*,

Mosasaurus, and hadrosaurs (refer to “Chapter 4—Affected Environment”). Several collections are on display at the Fort Peck Interpretive Center. Collection of any fossils is not allowed without a special use permit.

Objectives for Paleontological Resources, Alternative A

Paleontological Resources A1. Over 15 years, continue to issue permits to the Museum of the Rockies or others for collecting paleontological resources and prohibit recreational digging. (Same as Paleontological Resources B1, C1, and D1.)

Rationale for Paleontological Resources A1. 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 would continue.

Strategy for Paleontological Resources A1

- Monitor an operator to ensure compliance with terms of the permit, and monitor and investigate any reports of illegal digging.

Objectives for Paleontological Resources, Alternative B

Paleontological Resources B1. Same as Paleontological Resources A1, C1, and D1.

Paleontological Resources B2. Within 5 years, in cooperation with the Museum of Rockies and 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. (Same as Paleontological Resources C2 and D2.)

Paleontological Resources B3. Within 5 years, interpret and promote the national natural landmarks on the refuge. At a minimum post the plaque and announce the designation.

(Same as Paleontological Resources C3 and D3.)

Rationale for Paleontological Resources B1–B3. Montana State University is evaluating paleontological resources and working on the stepdown plan. The plan would include guidelines to decide when and how to issue permits for science and education. Mon-

tana 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 Resources B1–B3

- 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.

Objectives for Paleontological Resources, Alternative C

Paleontological Resources C1. Same as Paleontological Resources A1, B1, and D1.

Paleontological Resources C2–C3. Same as Paleontological Resources B2–B3 and D2–D3.

Rationale for Paleontological Resources C1–C3. Same as B, except the approach would increase opportunities for research when compatible with protection of resources.

Strategies for Paleontological Resources C1–C3. Same as B, plus:

- Consider increasing education opportunities and permits for universities.
- Consider buying inholdings for protection of paleontological resources.

Objectives for Paleontological Resources, Alternative D

Paleontological Resources D1. Same as Paleontological Resources A1, B1, and C1.

Paleontological Resources D2–D3. Same as Paleontological Resources B2–B3 and C2–C3.

Rationale and Strategies for Paleontological Resources D1–D3. Same as B, except:

- Limit or manage special use permits when necessary to protect resources.

OBJECTIVES for OPERATIONS, PARTNERSHIPS, and RESEARCH

REFUGE OPERATIONS

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 the day-to-day operations and the long-term programs such as land acquisition. The below objectives describe how the Service uses money and personnel to meet the refuge complex goals.

Objectives for Refuge Operations, Alternative A

Operations A1. Continue mineral withdrawal on all refuge lands until 2013, and work to renew mineral withdrawal or acquire minerals.

Operations A2. Over 15 years, work within the Service to adjudicate and define water rights. (Same as Operations B2, C2, and D2.)

Operations A3. Over 15 years, maintain existing public use facilities (refer to “Chapter 4—Affected Environment”). (Same as Operations B3, C3, and D3.)

Operations A4. Over 15 years, maintain refuge personnel at current levels as identified in table 9 (section 3.14 below).

Rationale for Refuge Operations A1–A3. Public Land Order 6997 (1993) withdrew minerals for all the refuge until 2013. Under all the alternatives, the Service would continue to renew and seek to purchase minerals on future acquisitions. This would not include private or State lands where this is exempted. The United States holds Federal reserved water rights on the refuge (refer to “Chapter 4—Affected Environment”), and the United States is in the process of quantifying these reserved rights with the Montana Reserved Water Rights Compact Commission.

There are approximately 28 full-time equivalent positions and several seasonal staff at the refuge (refer to table 9 in section 3.14 below). This includes positions that are funded by general refuge operations money and fire money (separate account). While money and personnel needs can and do change over time; generally, these are personnel levels that would be needed for 15 years.

Strategies for Refuge Operations A1–A4

- 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.
- Maintain select stock ponds.



USFWS

A Service employee prepares to release an endangered black-footed ferret on the refuge.

- Maintain the auto tour route, elk-viewing area, accessible hunting blind, and interpretive kiosks.
- Staff the interpretive center at Fort Peck Field Station with refuge personnel.
- 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.

Objectives for Refuge Operations, Alternative B

Operations B1. Same as Operations A1, plus 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. (Same as Operations C1 and D1.)

Operations B2–B3. Same as Operations A2–A3, C2–C3, and D2–D3.

Operations B4. Improve facilities as identified under the strategies and as part of implementing the public use objectives identified above. (Same as Operations C4 and D3.)

Operations B5. 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 9 (section 3.14 below). (Same as Operations C5 and D4.)

Rationale for Refuge Operations B1–B5. Same as A, plus the Service would 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. Specific improvements and additions would be made to public use facilities as part of implementing the objectives for public use and development of the visitor services stepdown plan (see specific topic under public use). The exact number of facilities, length of trail, and location would need to be determined based on projected visitor numbers and after more detailed programming occurred with the visitor services plan. There would be a need to increase personnel by about four positions to meet habitat and public use objectives, and one position would be eliminated (trainee).

Strategies for Refuge Operations B1–B5. Same as A, plus:

- 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.
- Fill one outdoor recreation planner position for the Lewistown or Fort Peck Field Station. If feasible, add a second position.
- Add more law enforcement personnel for Fort Peck Field Station. (Same as C and D.)
- 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. (Same as C and D.)
- 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 complete new monitoring across the refuge. (Same as C and D.)
- Hire seasonal employees for fence removal, and hire professional fence builders for boundary fence construction of remaining fences. (Same as C and D.)

Objectives for Refuge Operations, Alternative C

Operations C1. Same as Operations B1 and D1.

Operations C2. Same as Operations A2, B2, and D2.

Operations C3. Same as Operations A3 and B3.

Operations C4–C5. Same as Operations B4–B5 and D3–D4.

Rationale for Refuge Operations C1–C5. Similar to A and B, except there would be a need to increase personnel by seven to eight positions to meet habitat and public use objectives and one trainee position would be eliminated. (Same as D.)

Strategies for Refuge Operations C1–C4. Same as B, plus:

- Evaluate the possibility of constructing an interpretive center at the Sand Creek Field Station in cooperation with various nongovernmental organizations.
- Develop displays in the field offices and the headquarters to interpret the paleontological resources. (Same as D.)
- Hire two visitor services personnel (outdoor recreation planners) at Lewistown Field Station and Fort Peck Field Station (top priority). (Same as D.)
- Hire staff and graduate students to complete habitat inventories. (Same as D.)
- Hire two maintenance employees for UL Bend Refuge. (Similar to D.)

Objectives for Refuge Operations, Alternative D

Operations D1. Same as Operations B1 and C1.

Operations D2. Same as Operations A2, B2, and C2.

Operations D3–D4. Same as Operations B4–B5 and C4–C5.

Rationale for Refuge Operations D1–D4. Same as C, except positions could be classified differently because of the different emphasis.

Strategies for Refuge Operations D1–D4. Same as B, plus:

- 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. (Same as C.)

PARTNERSHIPS

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 landown-

ers next to the refuge and other interested agencies and groups, are essential to meeting refuge goals.

Objectives for Partnerships, Alternative A

Partnerships A1 (land management). Over 15 years, work cooperatively with USACE to acquire jurisdiction around the lake to enforce regulations. (Same as Partnerships B1, C1, and D1.)

Partnerships A2 (land management). Over 15 years, maintain existing partnerships and agreements with Federal, State, county, conservation districts, adjacent private landowners, and local communities as identified in section 3.11 below. (Same as Partnerships B2, C2, and D2.)

Partnerships A3 (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, pronghorn, and sage-grouse) and species of concern (prairie dogs and black-footed ferrets). (Same as Partnerships B3, C3, and D3.)

Rationale for Partnerships A1–A3 (land management). Currently, the Service works cooperatively with many agencies and jurisdictions and these efforts would continue under all alternatives. There are several agreements that are currently in place and these would continue. (Same as B, C, and D.)

Strategies for Partnerships A1–A3 (land management). None.

Objectives for Partnerships, Alternative B

Partnerships B1–B3 (land management). Same as Partnerships A1–A3, C1–C3, and D1–D3.

Partnerships B4 (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 Partnerships A3. (Similar to Partnerships D4.)

Rationale for Partnerships B1–B4 (land management). 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 pres-

ures (converting grassland to crops) are a few of the habitat limitations that negatively affect these sentinel species. Conservation incentives from government agencies or conservation groups would 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.

Strategies for Partnerships B1–B4 (land management)

- Develop standardized monitoring strategies to measure habitat conditions, wildlife distribution, and wildlife response to management actions to be used across the area.
- Support incentives in the current Farm Bill legislation (Cooperative Conservation Partnership Initiative and Conservation Innovation Grants) that are available to private landowners for habitat conservation for these species.
- Form partnerships or memoranda of understanding with private landowners, nongovernmental agencies, local tribes, and BLM to manage sentinel plant and wildlife species across boundaries.
- Coordinate and cooperate on research and monitoring needs and provide resources to implement adaptive management actions on neighboring lands.
- Manage sentinel wildlife such as prairie dogs to support the full suite of wildlife that rely on prairie dogs or prairie dog towns.

Partnerships B5 (volunteers and friends). Within 5 years, develop a volunteer program and Friends group aimed at meeting the refuge's biological and public use objectives. (Same as Partnerships C5 and D6).

Partnerships B6 (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. (Same as Partnerships C6 and D7).

Rationale for Partnerships B5–B6 (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 would establish an active volun-

teer program and Friends group to advance the refuge's programs and establish partnerships with the local communities.

Strategies for Partnerships B5–B6 (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.
- Work with partners to continue to seek grants to fund events and programs.

Objectives for Partnerships, Alternative C

Partnerships C1–C3 (land management). Same as Partnerships A1–A3, B1–B3, and D1–D3.

Partnerships C4 (land management). Similar to alternative B, except the six counties, tribal governments, conservation organizations (World Wildlife Fund, American Prairie Reserve, Ranchers Stewardship Alliance, and The Nature Conservancy) and interested private landowners develop habitat management treatments that benefit livestock operators and provide adequate habitat for a suite of prairie species that have large home ranges or are species of concern.

Rationale for Partnerships C1–C4. Private ranch operations support a variety of wildlife species. Many species of concern such as prairie dogs and pronghorn are found on lands outside of the refuge. Economic incentives to private individuals for conservation measures benefit both wildlife and local communities. By maintaining intact family ranches, wildlife managers reap the benefits of conservation measures on private lands next to the refuge and con-

servation organizations. By developing management strategies that benefit livestock operations and certain species of wildlife, all parties benefit. Forming formal partnerships with ranchers for wildlife conservation allows the Service to provide funds and resource to meet conservation objectives on a landscape scale.

Strategies for Partnerships C1–C4 (land management)

- Develop management procedures that benefit livestock operations and selected wildlife species.
- 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.

Partnerships C5–C6 (volunteers and friends). Same as B5–B6 and D6–D7.

Rationale for Partnerships C5–C6 (volunteers and friends). Same as B and D.

Strategies for Partnerships C5–C6 (volunteers and friends). Same as B, plus:

- Over 15 years, develop partnerships with photography clubs to provide five nature photography workshops on the refuge.
- Over 15 years, collaborate with other groups to provide three more Web-based cameras or video cameras to local schools.

Objectives for Partnerships, Alternative D

Partnerships D1–D3 (land management). Same as Partnerships A1–A3, B1–B3, and C1–C3.

Partnerships D4 (land management). Similar to Partnerships B4, except that USACE, BLM, MFWP, DNRC, the six counties, tribal governments, conservation organizations (World Wildlife Fund, American Prairie Reserve, Ranchers Stewardship Alliance, and The Nature Conservancy) and interested private landowners monitor and manage for sentinel plants and heterogeneity of habitats with associated wildlife.

Partnerships D5 (land management). Over 15 years, promote healthy populations of all plants and associated prairie-wildlife lands adjoining the refuge partners' focus areas.

Rationale for Partnerships D1–D5 (land management). 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 would be improved as well. By restoring pyric-herbivory processes and managing for total ungulate populations, the overall health of these plants and habitats would 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 Partnerships D1–D5 (land management).

Same as C, plus:

- Conduct a pyric herbivory study and management program on the refuge as a demonstration site for other interested land managers and landowners.

Partnerships D6–D7 (volunteers and friends). Same as Partnerships B5–B6 and C5–C6.

Rationale and Strategies for Partnerships D6–D7 (volunteers and friends). Same as B, plus:

- 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.

RESEARCH AND SCIENCE

In addition to the research needs described under the habitat, wildlife, and public use objectives, research as part of a partnership effort is described.

Objectives for Research, Alternative A

Research A1. Continue existing research, and continue to maintain partnerships with researchers interested in studying refuge resources.

Rationale for Research A1. The Service works with many universities and researchers and this would continue.

Strategies for Research A1. None.

Objectives for Research, Alternative B

Research B1. 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 B2. Over 15 years, support research of habitat, wildlife, and public use.

Research B3. Over 15 years, work with MFWP to annually study the movement of big game relative to habitat changes (for example, fire and grazing).

Research B4. Within 5 years, begin monitoring wintering pronghorn on the refuge to meet the Executive order.

Research B5. Over 15 years, work with MFWP to conduct research on habitat suitability for bighorn sheep.

Research B6. 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 B1–B6. Research would support the emphasis of increasing wildlife populations.

Strategies for Research B1–B6

- 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.

Objectives for Research, Alternative C

Research C1–C6. Same as Research B1–B6.

Research C7. Within 5 years, begin research of new species proposed for hunting (for example, mountain lion).

Rationale for Research C1–C7. Same as B, plus before a mountain lion hunt would be conducted on the refuge, more research would be needed to determine population numbers, food requirements, and the role these predators have on other wildlife on the refuge. This would be necessary before the full package can be submitted to Washington for approval.

Strategies for Research C1–C7. Same as B, plus:

- Within 5 years, work with MFWP to conduct research on the age structure of mule deer herds within the Missouri River Breaks.

Objectives for Research, Alternative D

Research D1–D6. Same as Research B1–B6 and C1–C6.

Rationale and Strategies for Research D1–D6. Same as B and C.

3.9 FORESEEABLE ACTIVITIES

Reasonably foreseeable future activities are actions and activities that are independent of the proposed actions for the refuge, but could result in cumulative effects when they are combined with the effects of the proposed alternatives. They are anticipated to occur regardless of any action or alternative that is selected. The effects of those are described in the cumulative impacts sections for each resource in chapter 5.

Reasonably foreseeable future activities within or near the refuge are represented in figure 5 (map of decision and analysis areas) and fall into the following categories:

- Federal land management
- State wildlife management
- nongovernmental conservation activities
- regional demographic and economic change
- infrastructure development

FEDERAL LAND MANAGEMENT

Federal land management activities include those by USACE, BLM, Federal Aviation Administration, and the Department of the Interior.

Fort Peck Dam/Fort Peck Lake Master Plan (USACE)

The master plan and environmental assessment of 2008 analyzes proposed expansion and upgrades to facilities at existing recreation areas as well as natural resource management improvements. The environmental assessment did not identify any significant effects resulting from the proposed master plan alternative. It did note that expanded shoreline development at Fort Peck West could negatively affect potential piping plover nesting areas, although there are no nests there currently. The environmental assessment also identified localized negative effects on air quality, noise, and visual quality due to added development within existing recreation areas (USACE 2008).

Transfer of Cabin Sites (USACE)

In 2004, USACE cooperated with the Service to complete an environmental assessment reviewing implementation of the Enhancement Act (refer to chapter 1) and found no adverse effects (USACE 2004). Following public comments that questioned the decision to deny conveyance of 12 cabin sites in the South Fork Rock Creek area, USACE reexamined the issue and agreed to convey all cabin sites. To offset the effects of this decision to the refuge, USACE agreed to outgrant more Fort Peck Project lands to the Service (USACE 2004). (Refer to chapter 1, section “1.9 Issues Not Addressed,” for more information.)

Upper Missouri River Breaks National Resource Management Plan (BLM)

BLM issued a record of decision for its approved resource management plan for the Upper Missouri River Breaks National Monument in December 2008. The plan responds to increasing demands for recreation while providing mitigating measures to manage enhance and protect fish and wildlife habitat and habitat for special status species including greater sage-grouse and black-tailed prairie dog. Vegetation will be managed to achieve a natural range of native plant communities for a wide variety of long-term benefits including aesthetics, wildlife, recreation, and livestock grazing (BLM 2008a,c).

The approved plan provides diverse recreational opportunities including both motorized and nonmotorized watercraft use on the Missouri River, with seasonal restrictions on motorized use within the designated wild and scenic river portions. BLM will coordinate with the Service on bank side recreation use and management within the refuge boundaries. The plan includes mitigation measures applied to surface-disturbing or disruptive activities to protect important wildlife habitat for greater sage-grouse, black-tailed prairie dog, bald eagle, bighorn sheep, designated sensitive species, and big game (winter range). Unavoidable effects of the plan alternatives were limited to localized, negative effects on soil erosion and vegetation from ground-disturbing activities (BLM 2008c).

Wilderness Study Areas (BLM)

BLM has several designated wilderness study areas near or next to the refuge. These include Seven Blackfoot, Burnt Lodge, and Antelope Creek wilderness study areas.

Sage-Grouse Conservation (BLM)

In 2004, BLM developed a national conservation strategy for sage-grouse habitat (BLM 2004). Additionally, BLM is in the process of amending or revising all its resource management plans to create a better regulatory structure for sage-grouse conservation.

Military Operations

The refuge is located below the Hays Military Operations Area. The Federal Aviation Administration is responsible for all airspace in the United States. The Improvement Act specifically exempted overflights above a refuge from compatibility requirements (FWS 2000a); therefore, the refuge does not have control over military overflights. These operations occur over the western boundary of the refuge and are infrequent and irregular. No further information is known about any negative effect these operations have on refuge wildlife or visitors. Refer to chapter 1, section 1.9, for more information.

Climate Change Initiative (DOI)

In March 2007, the Secretary of the Interior established the Department of the Interior Climate Change Task Force. That Task Force included subcommittees charged with exploring the potential consequences of climate change on Interior lands and resources, and potential ways for addressing them. Based on the findings and recommendations of the Task Force, some of the following issues have the potential for cumulative effects on resources in and around the refuge (DOI 2008b):

- changes in water quality and availability
- increased flood risk
- outbreaks of pests, invasive species, and diseases
- changes in wildlife habitat and migration patterns
- changes in wildfire frequency and behavior

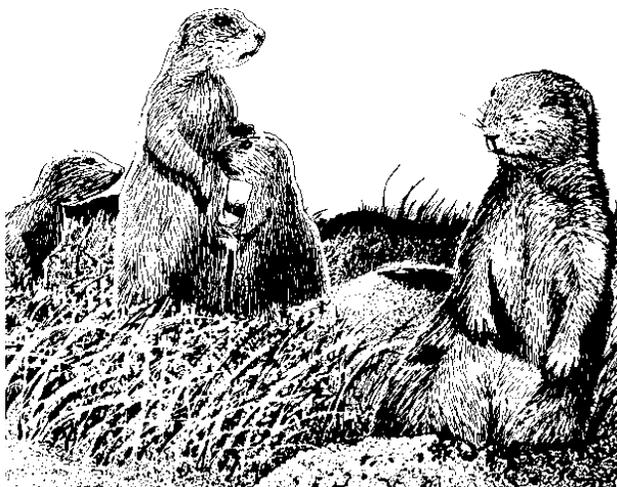
Refer to the discussion for the climate change objectives in section 3.8 above.

STATE WILDLIFE MANAGEMENT

Several MFWP wildlife management plans are discussed.

Prairie Dog Conservation Plan

In 2002, the Montana Prairie Dog Working Group developed a statewide conservation plan for prairie dogs, recognizing that current population numbers are much smaller than historical numbers due to eradication programs, conversion of native rangelands, sylvatic plague, and recreational shooting (MFWP 2002b). The overall goal of the conservation plan is to provide for management and long-term viability of prairie dog populations and associated species. The conservation plan recommends several specific management actions to enhance prairie dog populations.



Prairie Dog Town
Bob Savannah / USFWS

Big Game Management

MFWP has completed statewide management plans and conservation strategies for elk (MFWP 2004), mule deer (MFWP 2001), and bighorn sheep (MFWP 2009a). These documents outline guiding principles for management of these species, as well as specific objectives for management units and hunting districts that include the refuge. The elk and bighorn sheep plans outline specific management strategies that include coordination with the Service to achieve herd objectives on and off refuge land.

Fisheries Management

The Fort Peck Reservoir fisheries management plan (MFWP 2002a) includes specific management programs for walleye, sauger, smallmouth bass, lake trout, northern pike, Chinook salmon, forage fish, and fishing tournaments on Fort Peck Reservoir.

Sage-Grouse Management

Montana's conservation strategy for sage-grouse provides for coordinated management across jurisdictional boundaries and development of community support that will promote successful implementation (MFWP 2005b).

NONGOVERNMENTAL CONSERVATION ACTIVITIES

The American Prairie Reserve, The Nature Conservancy, World Wildlife Fund, National Wildlife Federation, and Ranchers Stewardship Alliance conduct conservation activities on large acreages next to or on the refuge.

American Prairie Reserve

Since 2004, the American Prairie Reserve has been working to create the American Prairie Reserve on private lands next to the north side of the refuge in Phillips County. The mission of American Prairie Reserve is "to create and manage a prairie-based wildlife reserve that, when linked to public lands already devoted to wildlife, it will protect a unique natural habitat, provide lasting economic benefits, and improve public access to and enjoyment of the prairie landscape" (American Prairie Foundation 2011). The foundation has been working on bison restoration, pulling interior fences, conducting stream restoration studies, bison and livestock studies, and other activities. Many stewardship activities are conducted in partnership with the refuge.

The American Prairie Reserve owns or leases 123,000 acres of land. Most of the acreage is public-leased land, while the remainder is deeded private land. The foundation is looking at new properties to expand the prairie reserve through more leases and acquisitions. Several new properties are under nego-

tiation (Scott Laird, American Prairie Foundation, personal communication on July 23, 2009).

Matador Ranch

The Nature Conservancy manages the 63,000-acre Matador Ranch located north of the refuge near the town of Zortman. The Nature Conservancy purchased the Matador Ranch in 2000 with the intent of conserving native prairie wildlife in the glaciated plains of north-central Montana. The ranch is the key element of a grass bank program, whereby grazing land is leased to area ranchers at discounted rates, and in exchange the ranchers agree to conservation measures on their own lands. Management and conservation goals include the protection of habitat for grassland birds, prairie dog colonies, and sage-grouse leks (Barbara Cozzens, Matador Ranch Project Director, The Nature Conservancy; personal communication, October 1, 2009).

Throughout the northern Great Plains, including Montana, land is being converted from native grassland or rangeland into crop production. From 2005–09, more than 13,000 acres were converted to cropland within the six-county area (personal communication with Robert Sanders, Ducks Unlimited, June 23, 2010). Landowners are responding to higher market prices for agriculture by converting grassland into crop production. Organizations such as the Nature Conservancy, Ducks Unlimited, and other organizations are working to conserve grassland throughout Montana’s northern prairie.

Ranchers Stewardship Alliance

“The mission of the Ranchers Stewardship Alliance is to promote the ecological, social and economic conditions that will sustain the biodiversity and integrity of America’s northern mixed-grass prairie for present and future generations. They work to support cost-effective, sustainable conservation that features private and public cooperation in a working landscape stewarded by profitable family ranches and thriving rural communities” (Ranchers Stewardship Alliance 2008).

LIVESTOCK GRAZING LEASE ACQUISITIONS

In mid-2009, the World Wildlife Fund and the National Wildlife Federation asked ranchers to submit a bid to voluntarily not apply for future grazing privileges on the refuge. In exchange for cash payment, the ranchers would agree to terminate grazing on the refuge and not renew their permits. Several bids were received, and in late 2009, two agreements were completed, retiring grazing on 55,261 acres (National Wildlife Federation 2011). This effort is part of the National Wildlife Federation’s Wildlife Conflict Reduction Program, which is intended to

reduce grazing conflict with wildlife using marked-based approaches (National Wildlife Federation 2010).

REGIONAL DEMOGRAPHIC and ECONOMIC CHANGE

Demographic and economic trends for the six-county region surrounding the refuge are described in detail as part of the overall socioeconomic context in chapter 4. Some of the reasonably foreseeable trends that could contribute to cumulative effects are briefly described here.

While Montana’s population is expected to increase by 34 percent over the next 20 years, the region surrounding the refuge is expected to continue to lose about 13 percent of its population. While overall employment in the region has been steadily increasing, most of those increases are likely due to people working multiple jobs. Travel and tourism will continue to contribute significantly to Montana’s economy. However, the region surrounding the refuge has experienced a much smaller proportion of growth in travel and tourism spending compared to the rest of the State. As the demand for outdoor recreation has increased, so has the number of land purchases for hunting, fishing, and other recreational uses in areas surrounding the refuge. This trend is expected to continue. With these changes in demographic, economic, and landownership patterns are also expected to bring changes in local communities, and prevailing attitudes values about wildlife, natural resources, and refuge management.

INFRASTRUCTURE DEVELOPMENT

In 2008, TransCanada Keystone Pipeline, LP, filed an application for a Presidential permit for the construction, operation, and maintenance of pipeline facilities at the border of the United States and Canada for the transport of crude oil across the two countries’ international boundary. The proposed pipeline project would deliver crude oil from western Canada to locations in the south-central United States. On August 26, 2011, the U.S. Department of State released a final EIS for the proposed TransCanada Keystone XL Pipeline Project (U.S. Department of State 2011). In January 2012, the Obama Administration denied a permit for the proposed pipeline, but there could be further action on this project in the future.

The proposed pipeline corridor would be near or adjacent to the northeastern edge of the Charles M. Russell National Wildlife Refuge but would not be located on refuge land. The final EIS anticipated general effects associated with ground disturbance and construction. The final EIS analyzed potential effects on federally listed and candidate

species including black-footed ferret, greater sage-grouse, least tern, piping plover, and pallid sturgeon. For all of the listed species, the final EIS finds that the proposed project is not likely to adversely affect the species. With the pipeline route proposed to pass through about 20 miles of core habitat for the greater sage-grouse in Montana, the final EIS found that the project would not likely affect the courtship activities of sage-grouse on leks and would likely result in a minor negative effect on nesting birds (U.S. Department of State 2011).

3.10 ELEMENTS CONSIDERED but ELIMINATED from FURTHER CONSIDERATION

During scoping and alternatives development, the Service or interested groups and the public suggested several goals, alternatives, or elements of alternatives that were considered but eliminated from further analysis. These elements are discussed below.

DEVELOPING GOALS for LIVESTOCK GRAZING and SOCIOECONOMIC USES

Some interested groups and the public requested the Service have a specific goal that would support livestock grazing because Executive Order 7509 made provisions for livestock grazing once the primary purposes were met. As per 50 CFR 29.1, the Service allows for economic uses on national wildlife refuges (including haying, logging, and grazing) when the uses are compatible with refuge purposes and when they contribute to accomplishing the purposes of the refuges or the mission of the Refuge System. It is not the mission of the Refuge System to provide for economic uses.

The Service manages each refuge to fulfill the mission and, where appropriate, restore the lost elements of biological integrity of each refuge and the Refuge System, as well as achieve the specific purposes for which the refuge was established. Congress also provided for six priority wildlife-dependent public uses to be accommodated wherever possible. The Improvement Act only addressed economic uses in the context of how compatibility standards and procedures should be administered for uses of a refuge (Section 6 under the Improvement Act). In reviewing the Service's compatibility policy (FWS 2000a), it states the following:

“Economic uses can only be allowed when they do not materially detract from the fulfillment of the Refuge System mission or the purposes

of the refuge. Inherent in fulfilling the System mission is not degrading the ecological integrity of the refuge. Compatibility, therefore, is a threshold issue, and the proponent(s) of any use or combination of uses must demonstrate to the satisfaction of the Refuge Manager that the proposed use(s) pass this threshold test.”

The Service uses livestock grazing to meet specific wildlife and habitat objectives. Grazing was considered in the objectives and strategies in the alternatives, but it was not considered as a specific goal of the planning process.

Like livestock grazing, the Service did not consider socioeconomic issues as being a singular goal of the planning process but did recognize these issues in the formation of alternatives, objectives, and strategies. Specifically, the Service has considered an alternative (C) that would emphasize and promote maximum compatible wildlife-dependent public uses and economic uses while protecting wildlife populations and habitats to the extent possible. The Service did change language in the Partnership Goal (refer to “Chapter 2—Refuge History and Vision”) to include more recognition of the social and economic contribution of the refuge to adjacent communities.

ELIMINATING ALL LIVESTOCK GRAZING

Some interested groups and the public requested the Service consider a no-grazing alternative. Although initially considered, it was eliminated from further analysis.

The use of livestock grazing is consistent with the direction provided in the Improvement Act, which defines conservation and management as “to sustain and, where appropriate restore and enhance, healthy populations of fish, wildlife, and plants, using, in accordance with Federal and State laws, methods and procedures associated with modern scientific resource programs.”

The northern Great Plains, including much of the landscape in and around the refuge, evolved over thousands of years through a complex ecological interaction between fire and grazing (Higgins 1986). Even if wild bison (extirpated from the area in the late 1800s) were to be restored to parts of the refuge (a consideration in alternatives B and D if proposed by MFWP), it could take years of coordination and planning to implement. There are many areas within the refuge where fire occurs infrequently or cannot be used because of other factors. Given the complex ecological factors including invasive species and uncertainties about how climate change could affect wildlife and their habitat, the Service determined that eliminating an important management tool for achieving habitat objectives was not realistic or needed. Several habitat

units have never allotted livestock grazing. Livestock are kept out of most riparian areas along the Missouri River, and there are cattle exclosures scattered across the refuge. Most areas that are managed under prescriptive grazing are largely being rested (refer to figure 16). One alternative (B), considers implementing prescriptive grazing over most of the refuge in an accelerated implementation timeframe within 4–7 years. Implementation would include long periods of rest, and livestock grazing would only be used to meet specific habitat objectives. In accordance with the Service’s compatibility policy, the use of prescriptive grazing will be periodically reevaluated, and the refuge manager could modify and reevaluate the existing determination (FWS 2000a). A compatibility determination for the use of prescriptive grazing is included in appendix C.

MANAGING ONLY for SHARP-TAILED GROUSE, PRONGHORN, and LIVESTOCK GRAZING

Some interested groups and the public felt the Service should only consider an alternative that only manages for sharp-tailed grouse, pronghorn, and livestock grazing as these were specifically mentioned in Executive Order 7509. Although Executive Order 7509 singled out sharp-tailed grouse and pronghorn for protection in 1936 (in addition to other wildlife), since then, there have been several Executive orders, laws, and policies that have guided the management of the refuge. Livestock grazing is only a provision to the extent that it remains compatible with the primary purposes. Not all lands within the refuge were set aside under Executive Order 7509. This includes UL Bend National Wildlife Refuge and other lands acquired through fee title. Many fish, wildlife, and plant species are found on the refuge (refer to “Chapter 4—Affected Environment”), and although sharp-tailed grouse and pronghorn are named in Executive Order 7509, in only managing for these species, the Service would not meet other refuge purposes, Refuge System mission, or the vision and goals of this planning process.

As stated in chapter 2, the refuge is administered under the provisions of the National Wildlife Refuge Administration Act of 1966 and not Taylor Grazing Act. Several court cases have affirmed this. Under the Refuge System, livestock grazing is used as a management tool for meeting habitat and wildlife objectives, and the four alternatives presented provide for a range of approaches for managing habitat and wildlife.

DEVELOPING a MEMORANDUM of UNDERSTANDING for LIVESTOCK GRAZING

Some interested groups and the public suggested that the Service collaborate with the adjoining conservation districts, either through a memorandum of understanding or through separate contracts for assessment and management of the refuge’s grazing allotments. This would include the calculation of AUMs that each habitat unit could support.

Partnerships certainly play an important role in helping the Service to achieve its planning goals for habitat management. The Service is committed to working with many Federal, State, and local governments, tribal governments, private landowners, and other organizations (refer to the partnership objectives for each alternative in section 3.8 above, as well as 3.11 below). However, a memorandum of understanding or contract with a local government agency to assess and manage grazing allotments as proposed would effectively limit a refuge manager’s ability to make stipulations or decisions on the compatibility of economic activities in managing habitat for the benefit of wildlife (refer to the above discussion on compatibility about developing goals for livestock grazing and socioeconomic uses). In the Improvement Act, Congress set provisions for “ensuring timely and effective cooperation with Federal agencies and State fish and wildlife agencies during the course of acquiring and managing refuges.” Congress did not specify a role for other governmental agencies in managing refuge habitat, which seems to be the intent of this suggestion. The Service has considered an alternative that emphasizes public use and economic use while protecting habitat and wildlife; therefore, this suggestion was not analyzed further.

OPENING ROADS in WILDERNESS

Several interested groups and the public wanted the Service to consider reopening roads that were previously closed through proposed or designated wilderness, either seasonally or permanently. In compliance with the Wilderness Act and Service’s Wilderness Stewardship policy (FWS 2008c), the Service did not consider reopening formerly closed roads in existing proposed wilderness units. The Service uses the CCP process to determine if other lands should be recommended for wilderness designation or if other changes should be made to the existing proposed wilderness units.

REDUCTION of PROPOSED WILDERNESS AREAS

During the scoping period, several people asked the Service to consider reducing the number of proposed wilderness areas on the refuge. The Service initially considered this idea under two alternatives (C and D) and evaluated several options in the draft CCP and EIS. Although this consideration does not specifically conflict with the Service's Wilderness Stewardship policy, it does conflict with the policies of other agencies within the Department of Interior (BLM and National Park Service). Several units are split in two by a road as is the case with East and West Beauchamp Creek (road 201). Another unit (East Hell Creek) has a road leading to a private inholding. However, conditions have not changed in any of the units since they were proposed as wilderness in 1974, and measurable negative effects have not been documented. The presence of a road is not justification for eliminating the unit. Furthermore, because the proposed wilderness units were transmitted to Congress by the President in 1974, any recommendation that came out of the CCP process could not be carried out until Congress acted on the original proposals. This would cause confusion; therefore, the reduction of any unit was not carried forward in the final CCP and EIS.

3.11 PARTNERSHIPS

Many opportunities exist near the Charles M. Russell National Wildlife Refuge to continue existing partnerships or establish new ones. These include 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

3.12 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 outline within a CCP (see figure 11).

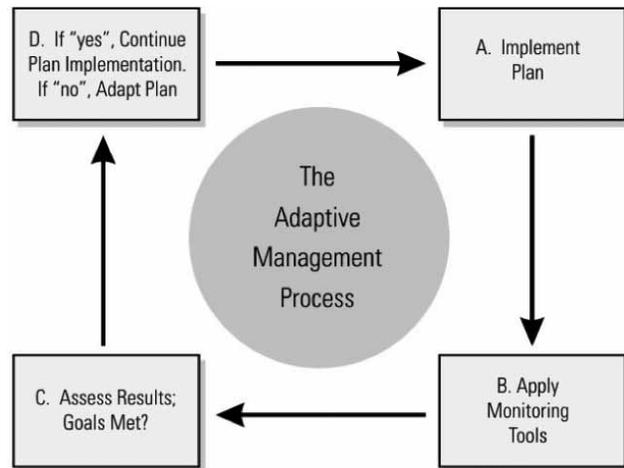


Figure 11. Adaptive management process.

To apply adaptive management, specific survey, inventory, and monitoring protocols would be adopted for the refuge. The habitat management strategies would be systematically evaluated to determine management effects on wildlife populations. This information would be used to refine approaches and find out how effectively the objectives are being accomplished. Evaluations would 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 would be made. Subsequently, the CCP would be revised.

3.13 PLAN AMENDMENT and REVISION

The final CCP will be reviewed annually to determine the need for revision. A revision would occur if and when significant information becomes available, such as a change in ecological conditions. Revisions to the CCP and subsequent stepdown management plans

would be subject to public review and compliance with the National Environmental Policy Act. At a minimum, this plan would be evaluated every 5 years and revised after 15 years. Table 6 identifies the step-down plans needed to fully implement the CCP.

Table 6. Stepdown management plans for the Charles M. Russell and UL Bend Refuges.

<i>Plan</i>	<i>Year to be Completed*</i>
Cultural resources	2017
Fire management	2014
Habitat management	2015–9
Invasive plant management	2015
Paleontological resources	2017
Public use hunting and fishing fishing and mussels wildlife observation, photography, and interpretation environmental education	2017
Transportation	2017
Wilderness stewardship	2015

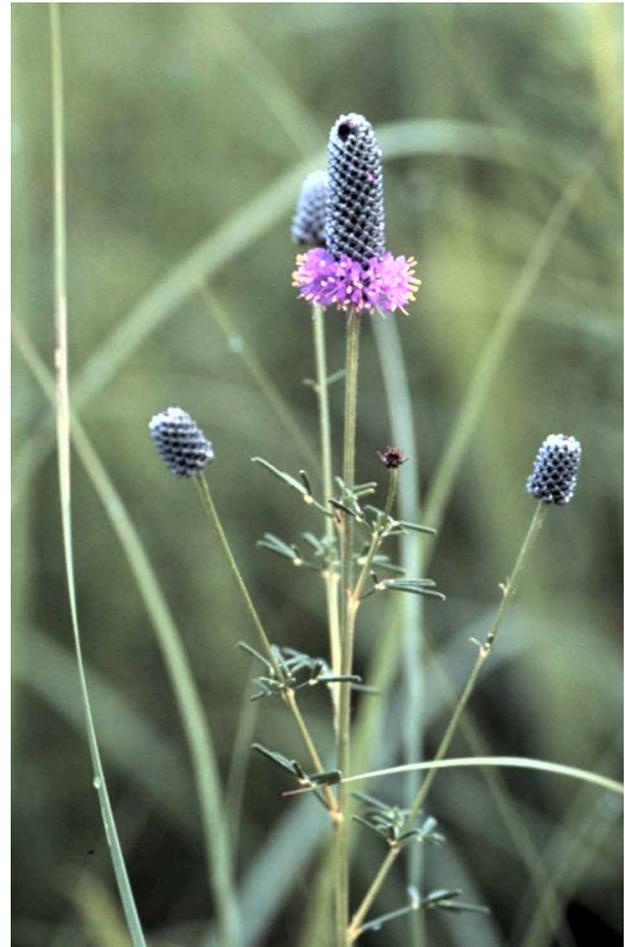
**Depends on the preferred alternative selected for the CCP.*

3.14 FUNDING and PERSONNEL

Refuge budgets generally include ongoing operations funds for personnel, maintenance, and utility needs. Table 7 summarizes the estimated costs for the alternatives over 15 years, and table 8 displays the details used to develop the costs.

Table 9 compares the current personnel plan with the proposed personnel needed under each alternative. Projects required to carry out the final 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.



Purple Prairieclover

Larry Allain / USDA-NRCS PLANTS Database

Table 7. Costs over 15 years to carry out the CCP alternatives for the Charles M. Russell and UL Bend Refuges (\$1,000).

	<i>Alternative A</i>	<i>Alternative B</i>	<i>Alternative C</i>	<i>Alternative D</i>
One-time cost	7,945	19,569	18,872	20,356
Salaries	41,310	45,193	56,288	56,351
Total cost	49,255	64,762	75,160	76,707

Table 8. Cost analysis for the CCP alternatives for the Charles M. Russell and UL Bend Refuges (\$1,000).

<i>Management cost item</i>	<i>Cost over 15 years (in thousands of dollars)</i>			
	Alternative A	Alternative B	Alternative C	Alternative D
HABITAT: uplands	317	500	626	598
river bottoms	420	494	350	490
riparian areas and wetlands	150	213	71	258
shorelines	0	51	51	51
CLIMATE CHANGE	45	95	95	95
INVASIVE SPECIES	75	120	120	120
FIRE: prescribed fire	576	2,100	655	2,100
wildfire	1,190	1,190	1,190	1,190
WILDLIFE MANAGEMENT: big game	425	500	435	475
furbearers	100	400	200	400
threatened and endangered species	150	215	215	215
American bison	0	80	10	80
other wildlife	0	97	97	97
birds	35	121	96	121
PUBLIC USE: hunting	30	265	338	330
fishing	50	163	189	163
observation, interpretation, and photography	95	279	423	346
environmental education	15	35	122	47
outreach	5	15	25	20
commercial uses and outfitting	15	32	52	32
recreation sites	50	75	90	90
access	95	140	360	210
WILDERNESS	15	15	15	15
CULTURAL RESOURCES	10	93	110	110
REFUGE OPERATIONS: stock ponds and maintenance	82	162	155	172
VOLUNTEERS and FRIENDS	0	20	33	32
PRIORITY LAND ACQUISITIONS	4,000	4,000	4,000	4,000
INTERPRETIVE CENTER: building		8,000	8,000	8,000
exhibits		100	750	500
Subtotal of one-time costs over 15 years	7,945	19,569	18,872	20,356
Salaries over 15 years	41,310	45,193	56,288	56,351
Total Cost	49,255	64,762	75,160	76,707

Table 9. Personnel to carry out the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Alternative A (current personnel)</i>	<i>Alternative B</i>	<i>Alternative C</i>	<i>Alternative D</i>
<i>Headquarters (Lewistown, Montana)</i>			
Project leader GS*–14	Project leader GS–14	Project leader GS–14	Project leader GS–14
Deputy project leader GS–13			
Pilot and wildlife biologist GS–12			
Wildlife refuge specialist GS–9	Wildlife refuge specialist GS–9	Outdoor recreation planner GS–9	Outdoor recreation planner GS–9
Maintenance worker WG*–8	Maintenance worker WG–8	Maintenance worker WG–8	Maintenance worker WG–8
Maintenance worker WG–7	Maintenance worker WG–7	Maintenance worker WG–7	Maintenance worker WG–7
Supervisory wildlife biologist GS–13			
**Wildlife biologist GS–12	Wildlife biologist GS–12	Wildlife biologist GS–12	Wildlife biologist GS–12
Wildlife biologist GS–9	Wildlife biologist GS–9	Wildlife biologist GS–9	Wildlife biologist GS–9
Wildlife biologist GS–9	Wildlife biologist GS–9	Wildlife biologist GS–9	Wildlife biologist GS–9
Fire management officer GS–12	Refuge complex fire management officer GS–13	Refuge complex fire management officer GS–13	Refuge complex fire management officer GS–13
Administrative officer GS–11	Administrative officer GS–11	Administrative officer GS–11	Administrative officer GS–11
Administrative assistant GS–6	Administrative assistant GS–6	Administrative assistant GS–6	Administrative assistant GS–6
Administrative assistant (term) GS–4			
—	—	Outdoor recreation planner GS–11	Outdoor recreation planner GS–11
<i>Fort Peck Field Station</i>			
Station manager GS–12	Station manager GS–12	Station manager GS–12	Station manager GS–12
Assistant station manager GS–9			
Biological technician GS–6	Biological technician GS–6	Biological technician GS–6	Biological technician GS–6
—	Outdoor recreation planner GS–7/9	Outdoor recreation planner GS–7/9	Outdoor recreation planner GS–7/9
—	Law enforcement officer GS–7/9	Law enforcement officer GS–7/9	Law enforcement officer GS–7/9
—	Range technician GS–5/6	Range technician GS–5/6	Range technician GS–5/6

Table 9. Personnel to carry out the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Alternative A (current personnel)</i>	<i>Alternative B</i>	<i>Alternative C</i>	<i>Alternative D</i>
Jordan Field Station			
Station manager GS-12	Station manager GS-12	Station manager GS-12	Station manager GS-12
Assistant station manager GS-7/9	Assistant station manager GS-7/9	Assistant station manager GS-7/9	Assistant station manager GS-7/9
Range technician GS-6	Range technician GS-6/7	Range technician GS-6/7	Range technician GS-6/7
Sand Creek Field Station			
Station manager GS-12	Station manager GS-12	Station manager GS-12	Station manager GS-12
Assistant station manager GS-9	Assistant station manager GS-9	Assistant station manager GS-9	Assistant station manager GS-9
Assistant fire management officer GS-9	Assistant fire management officer GS-11	Assistant fire management officer GS-11	Assistant fire management officer GS-11
Biological technician GS-6	Biological technician GS-6	Biological technician GS-6	Biological technician GS-6
Law enforcement officer GS-9	Law enforcement officer GS-9	Law enforcement officer GS-9	Law enforcement officer GS-9
Range technician GS-7	Range technician GS-7	Range technician GS-7	Range technician GS-7
Maintenance worker WG-8	Maintenance worker WG-8	Maintenance worker WG-8	Maintenance worker WG-8
Student Career Experience Program student GS-4	—	***Outdoor recreation planner GS-7/9	***Outdoor recreation planner GS-7/9
UL Bend National Wildlife Refuge			
—	Refuge operations specialist GS-9/11	Station manager GS-9/11	Station manager GS-9/11
—	Technician GS-5/6	Maintenance worker WG-6/7	Technician GS 5/6
—	—	Maintenance worker WG-7/8	Maintenance worker WG-7/8
Seasonal Employees			
1 Fire seasonal GS-5	<i>Fill to meet needs</i>	<i>Fill to meet needs</i>	<i>Fill to meet needs</i>
2 Fire seasonals GS-4	<i>Fill to meet needs</i>	<i>Fill to meet needs</i>	<i>Fill to meet needs</i>
1 Fire seasonals GS-3	<i>Fill to meet needs</i>	<i>Fill to meet needs</i>	<i>Fill to meet needs</i>
7 Biological technician seasonals GS-3	<i>Fill to meet needs</i>	<i>Fill to meet needs</i>	<i>Fill to meet needs</i>

* GS=General Schedule employee by pay grade; WG=Wage Grade employee by pay grade.

** 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.

*** Dependent on Interpretive Center being built at Sand Creek Field Station.

3.15 COMPARISON of ALTERNATIVES

Table 10 is a summarized, side-by-side look at the actions for each alternative. An analysis of these actions is in “Chapter 4—Environmental Consequences”; a summary of the expected consequences of the alternatives is in table 56 at the end of chapter 5.



Table 10. Comparison of actions for the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Alternative A</i> —no action	<i>Alternative B</i> —wildlife population emphasis	<i>Alternative C</i> —public use and economic use emphasis	<i>Alternative D</i> —ecological processes emphasis (preferred alternative)
<p>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.</p>			
<p>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.</p>			
<p>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.</p>			
<p>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.</p>			
<i>Habitat—upland</i>			
<p>Keep the current habitat regime on 65 habitat units through a fire suppression program, use of livestock grazing (mostly annual grazing versus prescriptive), an emphasis on big game, fencing, and water development. Continue current monitoring of residual cover.</p>	<p>Manage for a diverse plant community of highly productive wildlife food and cover plants emphasizing target and focal species. Create these conditions using natural ecological processes (fire management, grazing by wildlife, or flooding) or active management practices (prescriptive grazing, prescribed fire, or agricultural plantings). Within 3 years, develop new HMPs based on field station boundaries and evaluation of needs of target species. Evaluate success through monitoring of residual cover, sentinel plants, and other measures. Use more intensive manipulation to remove junipers for protection of existing trees from wildfire.</p>	<p>Similar to A, except: Manage the present habitat units for improving range conditions for domestic and wild ungulates using NRCS ecological site conditions and guidelines. Manage habitat to support maximum opportunities for wildlife-dependent recreation, and manage for a plant community that is a compromise between wildlife food and cover and livestock forage needs. Within 7 years, develop new HMPs based on soil characteristics, historical fire occurrence, grazing, and field station boundaries. Include fencing for better livestock distribution, water development, rotational grazing, and other management techniques designed to improve range conditions. In cooperation with NRCS, conduct ecological site evaluations on habitat units, monitoring residual cover and sentinel plant species. Continue current monitoring of residual cover.</p>	<p>Promote ecological resilience (where the land can absorb disturbance and still keep its basic function and structure), restore fire–grazing interactions, promote animal movement with long periods of abandonment to reduce plant species selectivity for sentinel species, and increase landscape species and structural heterogeneity. Mimic and restore natural processes and manage for diversity of plant species within the community. Initially use active management such as manipulation of habitats or wildlife populations using food plots, managing water levels, and relocating wildlife, but move toward using more passive approaches such as allowing natural processes such as fire and flooding and using prescriptive grazing. Mimic ecological processes using fire and herbivory (grazing) by wild ungulates or livestock, or both, as prescribed to maintain plant diversity. Sustain viable populations of plant species that are first to decline when management practices are injurious (sentinel species).</p>

Table 10. Comparison of actions for the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Alternative A</i> —no action	<i>Alternative B</i> —wildlife population emphasis	<i>Alternative C</i> —public use and economic use emphasis	<i>Alternative D</i> —ecological processes emphasis (preferred alternative)
<i>Habitat—upland (continued)</i>			
			<p>When feasible, restore the natural fire regime through an increased use of prescribed fire to increase diversity of all fire-dependent species where necessary to restore natural processes and conditions.</p> <p>Consolidate 65 habitat units into 3–8 units, and develop new HMPs based on soil characteristics and historical fire conditions.</p>
<i>Habitat—river bottom</i>			
Restore small acreages of bottomlands when money allows.	<p>Develop and apply an aggressive approach to treating the bottomlands on a prioritized basis. Treatment would include burning and spraying with herbicides to clear invasive plants and planted with wildlife food crops.</p> <p>Increase fencing where needed to exclude livestock from river bottoms except for developed water gaps where necessary.</p>	<p>Rely on partnerships and cooperators to restore river bottoms.</p> <p>Less aggressive timeframe for restoration of river bottoms than under alternative D and would enable economic benefits from crops produced.</p>	More aggressive timeframe for restoration of river bottoms than C. More emphasis on native plant restoration (no food plots).
<i>Habitat—riparian area and wetland</i>			
Maintain the current stream riparian habitat through a fire suppression program, big game emphasis, and livestock grazing, fences, and water development.	<p>Resurvey the health of streams.</p> <p>Resurvey streams and riparian areas (85% of the 82 miles of stream and 1,300 acres of riparian areas would improve to next category using ESG Lotic Wetland Health Assessment Survey, and at least 95% from 2009 survey are maintained as “healthy”).</p> <p>Over 15 years, remove all reservoir and stock ponds that do not support species of concern (for example, redbelly and finescale dace).</p> <p>Figure out if other stock ponds are needed to meet needs for target and focal species.</p> <p>Restore properly functioning conditions (support productive populations of native fish species) where feasible.</p>	<p>Resurvey the health of streams.</p> <p>Restore streams and riparian areas (60% of the 82 miles of stream and 1,300 acres of riparian areas would improve to next category using ESG Lotic Wetland Health Assessment Survey, and at least 85% from 2009 survey are maintained as “healthy”).</p> <p>Within 10 years, evaluate current stock ponds and figure out which ponds need to be rehabilitated or are needed to meet grazing needs.</p> <p>Within 5 years, determine the potential of and prioritize selected sites for streambank stabilization. Stop hoof bank-shearing.</p> <p>Over 15 years on priority streams, restore using a variety of methods that improve water quality and quantity, stabilize streambanks, and improve channeling.</p>	<p>Similar to B and C, except:</p> <p>Restore streams and riparian areas (75% of the 82 miles of stream and 1,300 acres of riparian areas would improve to next category using ESG Lotic Wetland Health Assessment Survey, and at least 90% from 2009 survey are maintained as “healthy”).</p> <p>Over 15 years, provide alternate water sources for cattle where prescriptive grazing is required to accomplish habitat objectives away from riparian areas or sensitive areas.</p> <p>Over 15 years, identify locations along riverbanks for stabilization and revegetation and restore 50–75% of those locations.</p> <p>Over 15 years, restore natural hydrology to five first-, second-, and third-order streams that would normally flow into the Missouri or Musselshell Rivers.</p>

Table 10. Comparison of actions for the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Alternative A</i> —no action	<i>Alternative B</i> —wildlife population emphasis	<i>Alternative C</i> —public use and economic use emphasis	<i>Alternative D</i> —ecological processes emphasis (preferred alternative)
<i>Habitat—riparian area and wetland (continued)</i>			
	<p>Identify and rank riverbanks in need of stabilization and revegetation and restore 50% of those locations.</p> <p>Fence out livestock from all riparian areas with the exception of developed water gaps.</p> <p>Use flooding as tool.</p>		<p>Use exclosures in riparian areas.</p> <p>Manage for diversity of plant species within the stream riparian community using natural processes.</p> <p>Study and preserve areas where with longer fire intervals (refugia).</p> <p>Conduct research onsite hydrology and restore dynamic hydrological processes where possible.</p>
<i>Habitat—shoreline</i>			
<p>Continue to combat invasive plants (mostly saltcedar). If Fort Peck Lake levels rise to historical levels, revisit treatment of shoreline areas.</p>	<p>Increase efforts to combat invasive plants through partnerships. Plant native species in treatment areas. Manipulate shoreline by mechanical means as necessary to improve populations of fish, birds, or other wildlife.</p>	<p>Same as A, plus:</p> <p>Work with USACE to ensure access to Fort Peck Lake for recreational activities as lake levels vary.</p>	<p>Same as B, plus:</p> <p>Encourage growth of native vegetation.</p> <p>Enhance opportunities to benefit plovers and terns, and other species of Federal and State concern along the shoreline.</p>
<i>Habitat—invasive species</i>			
<p>Continue to use the weed strike team.</p> <p>Continue to update invasive species mapping.</p> <p>Maintain existing invasive species control programs including mapping program of existing and invasive species, biocontrol research project with USDA, releasing of at least two biocontrol agents, weed-seed-free hay requirements.</p> <p>Maintain the active bottomland restoration program.</p> <p>Continue partnerships to provide free car washes for refuge visitors.</p>	<p>Same as A, plus:</p> <p>Aggressively reduce weeds and replace with native plants. Convert former croplands infested with weeds into food plots >3,000 acres.</p> <p>Consider crop rotation in bottomlands.</p> <p>Continue cooperative effort with USACE on saltcedar removal.</p> <p>Emphasize visitor education about weeds and aquatic invasives (for example, zebra mussels) and increase public awareness and enforcement.</p> <p>Consider added weed-free restrictions for outfitters and permittees.</p>	<p>Same as B, plus:</p> <p>Emphasize visitor education about weeds.</p> <p>Increase public awareness and enforcement.</p> <p>Implement controls and education programs, and increase awareness of the growing problem of aquatic invasives (for example, zebra mussels).</p>	<p>Same as B and C, except:</p> <p>Evaluate the biological potential and economical feasibility to use more biological control measures when proven safe and effective and less chemical control to reduce weed infestations.</p>
<i>Habitat—water resources</i>			
<p>Continue restoring riparian habitat and adhere to standard watershed management practices as money allows.</p> <p>Continue working with USGS and the State on water quality studies and standards.</p>	<p>Restore water quality for fish and wildlife by addressing soil erosion from overgrazing, roads, or other sources, and contamination from recreational or economic use (for example, excessive livestock use of streams and human use of camping areas).</p>	<p>Balance water quality restoration with public use and economic needs. Restore water quality for fish and wildlife by addressing soil erosion from overgrazing, roads, or other sources, and contamination from recreational or economic use (for example, excessive livestock use of streams and human use of camping areas).</p>	<p>Restore water quality for fish and wildlife by addressing soil erosion from overgrazing, roads, or other sources, and contamination from recreational or economic use (for example, excessive livestock use of streams and human use of camping areas). (Same as B.)</p>

Table 10. Comparison of actions for the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Alternative A</i> —no action	<i>Alternative B</i> —wildlife population emphasis	<i>Alternative C</i> —public use and economic use emphasis	<i>Alternative D</i> —ecological processes emphasis (preferred alternative)
<i>Habitat—water resources (continued)</i>			
Maintain and rehabilitate select stock ponds. Continue to cap artesian wells to prevent depletion of ground water. (Same as B, C, and D.)	Keep ground cover to increase ground waterflow into streams, and reduce runoff and soil erosion and protect riparian area corridors. Encourage natural water development within streams such as increased flow, pools, beaver ponds, and artificial water such as dugouts to benefit wildlife populations. Evaluate stock dam needs especially in high-functioning watersheds to determine cumulative impacts on streamflow fish and riparian conditions. Evaluate current and future water development on a site-specific basis and consider effects (positive and negative to all resources).	Keep ground cover across refuge to increase ground waterflow into streams, and reduce runoff and soil erosion and protect riparian area corridors. (Same as B.) Encourage natural and constructed water sources for livestock and public fishing and hunting opportunity. Evaluate current and future water development on a site-specific basis and consider effects (positive and negative) to all resources.	Keep ground cover across refuge to increase ground waterflow into streams, and reduce runoff and soil erosion and protect riparian area corridors. (Same as B.) Reference riparian area research and publication for guidance on restoring or improving water quality in identified areas. Assess the needs of current reservoirs and restore historical hydrologic condition of reservoirs no longer needed for livestock or wildlife. Maintain and rehabilitate select stock ponds.
<i>Habitat—water rights</i>			
Adjudicate, define, and quantify water rights.	Same as A, plus: Pursue water rights associated with buying inholdings. Obtain senior upstream water rights only when approached by landowner or current water right holder.	Same as B.	Same as B.
<i>Habitat—grazing</i>			
Continue to manage 65 habitat units with livestock (1986 EIS). (In 2009, 55 units have active permits.) Retire livestock grazing permits as they become available (i.e., ranch changes ownership, but this would not include generational transfer). Maintain fencing. Gradually move toward prescriptive grazing to manage grazing (defined as use of specific, written directions to achieve a desired outcome) as units become available, or habitat evaluations are completed, and action is necessary to meet wildlife or habitat objectives. Over 15 years, apply prescriptive grazing on at least 50% of the refuge.	Actively work toward reducing livestock grazing permits to only use prescriptive grazing as a management tool to achieve specific habitat or wildlife objectives, or where use of other management tools may not be feasible. Remove livestock grazing from all habitat units that are fenced separately from surrounding lands. Use only prescriptive grazing. Within 4–7 years, prescriptive grazing would be developed for 50–75% of the refuge. Remove interior fencing where appropriate. Fence boundary to exclude common pastures and allow the Service to affect management treatments to meet wildlife objectives.	Take a passive approach in gradually moving toward a prescriptive grazing program as current grazing permits become available due to a ranch changing ownership (this would not include generational transfer). Up to 50% of the refuge would be under prescriptive grazing. If monitoring reveals that populations of the first-to-decline sentinel plant species for grazing and browsing are not viable, balance reductions in livestock permit numbers and wild ungulates numbers. Consider designating administrative use-only roads for livestock management where appropriate and allowed by policy and laws.	Adopt an active approach to using prescriptive grazing as a management tool (less aggressive than B). Shift from traditional annual permitted grazing to prescriptive grazing to enhance habitats for wildlife. Within 6–9 years, develop 50–75% of the refuge for prescriptive grazing; more conversion to prescriptive grazing would be ongoing. If monitoring reveals prescribed habitat objectives are not met due to livestock grazing, make prescription changes (including stocking density, duration, season, AUM reduction, and retiring the permit). Remove interior fences to facilitate long-distance animal movements and use of prescribed fire. Fence boundary. Allow generational transfer under a prescriptive program.

Table 10. Comparison of actions for the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Alternative A</i> —no action	<i>Alternative B</i> —wildlife population emphasis	<i>Alternative C</i> —public use and economic use emphasis	<i>Alternative D</i> —ecological processes emphasis (preferred alternative)
Habitat—prescribed fire			
<p>Continue the fire suppression policy.</p> <p>Manage habitat with minimal use of prescribed fire.</p>	<p>Increase use of prescribed fire to enhance wildlife populations and habitat and reduce hazardous fuel.</p> <p>Monitor the effects of prescribed fire on the habitat and wildlife populations.</p> <p>Work with partners to address wildland–urban interface areas at the Pines Recreation Area and other USACE recreation areas.</p>	<p>Same as B, except:</p> <p>Use prescribed fire to create a balance between enhanced wildlife habitat and improved forage for livestock.</p>	<p>Use patch burning (burn patches of varying sizes, within historical fire-return intervals and on a rotation to create a mosaic of habitats) to restore heterogeneity (diversity) within landscapes, preserve fire refugia and associated plant species, enhance food resources for wildlife, and ensure biological diversity and integrity and environmental health.</p> <p>Move toward allowing fire to play its natural role in shaping the ecosystem in adherence with the fire management plan. Monitor the effects of fire on the habitat and wildlife populations. (Same as B.)</p> <p>Work with partners to address wildland–urban interface areas. (Same as B.)</p>
Habitat—wildfire			
<p>Continue fire suppression using a management response strategy that evaluates the response to a wildfire based on several factors including risks to firefighters, the public, property, and other resources.</p>	<p>Identify and take the appropriate and necessary fire management actions, according to an approved fire management plan and maintain or improve wildlife habitat during a wildfire.</p>	<p>Use aggressive initial attack to minimize economic loss from wildfire.</p> <p>Increase prescriptive grazing to minimize the fuel load.</p>	<p>Similar to B, except:</p> <p>Using historical fire frequency data, manage naturally occurring wildfire for multiple objectives and implement actions in accordance with an approved fire management plan. Monitor the effects of fire on the habitat and wildlife populations.</p>
Habitat—climate change			
<p>Continue current efforts to reduce the carbon footprint including maintaining a small wind turbine, recycling, building energy-efficient facilities, and using energy-efficient vehicles.</p> <p>Consider what conditions precipitated by climate change the refuge may have to deal with increased drought, longer fire season, hotter fires, loss of plants and animals, increase of other plants and animals, change of migration patterns, and relocation of species.</p>	<p>Same as A, plus:</p> <p>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 would increase.</p> <p>Design science-based long-term monitoring protocols to document changes in plant and animal composition or health due to climate change.</p> <p>Coordinate with adjoining agencies and partners to immediately alleviate the declines (and increases) on sites with appropriate modification of ecological processes (management action) such as herbivory, fire, or flooding.</p>	<p>Same as B.</p>	<p>Same as B.</p>

Table 10. Comparison of actions for the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Alternative A</i> —no action	<i>Alternative B</i> —wildlife population emphasis	<i>Alternative C</i> —public use and economic use emphasis	<i>Alternative D</i> —ecological processes emphasis (preferred alternative)
<i>Habitat—climate change (continued)</i>			
	<p>Cooperate with national and international projects to maintain biological diversity, integrity, and environmental health on global basis.</p> <p>Replace all vehicles with fuel-efficient vehicles.</p> <p>Upgrade offices to “green” standards. Install solar panels and carefully sited wind turbines. Provide recycling bins. Encourage teleconferencing instead of driving, turning off lights, recycling, and turning down heat.</p>		
<i>Wildlife—birds</i>			
<p>Maintain habitat to support 30 spring-breeding sharp-tailed grouse per square mile when conditions permit.</p> <p>Maintain riparian areas to benefit waterfowl, king-bird, mourning dove, American kestrel, and turkey.</p> <p>Improve waterfowl habitat on all suitable ponds.</p> <p>Maintain two peregrine falcon eyries.</p>	<p>Within 7 years, complete a bird atlas (collection of data) of the refuge to determine existing composition, distribution, and relative abundance of breeding, non-breeding, resident, and migratory birds using the refuge. Within 8–15 years, repeat the effort, and establish a refugewide monitoring program that describes the sentinel plant associations and habitat needs of 75% of the highest priority focal bird species.</p>	<p>Similar to B, except establish a monitoring program for 50% of focal bird species. Specifically, look at greater sage-grouse and sharp-tailed grouse distribution and how they are affected by habitat objectives.</p>	<p>Similar to B, except establish a monitoring program for 90% of focal bird species.</p>
<i>Wildlife—threatened and endangered species and species of concern</i>			
<p>Continue to inventory and monitor threatened and endangered species and carry out recovery plans. Listed species include black-footed ferret, least tern, pallid sturgeon, and piping plover. The grizzly bear is a listed species that occurs in Montana, but is not found on refuge.</p> <p>Continue efforts in black-footed ferret recovery including the release of animals, intensive monitoring, and disease and habitat management.</p> <p>Continue surveying and conservation efforts for other species of concern: greater sage-grouse (candidate), Sprague’s pipit (candidate), mountain plover, swift fox, prairie dog, and other rare species.</p>	<p>Same as A, plus:</p> <p>Actively manipulate habitats to promote the recovery of threatened and endangered species. In critical habitat for select threatened and endangered species, ensure listed species are given highest priority.</p> <p>Develop management plans for grizzly bear in accordance with Federal and State regulations and plans for management of this species should natural migration to the refuge occur.</p>	<p>Same as B, except:</p> <p>Less intensive manipulation of threatened and endangered species habitat. Balance threatened and endangered species needs with public and economic use needs.</p>	<p>Same as B, except:</p> <p>Protect current listed species and habitat, and work collaboratively with partners to prevent other species from being listed by restoration of biological diversity, integrity, and environmental health throughout the landscape.</p>

Table 10. Comparison of actions for the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Alternative A</i> —no action	<i>Alternative B</i> —wildlife population emphasis	<i>Alternative C</i> —public use and economic use emphasis	<i>Alternative D</i> —ecological processes emphasis (preferred alternative)
<i>Wildlife—furbearers and small predators</i>			
<p>Continue to allow coyote hunting at the start of pronghorn season through March 1.</p> <p>Maintain active predator management by USDA on a limited basis.</p> <p>Allow no predator hunting or trapping.</p>	<p>Manage predatory species as an important component of the wildlife community.</p> <p>End active predator management by USDA.</p>	<p>Increased predator management through an expanded predator-hunting program to benefit economic uses and provide more public recreational opportunities.</p> <p>Consider allowing trapping.</p>	<p>Ensure that the top-down effects of predation on prey species and plant species is a functioning component in restoration of biological diversity, integrity, and environmental health.</p> <p>End active predator management by USDA.</p>
<i>Wildlife—big game</i>			
<p>Improve and maintain elk, mule deer, pronghorn, and bighorn sheep in good to excellent condition.</p> <p>Continue to manage for 10 mule deer per square mile and 2.5 elk per square mile.</p>	<p>Coordinate surveys and research with MFWP.</p> <p>Manage elk and mule deer populations at highest levels possible without negatively affecting habitat or other wildlife species. Manage harvest levels for herd sex and age ratios similar to unhunted or lightly harvested populations.</p> <p>Monitor pronghorn abundance and distribution.</p> <p>Expand huntable population of bighorn sheep in suitable and unoccupied habitat (east of Timber Creek and south of the Missouri River into the Seven Blackfoot, Snow Creek, and Hell Creek areas).</p> <p>Determine mountain lion population levels.</p>	<p>Manage elk and deer populations at levels consistent with MFWP objectives and landowner tolerance.</p> <p>Manage pronghorn and bighorn sheep similar to alternative B.</p> <p>Within 10 years, conduct a mountain lion hunt if monitoring data shows it is warranted.</p>	<p>Develop cooperative monitoring programs with MFWP for big game populations and habitat by 2015 to establish desired population levels, herd composition targets, and harvest strategies for elk, deer, and bighorn sheep.</p> <p>Determine mountain lion levels and consider harvest if monitoring shows it could be sustained.</p>
<i>Wildlife—other wildlife</i>			
<p>Little to no monitoring or management.</p>	<p>Within 2 years, assess the need for baseline inventory plans or research for fish, reptiles, amphibians, invertebrates, and small mammals. Rank the highest needs (top 7–10) for research, particularly those species that support the habitat monitoring program.</p> <p>Within 15 years, complete 75–100% of the highest priority inventory plans.</p>	<p>Similar to alternative B on monitoring and research.</p> <p>Work with partners to enhance fishing opportunities.</p>	<p>Same as B.</p>

Table 10. Comparison of actions for the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Alternative A</i> —no action	<i>Alternative B</i> —wildlife population emphasis	<i>Alternative C</i> —public use and economic use emphasis	<i>Alternative D</i> —ecological processes emphasis (preferred alternative)
<i>Wildlife—reintroductions</i>			
No new reintroductions. Past reintroductions of black-footed ferrets, prairie dogs, bighorn sheep, and elk (1950s). Turkeys reintroduced by MFWP adjacent to the refuge.	Cooperate with partners on potential reintroductions of black-footed ferret, swift fox, pallid sturgeon, bighorn sheep, and prairie dog (if necessary due to plague). Cooperate with State and partners on the potential reintroduction of wild bison as wildlife in the landscape.	Cooperate with partners on the reintroduction of and expansion of the bighorn sheep population for expanded hunting. Consider no other reintroductions.	Cooperate with partners to restore the biological integrity and ecological processes of the site where practical for reintroduction of extirpated species. Cooperate with the State to consider species reintroductions when the landscape has been prepared and accepted by the public.
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.			
<i>Public use—hunting</i>			
Maintain current hunting programs, which includes ungulates, upland birds, and waterfowl is currently allowed. Maintain a limited coyote season. Shooting of nongame species is not allowed. Trapping is not allowed. Protect all other wildlife.	Work with MFWP to provide quality hunting opportunities that maintain sustainable populations of big game and habitat for nongame species.	Work with MFWP to provide maximum hunting opportunities and expand the following: —hunting programs to include new species and traditional and niche (primitive weapon) —hunts for young people —mule deer season —predator hunting and allow for trapping	Work with MFWP to provide hunting opportunities that keep big game and other species at levels that restore biological diversity and integrity, and environmental health. Consider a limited predator hunting and trapping program.
<i>Public use—fishing</i>			
Continue to follow State regulations. Continue cooperation with MFWP to regulate paddle-fishing.	Provide opportunities for quality fishing that maintains sustainable populations of game and nongame fish.	Provide increased fishing access to areas not accessible due to the changing lake level. Consider permitting vehicular shoreline access to ice fishing in the winter. Stock select livestock reservoirs to create more fishing opportunities. Increase participation by youth and fishing groups.	Cooperate with other agencies and partners to enhance fishing opportunities that maintain game species and other species at levels that restore biological diversity and integrity and environmental health where possible within the refuge.
<i>Public use—wildlife observation, photography, and interpretation</i>			
Maintain elk-viewing areas, trails, the auto tour route, and other facilities that provide opportunities for wildlife observation, photography and interpretation to support 40,000 visits.	In 5 years, develop and complete visitor services plan and visitor experience survey. Hire one outdoor recreation planner. Over 15 years, increase participation in nonconsumptive uses by 5–10% annually (2,000–4,000 more visits).	In 5 years, develop a visitor services plan and conduct a visitor experience survey. Hire two outdoor recreation planners. Over 15 years, increase participation in nonconsumptive uses by 20–50% annually (8,000–20,000 more visits).	In 5 years, develop and complete a visitor services plan and conduct a visitor experience survey. Hire two outdoor recreation planners. Over 15 years, increase participation in nonconsumptive uses by 15–25% (6,000–10,000) more visits.

Table 10. Comparison of actions for the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Alternative A</i> —no action	<i>Alternative B</i> —wildlife population emphasis	<i>Alternative C</i> —public use and economic use emphasis	<i>Alternative D</i> —ecological processes emphasis (preferred alternative)
<i>Public use—wildlife observation, photography, and interpretation (continued)</i>			
	<p>Over 15 years, increase the quality of and number of facilities by 5–10% over alternative A. Provide more viewing or photography opportunities by sustaining high populations of wildlife (migratory birds, big game, and prairie dog).</p> <p>Update existing signage, Web site and other interpretive media and facilities as needed. (Same as C and D.)</p>	<p>Over 15 years, increase the quality and number of facilities and programming by 5–15% over alternative A. Develop new facilities (trails, viewing blinds, interpretive center at Sand Creek) that expand opportunities for wildlife observation and photography.</p> <p>Identify new areas for wildlife viewing.</p> <p>Increase opportunities for ecotourism.</p> <p>Consider ways to encourage more youth to visit the refuge (such as geocaching or other Internet tools).</p> <p>Increase interpretation of paleontological resources.</p>	<p>Over 15 years, increase the quality and number of facilities and programming by 10% over alternative A (Sand Arroyo trail, viewing blinds, and science and interpretive center). Provide for opportunities to see a diversity of healthy habitats that sustain the full spectrum of plant and animal species found in the area.</p>
<i>Public use—environmental education</i>			
<p>Maintain limited environmental education programming (for example, school visits and fair booths).</p> <p>Maintain interpretative center, kiosks, and other facilities.</p> <p>Continue to serve as a destination for troubled youth groups.</p>	<p>Expand environmental education program by 5% (program elements identified in the visitor services plan) based on wildlife biology and habitat requirements.</p> <p>Work with more partners to expand interpretive and educational opportunities.</p>	<p>Expand environmental education program by 25% and focus on threatened and endangered species, reintroduced species and restoration, and aquatic invasives.</p> <p>Increase programming levels for troubled youth groups.</p>	<p>Expand environmental education program by 10% and focus on ecological processes, biological diversity and integrity, environmental health.</p>
<i>Public use—opportunities for visitors with disabilities</i>			
<p>Continue to provide an accessible blind for persons with disabilities.</p> <p>Continue support for USACE’s closure of an area to provide deer hunting opportunities for persons with disabilities.</p>	<p>Same as A, plus:</p> <p>Adaptively manage wildlife-dependent recreation opportunities to meet the needs of visitors with disabilities.</p>	<p>Same as B, plus:</p> <p>Collaborate with other agencies to increase accessibility for wildlife recreation. Provide more accessible facilities.</p>	<p>Same as B, plus:</p> <p>Upgrade existing facilities to meet current standards for accessibility and increase accessibility where appropriate.</p> <p>Adaptively manage for an aging hunting population such as providing game retrieval roads on northeast side.</p>
<i>Public use—other activities in support of priority public uses</i>			
<p>Continue allowing the following uses: —horseback riding throughout the refuge and ATV use on public roads within the refuge —bicycling on numbered roads, which include seasonally closed roads —permit public planes to land only on water or ice determined by USACE’s plan</p>	<p>Same as A, except:</p> <p>Use adaptive management as various uses increase.</p> <p>Disallow new secondary recreational uses unless it facilitates a wildlife-dependent recreational use.</p>	<p>Same as A, except:</p> <p>Use adaptive management as various uses increase.</p>	<p>Same as C.</p>

Table 10. Comparison of actions for the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Alternative A</i> —no action	<i>Alternative B</i> —wildlife population emphasis	<i>Alternative C</i> —public use and economic use emphasis	<i>Alternative D</i> —ecological processes emphasis (preferred alternative)
<i>Public use—access</i>			
<p>Maintain existing refuge roads (670 miles). (Alternative A only)</p> <p>Keep roads closed in the proposed and designated wilderness.</p> <p>Continue the limited seasonal closure of roads when necessary.</p> <p>Continue to work with USACE on management of boat ramps. Rock Creek is only boat ramp under Service jurisdiction.</p> <p>Develop a travel management plan (stepdown plan) in cooperation with partners to ensure secured public access.</p> <p>Allow current access to private inholdings to continue.</p>	<p>Similar to A, except or plus:</p> <p>Reduce some existing roads to benefit wildlife populations.</p> <p>Close 106 miles of road to meet habitat objectives, manage roads and access to promote more harvest opportunities and larger wildlife populations.</p> <p>Promote nonmotorized access, but consider allowing motorized access on existing roads for retrieval only.</p> <p>Restrict access on a seasonal basis to sensitive areas by river and road. Monitor ATV use on numbered trails and manage if documented disturbance issues (both wildlife and visitor use).</p> <p>Work with USACE and other agencies to monitor boat use and determine if disturbance is an issue, then work with cooperators and users to manage access to certain areas (for example, harden ramps) to limit disturbance to wildlife along river corridor.</p>	<p>Similar to A, except or plus:</p> <p>Manage access to benefit public and economic use.</p> <p>Consider expanding or improving access in some areas and seasonally closing areas if needed to protect wildlife and habitat.</p> <p>Improve about 16 miles of roads to all-weather access (gravel) along Knox Ridge road and road 108 (north-east side) to provide a loop.</p> <p>Consider winter fishing access for Elk Hole or Big Swirl.</p> <p>Improve access to boat ramps.</p> <p>Promote nonmotorized access, but consider allowing motorized access on existing roads for retrieval only.</p> <p>Work within existing policies to allow livestock permittees to manage infrastructure and stock within habitat units.</p> <p>Evaluate creating trails that are open for bicycle use.</p>	<p>Similar to A, except or plus:</p> <p>Manage access to benefit natural processes and habitat.</p> <p>Close about 21 miles of road; seasonally close road 315; designate 13 miles on north-east side as game retrieval roads (closed during hunting season except to retrieve game); gravel 5 miles along Knox Ridge road; allow for additional winter fishing access from the southwest side; and fully evaluate all roads and make further modifications as necessary to achieve habitat and wildlife objectives.</p> <p>Work with USACE and other agencies to monitor boat use and determine if disturbance is an issue, then work with cooperators and users to manage access to certain areas (for example, harden ramps) to limit disturbance to wildlife along river corridor.</p> <p>Monitor ATV use on numbered trails and manage if document disturbance issues (both wildlife and visitor use).</p> <p>Continue to restrict bicycles to numbered roads only including seasonally closed roads.</p>
<i>Public use—recreation sites</i>			
<p>Continue allowing camping within 100 yards of roads.</p>	<p>Same as A, except:</p> <p>Use adaptive management as use increases.</p> <p>Manage vehicular camping to fit the use (i.e., paddling and concentrated camping versus big game hunting and dispersed camping) and ensure protection of surrounding habitat.</p> <p>Permit backcountry camping.</p>	<p>Same as A, except:</p> <p>Use adaptive management as use increases.</p> <p>Establish new campsites and campgrounds. Look to create designated horse camps and evaluate the need for designating campsites along the lake to meet increased demand and lessen the negative effect on shoreline habitat.</p>	<p>Same as A, except:</p> <p>Use adaptive management as use increases.</p> <p>Evaluate and address camping needs as use changes on the refuge. Use adaptive management to address camping demand (for example, harden frequently used sites to minimize erosion and negative effects on habitat). Limit camping to within 100 yards of numbered routes.</p>

Table 10. Comparison of actions for the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Alternative A</i> —no action	<i>Alternative B</i> —wildlife population emphasis	<i>Alternative C</i> —public use and economic use emphasis	<i>Alternative D</i> —ecological processes emphasis (preferred alternative)
<i>Public use—commercial recreation</i>			
<p>Continue to offer 11 outfitting permits for hunting. Commercial outfitting for coyote hunting is illegal.</p>	<p>Permit commercial recreation when it benefits fish and wildlife populations. Develop more commercial backcountry outfitting permits for hunting that accomplish habitat and wildlife objectives.</p>	<p>Permit commercial recreation when it benefits public or economic use. Increase commercial opportunities and increase the promotion of ecotourism tours and experiences. Increase outfitting permits to the point that they do not negatively affect public hunting.</p>	<p>Only permit commercial recreation when it benefits natural ecological processes or habitats (for example, allow commercial activities in roadless areas that facilitate big game harvest to meet wildlife or habitat objectives).</p>
<p>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.</p>			
<i>Wilderness</i>			
<p>Manage UL Bend Wilderness as a class 1 air shed. Within 2 years, submit a final report on the wilderness study to Washington. Follow Service policy to manage proposed wilderness.</p>	<p>Same as A, except: Over 15 years and on approval by the Department of the Interior, expand or adjust proposed wilderness units totaling about 25,869 acres.</p>	<p>Manage UL Bend Wilderness as a class 1 air shed. Within 2 years, submit a final report on the wilderness study to Washington. Follow Service policy to manage proposed wilderness.</p>	<p>Same as A, except: Over 15 years and on approval by the Department of the Interior, expand or adjust proposed wilderness units totaling about 19,942 acres.</p>
<p>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.</p>			
<i>Cultural resources</i>			
<p>Identify and protect significant cultural resources according to the National Historic Preservation Act and other laws. Identify a sample of homesteads to be protected and interpreted. Protect known gravesites. Maintain road closures through sensitive cultural resource areas. Maintain the cultural resource inventory. Provide a brochure about the prehistory and history of the refuge.</p>	<p>Same as A, plus: Create a sensitivity model and conduct surveys in areas with a moderate or high potential for resources. Conduct oral histories to find out about structures. Complete a comprehensive cultural resources overview. Identify potential preservation projects, and work with partners to find funding and implement. Locate and properly curate collections. Develop more interpretation materials.</p>	<p>Same as B, plus: Increase opportunities for ecotourism (nonconsumptive) through tours of historic sites. Develop brochures and kiosks that interpret cultural resources. Use more interpretive signs (would not identify specific archaeological resources). Collaborate with others to identify or stabilize resources.</p>	<p>Same as B.</p>
<i>Paleontological resources</i>			
<p>Continue to issue permits to professional paleontologists for the collection, curation, and study of the resources. Continue to prohibit recreational digging.</p>	<p>Same as A, except: Work with professional paleontologists to develop a step-down plan for the identification, study, and protection of resources. Increase protection and law enforcement.</p>	<p>Same as A, plus: Promote the creation of documentaries and increase educational opportunities. Consider buying inholdings for protection.</p>	<p>Same as A, except: Limit or manage special use permits to protect resources.</p>

Table 10. Comparison of actions for the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

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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.			
<i>Refuge operations</i>			
<p><i>Personnel:</i> Keep current personnel levels.</p> <p><i>Equipment and facilities:</i> Maintain the current number of facilities and equipment.</p> <p><i>Minerals:</i> Continue mineral withdrawal until 2013 and work to renew withdrawal.</p>	<p>Same as A, plus:</p> <p><i>Personnel:</i> Increase personnel by adding an outdoor recreation planner and additional full-time law enforcement officer and fire specialist on the east end of the refuge, and an assistant manager at Jordan Field Station.</p> <p><i>Equipment and facilities:</i> Same as A.</p> <p><i>Minerals:</i> Same as A, plus seek permanent withdrawal of all minerals including oil and gas and other leasable and locatable minerals on all refuge lands and future acquisitions.</p>	<p>Same as A, plus:</p> <p><i>Personnel:</i> Increase personnel by adding an outdoor recreation planner at Fort Peck and Lewistown Field Stations, a full-time law enforcement officer on the east end of the refuge, an assistant manager at Jordan Field Station and manager at UL Bend Refuge, and two maintenance positions and a fire specialist on the east end of the refuge.</p> <p><i>Equipment and facilities:</i> Expand facilities at Jordan Field Station and more office space at Jordan and Sand Creek Field Stations.</p> <p><i>Minerals:</i> Same as B.</p>	<p>Same as A, plus:</p> <p><i>Personnel:</i> Same as C.</p> <p><i>Equipment and facilities:</i> Same as C.</p> <p><i>Minerals:</i> Same as B.</p>
<i>Partnerships—land management</i>			
<p>Maintain existing working relationships and outreach with private landowners and land managers.</p> <p>Examples of landscape management include wildlife movement, habitat management, travel planning, fire suppression, wild bison, oil and gas lease, and other species of concern (sage-grouse and pronghorn).</p>	<p>Same as A, plus:</p> <p>Emphasize wildlife populations.</p> <p>Emphasize working relationships and outreach with private landowners and land and wildlife managers to improve management of land and wildlife across boundaries.</p> <p>Consider effects of management actions that affect landscapes within and outside refuge boundaries.</p> <p>Look for opportunities to exchange, consolidate and obtain habitat.</p>	<p>Same as B, except:</p> <p>Emphasize public and economic uses.</p> <p>Look at landscape-scale management of all ungulate species in and around refuge to benefit all wildlife species and promote private conservation easements to benefit species diversity and ecological integrity.</p>	<p>Same as B, except:</p> <p>Emphasize habitat and ecological processes.</p> <p>Look at landscape-scale management of all wildlife species in and around refuge to benefit wildlife diversity and health work with local landowners to promote private conservation easements and conservation incentives to benefit species diversity and ecological integrity.</p>
<i>Partnerships—collaboration</i>			
<p>Maintain existing partnerships as described in chapter 3:</p> <ul style="list-style-type: none"> —Federal agencies —MFWP and DNRC on wildlife and habitat management and other State agencies 	<p>Same as A, plus:</p> <p>Revisit partnerships and adapt as needed based on new management direction.</p> <p>Work with USACE on lands that could be transferred to the Service for primary jurisdiction.</p>	<p>Same as B, plus:</p> <p>Develop partnerships with the chamber of commerce and State tourism board.</p> <p>Work with these and other partners to highlight refuge resources through promotional materials. Work with nongovernmental organizations interested in developing ecotourism opportunities.</p>	<p>Same as C, plus:</p> <p>Revisit partnerships and adapt as needed based on new management direction.</p> <p>Work with USACE on lands that could be transferred to the Service for primary jurisdiction.</p>

Table 10. Comparison of actions for the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

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<i>Partnerships—collaboration (continued)</i>			
<p>—Conservation districts, county commissioners, fire wardens, weed districts, fire districts, and sheriff departments</p> <p>—Nongovernmental organizations</p> <p>—Adjacent private landowners and local communities</p> <p>Continue to work with partners to promote the refuge as an ecotourism destination.</p>	<p>Pursue more opportunities for joint management of fire suppression, prescribed fire, and habitat manipulation.</p> <p>Develop a road management plan (Federal, State, and county).</p> <p>Look for more partnerships and money to support increased invasive species control.</p> <p>Develop a Friends group.</p>	<p>Develop more partnerships with various sporting organizations that would support public uses (such as Mule Deer Foundation).</p> <p>Explore more commercial activities such as guided fishing and hunting.</p> <p>Establish more detailed agreements with the fire district for fire suppression.</p> <p>Develop a Friends group and expand volunteer groups and provide staff to manage.</p>	<p>Pursue more opportunities for joint management of fire suppression, prescribed fire, and habitat manipulation.</p> <p>Look for more partnerships and money for increased invasive species control.</p> <p>Work with these and other partners to highlight refuge resources through promotional materials.</p> <p>Develop a Friends group and expand volunteer opportunities.</p>

4—Affected Environment

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.

4.1 TOPICS not ANALYZED FURTHER

The affected environment describes those parts of the natural and human environment that could be affected by implementing any of the management alternatives. The following topics or species were

dismissed from further consideration because there would be no effects, or effects would be negligible or not detectable, as discussed below.

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.



USFWS

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

4.2 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.

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—Introduction”). 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 would likely increasingly compete with native vegetation on rangelands (Karl et al. 2009). Precise estimates of how climate change would 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 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.



Google Earth

Roads often follow ridges, bottomlands, and drainages.

Roads. The refuge covers a vast remote area with about 670 miles of road that crisscross the refuge and provide vehicle access that would otherwise only be accessible by foot or horseback (refer to access under visitor services in section 4.4 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 12 and 13 show the potential visibility of roads from a distance of 1 mile and

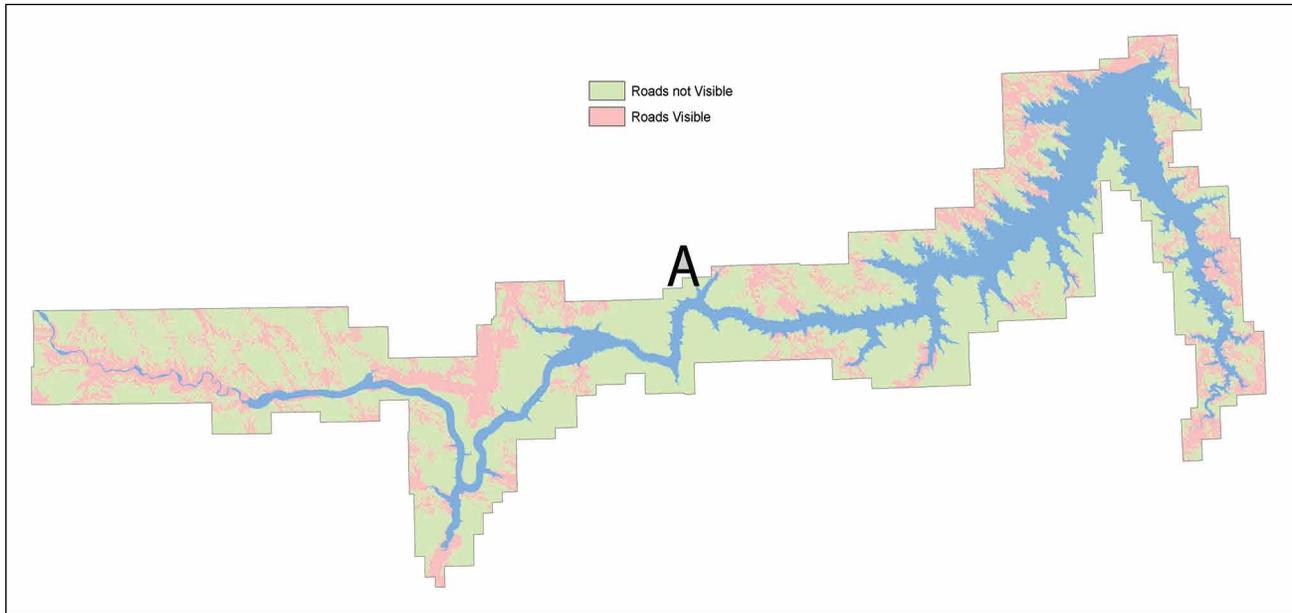


Figure 12. Map of potential visibility of roads at 1 mile along the Charles M. Russell and UL Bend Refuges. (Pink indicates that roads are likely to be visible and green indicates roads are less likely to be visible.)

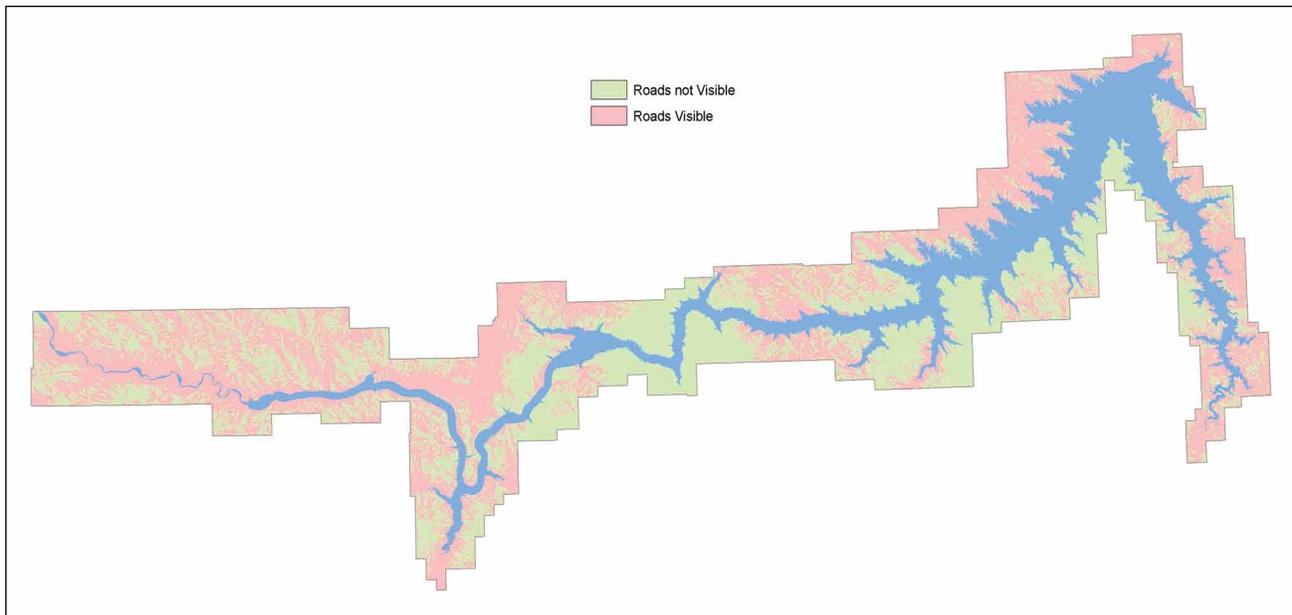
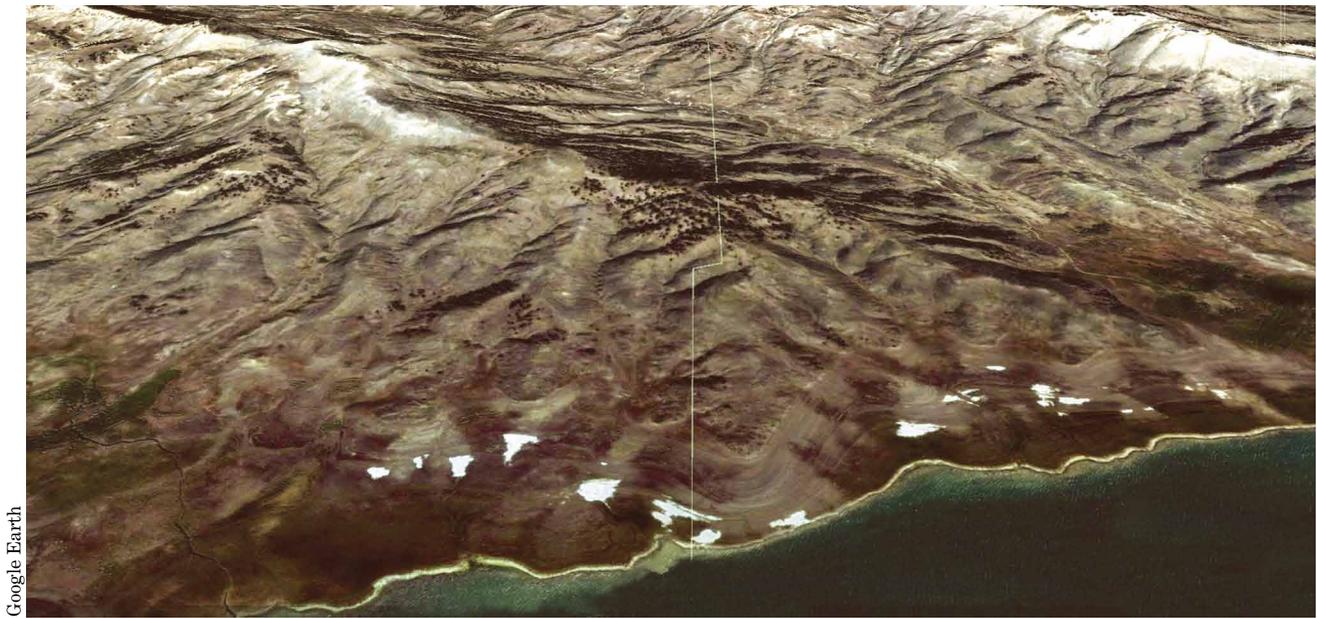


Figure 13. Map of potential visibility of roads at 3 miles along the Charles M. Russell and UL Bend Refuges. (From further away, roads could be more visible.)



Google Earth

An aerial photograph shows the low density of roads in a wilderness unit (near the same area marked as “A” in figure 12.)

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 is lowest with fewer visible roads versus where road density is highest and roads are more visible. The aerial photo provides an overview of the area marked as “A” in figure 12, 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 14 summarizes the number of road segments that are likely to be visible from various sight distances across the refuge including nonwilderness and wilderness.

Other Facilities and Structures. Fencing is used across the refuge to fence livestock pastures including com-

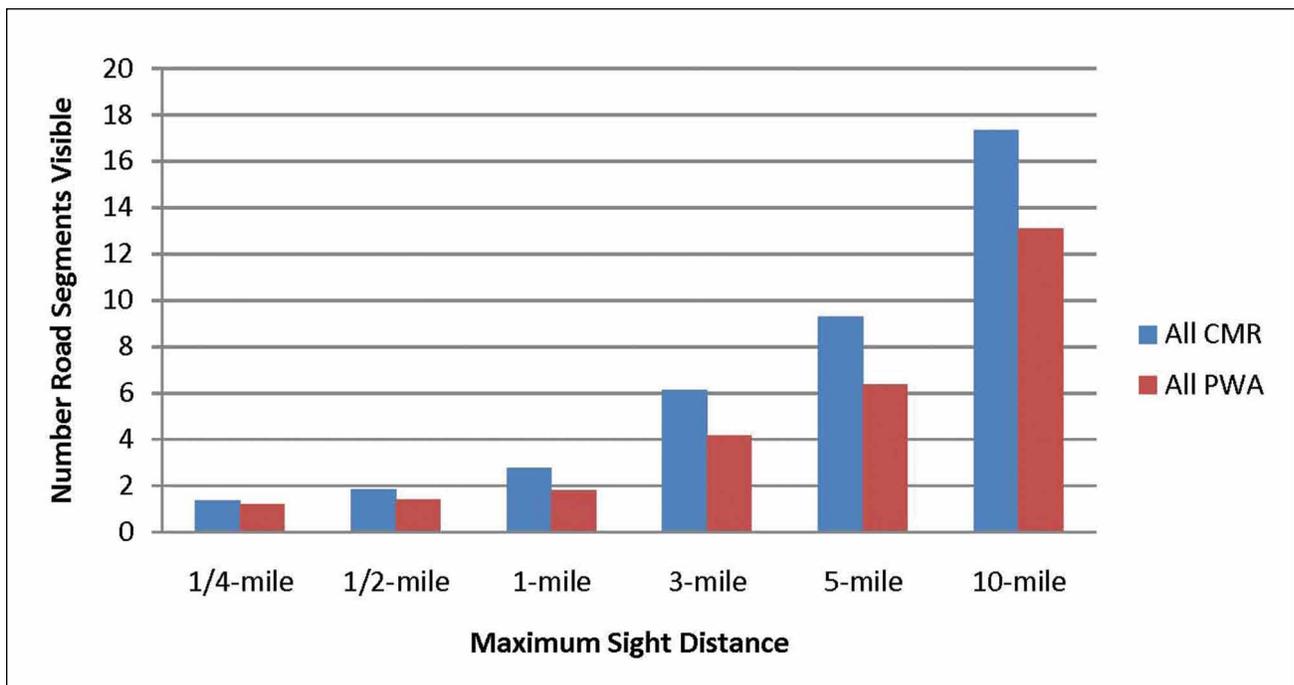


Figure 14. Chart of the number of road segments visible across the Charles M. Russell and UL Bend Refuges and from proposed wilderness units and wilderness study areas.

mon pastures with BLM, riparian areas, and for delineating the refuge boundary (refer to uplands in section 4.2 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 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 15). Additionally, there are several historic homesteads found 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 16). 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 4.3 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 4.3 below). Fire management is a significant issue in this planning process and one that could affect visual resources. Several alternatives would increase the use of prescribed fire. This topic 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

*Figures 15 and 16 follow
(three foldout pages)*

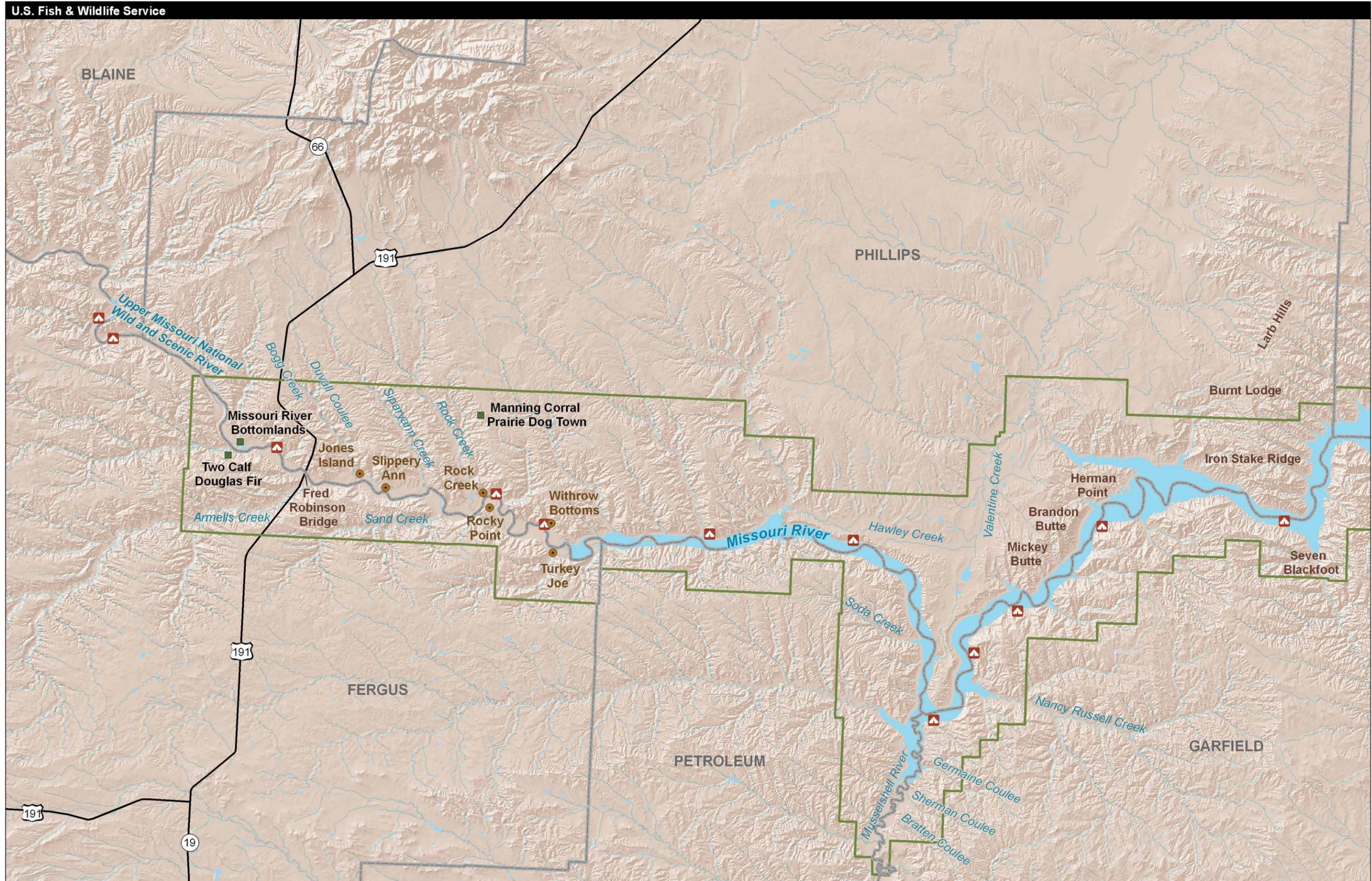


Figure 15. Map of water and geographic features in the Charles M. Russell and UL Bend Refuges.

Figure 15 (water and geographic map, west)

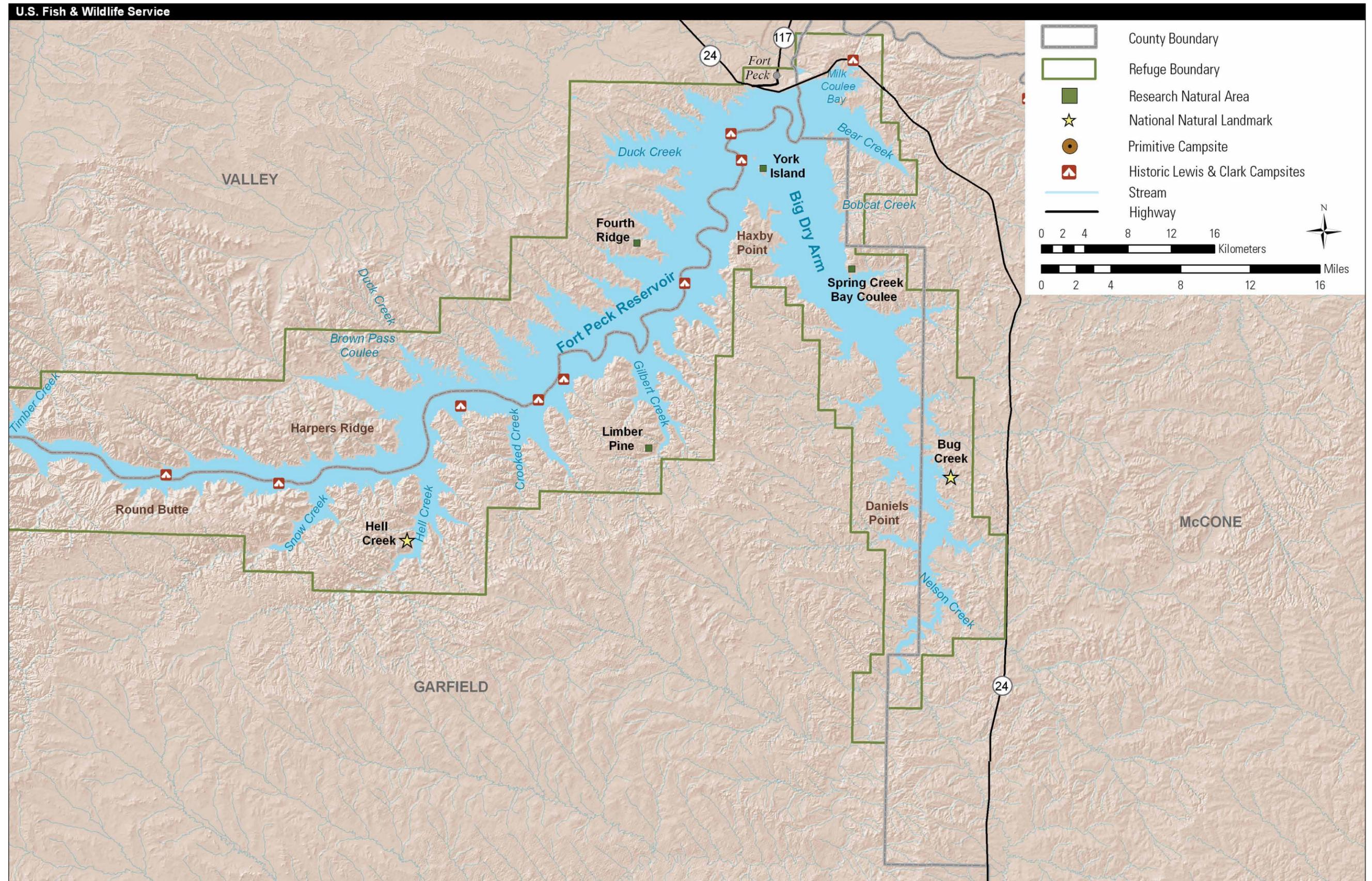


Figure 15 (water and geographic map, east)

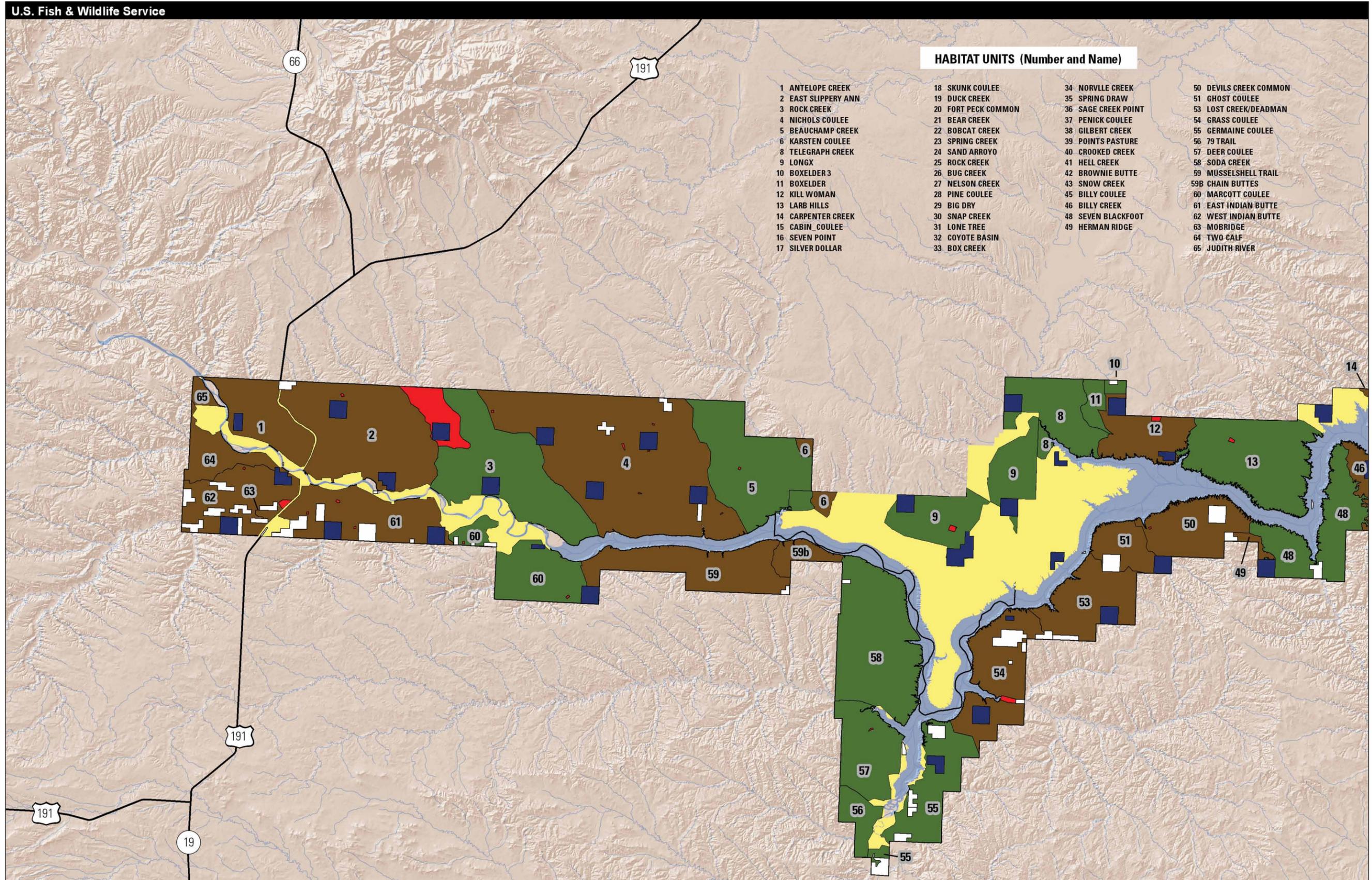


Figure 16. Map of habitat units (grazing) in the Charles M. Russell and UL Bend Refuges.

Figure 16 (habitat grazing units, west)

U.S. Fish & Wildlife Service

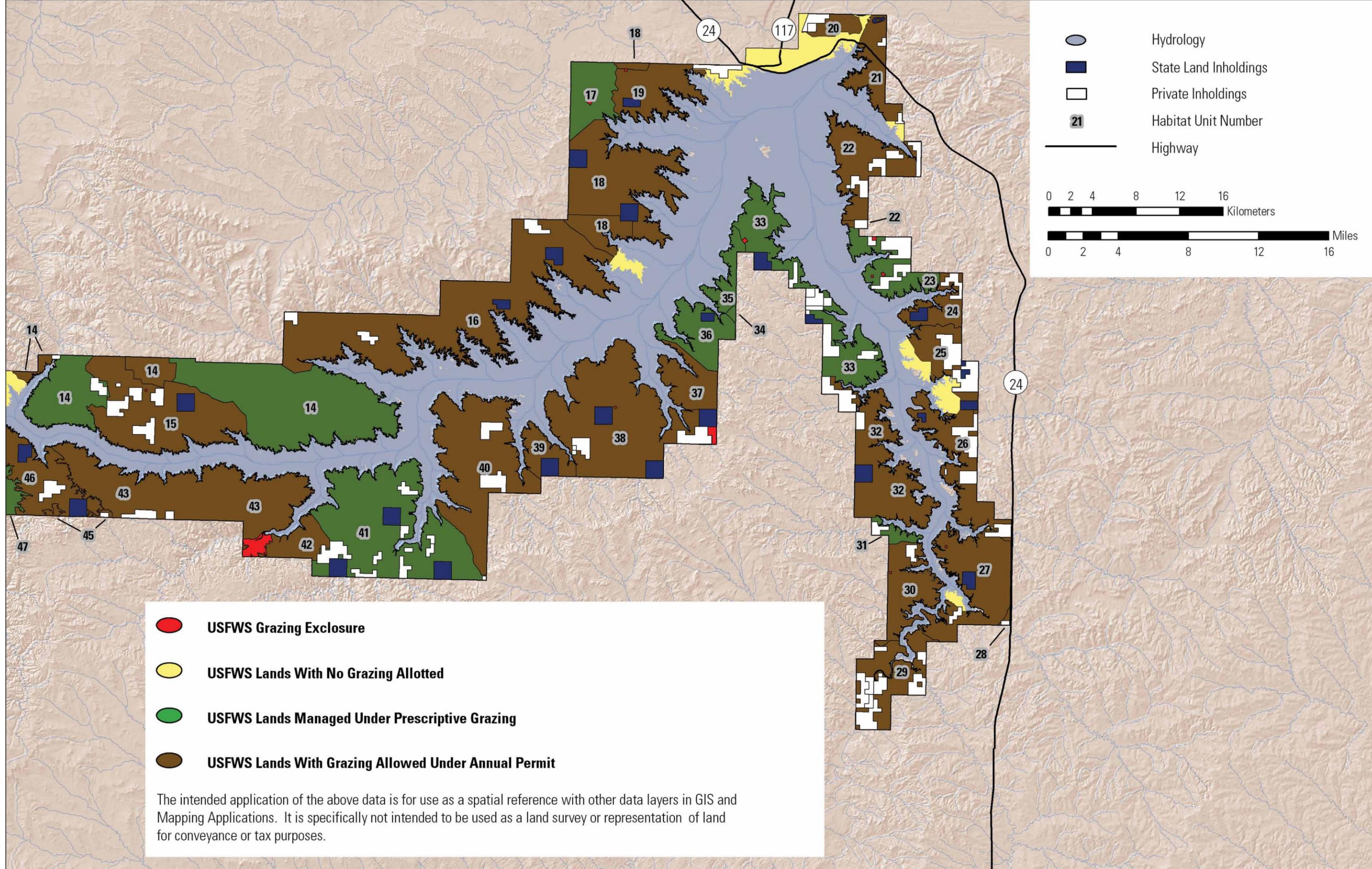


Figure 16 (habitat grazing units, east)

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 motor boats could negatively affect some users, information about the aircraft and motorboat use is described under soundscapes below and under Access 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-water-mark, 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).

Wildfires, generally lightning-caused, occur frequently across the refuge during the summer months (refer to wildfires under uplands in section 4.2 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—Refuge History and Vision”). 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, 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 this CCP and EIS and is not discussed further; refer to “Chapter 1—Introduction” for more information.)

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 Scenic 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



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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.

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 (refer to the socioeconomic analysis in chapter 5). Gunshots could potentially be heard. The distance that any weaponry could be heard varies greatly with the terrain and other factors.

LAND FEATURES, SOILS, and GEOLOGY

Many of the topographical and water sources in this section are identified on figure 15. 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 15). 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 (U.S. Geological Survey, 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 15). 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), intermittent (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 under vegetation 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 11 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

Table 11. Average daily discharge and peak flows for six USGS water stations on or near the Charles M. Russell and UL Bend Refuges.

<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	2001–2004
Duval Creek near Landusky, Montana	06115300	0.09	0	640	2001–2004 (mean daily) 1963–2007 (peaks)
Rock Creek near Landusky, Montana	06115350	2.36	12	1660	2001–2004
Hell Creek near Jordan, Montana	06130650	2.23	120	1700	2001–2004
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

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-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 Commission 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 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 snowmelt 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).

4.3 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 following 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 17) 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 disturbance 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 (sentinel species; refer to section 3.8 in chapter 3 for descriptions of focal, target, and sentinel species). 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 F 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, its alternatives 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 18).

- *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 predators 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.
- *1910–1986*: 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 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

*Figures 17 and 18 follow
(three foldout pages)*

U.S. Fish & Wildlife Service

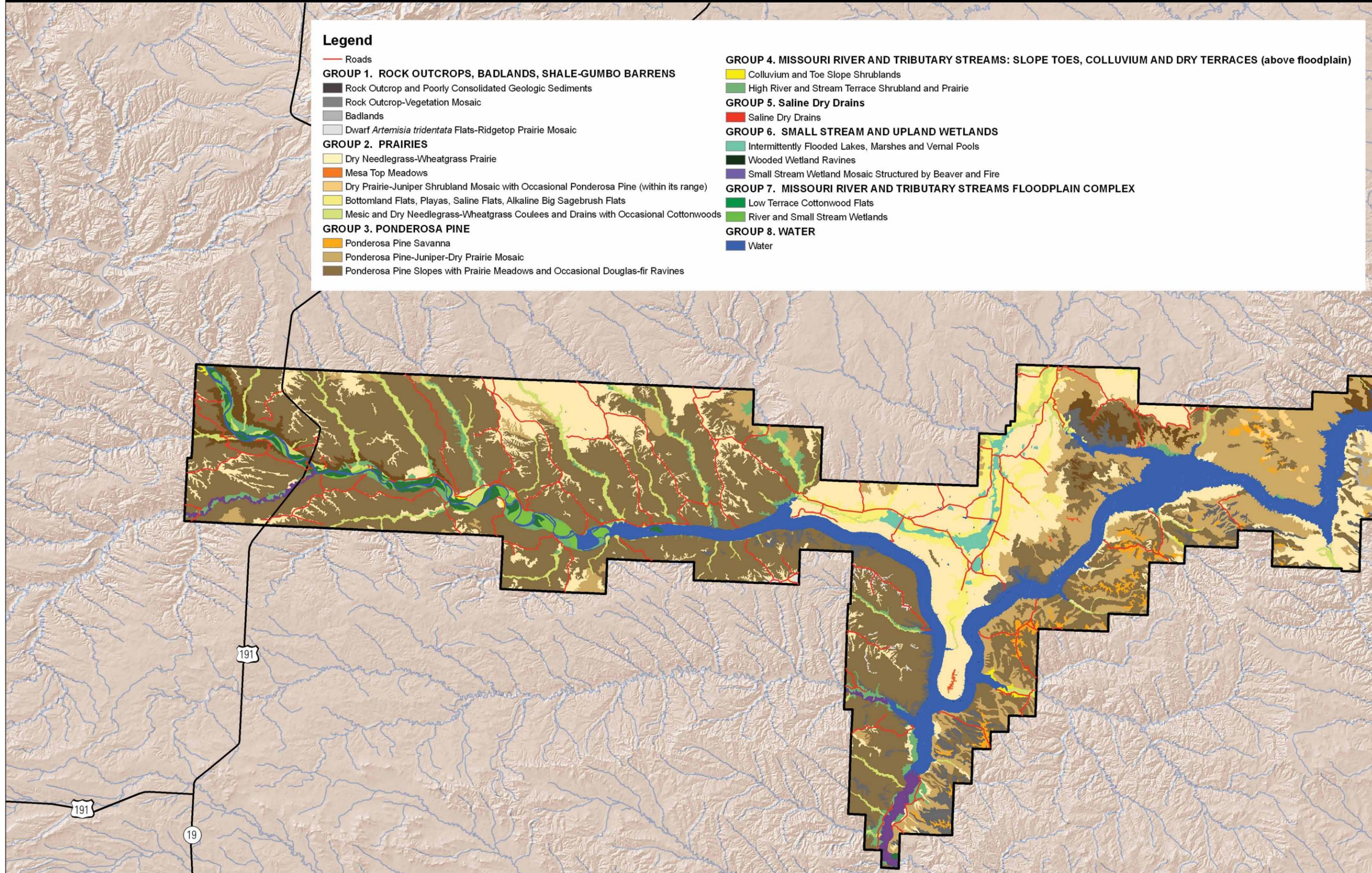


Figure 17. Map of habitat types for the Charles M. Russell and UL Bend Refuges. Source: Cecil Frost.

Figure 17 (habitat, west)

U.S. Fish & Wildlife Service

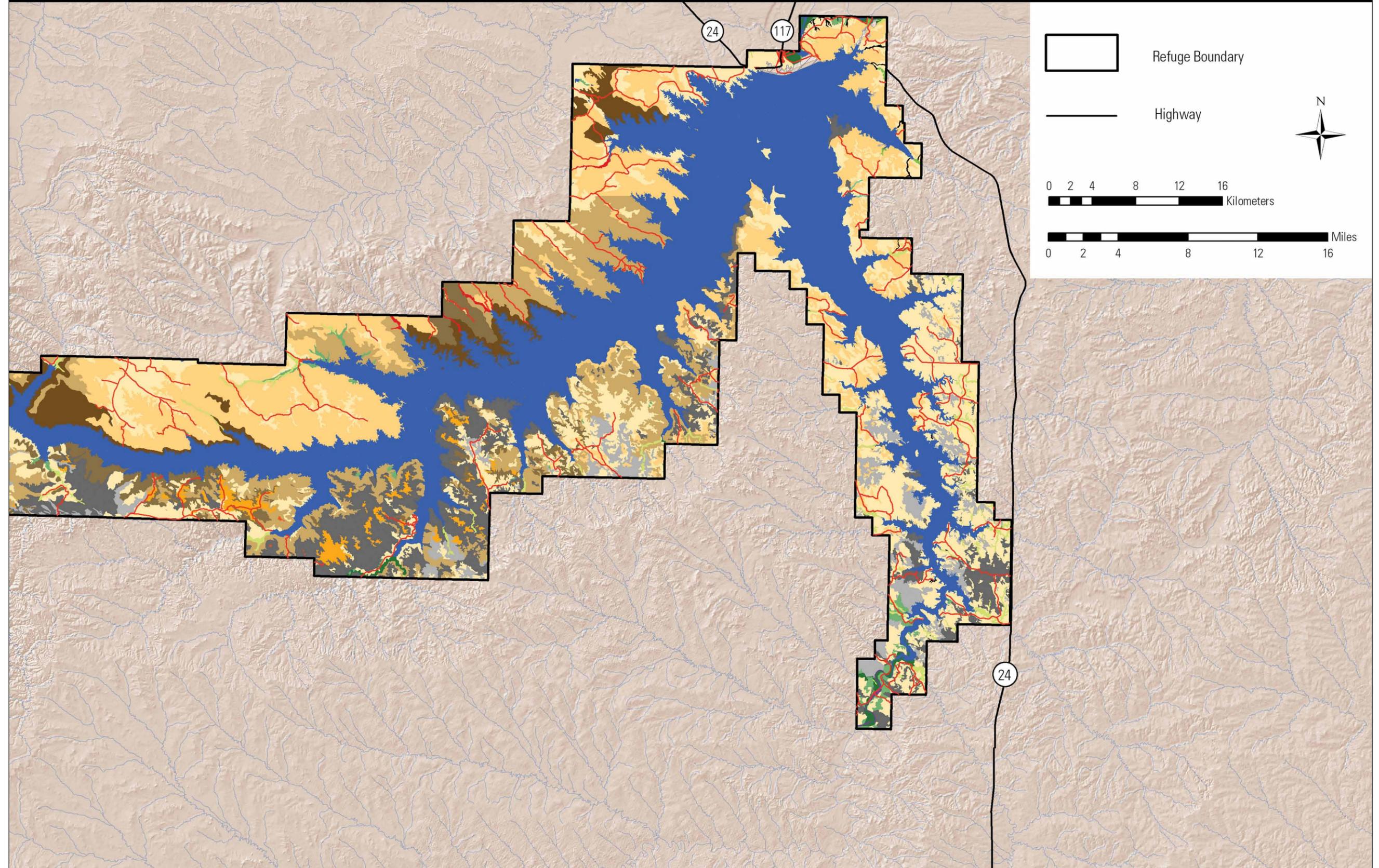


Figure 17 (habitat, east)

U.S. Fish & Wildlife Service

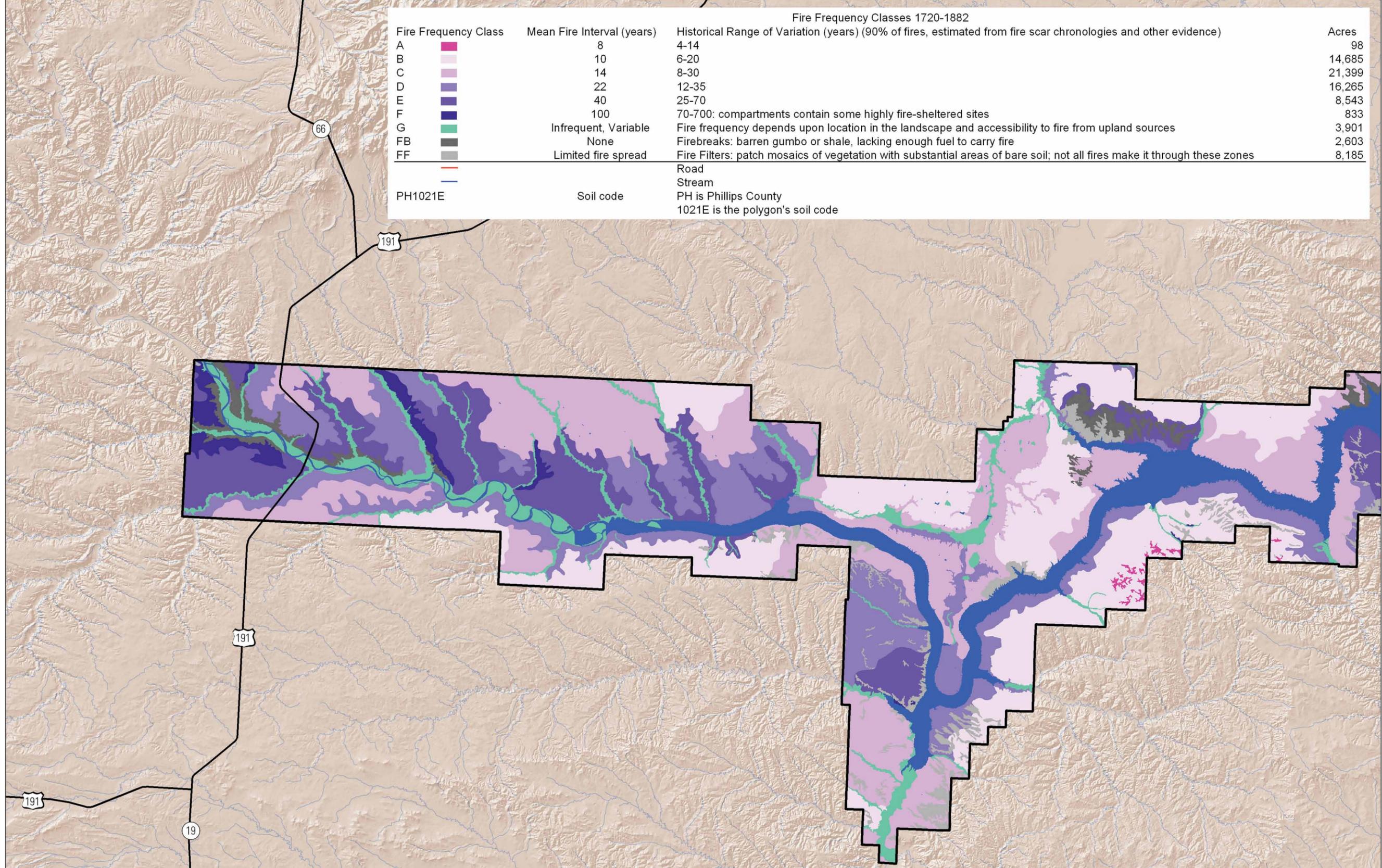


Figure 18. Map of fire frequency for the Charles M. Russell and UL Bend Refuges. Source: Frost 2008.

Figure 18 (fire frequency, west)

U.S. Fish & Wildlife Service

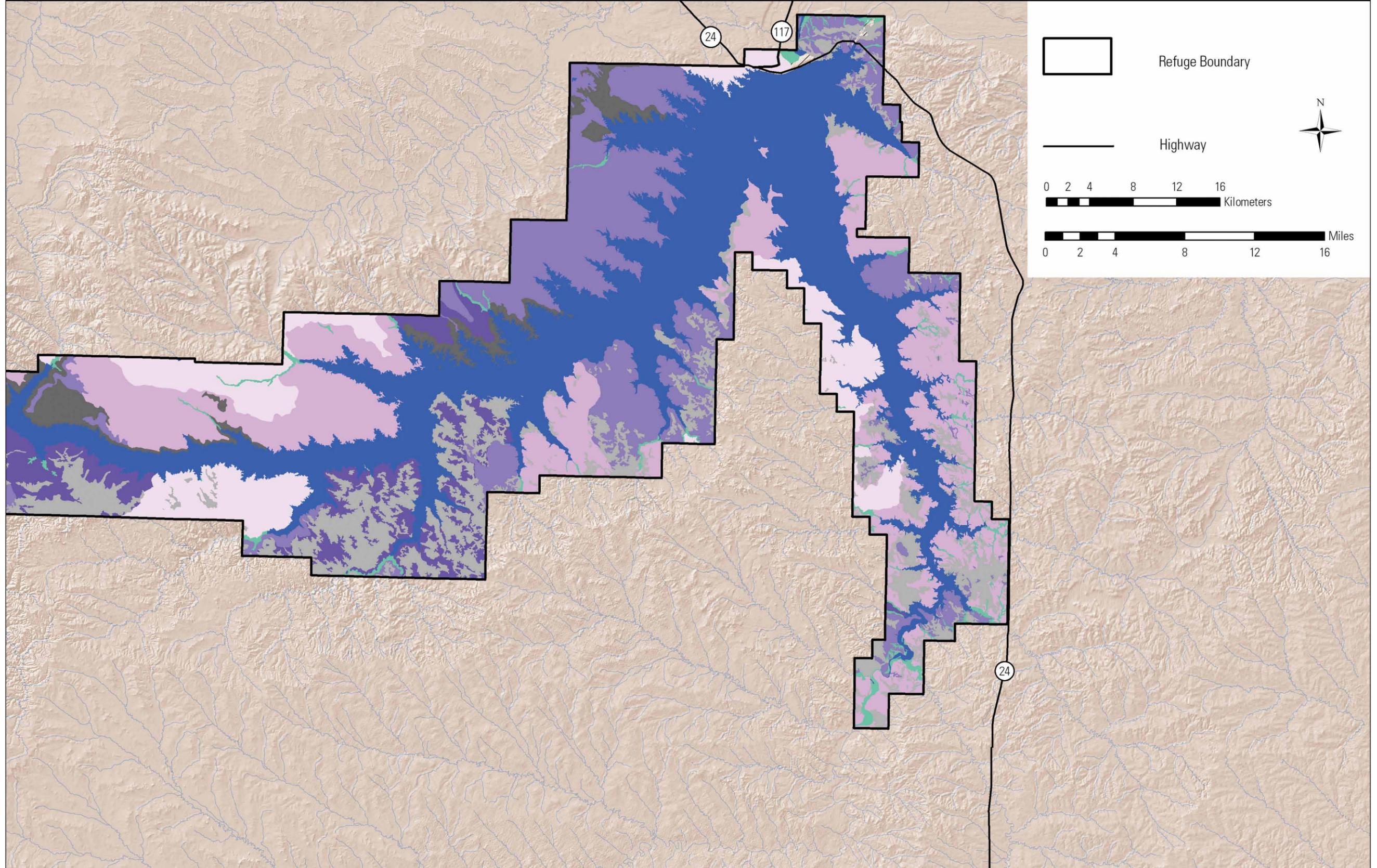


Figure 18 (fire frequency, east)

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 enclosures 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 enclosures 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 enclosures on the refuge and about the same number of total enclosures.

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 1940's and 1950's 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 migratory 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 lin-

ear 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.



USFWS

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 sen-

sitive 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 indi-



Gary A. Monroe / USDA-NRCS PLANTS Database

Golden Currant



W.L. Wagner / Smithsonian Institution

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

vidual wildlife species that have the most stringent limitations for area, dispersal, or resources or are limited by ecological processes (Lambeck 1997). (Refer to section 3.8 in chapter 3 for descriptions of focal, target, and sentinel species). 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 (see chapter 3 upland objectives).

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 fires suppressed woody vegetation (Gruell 1983).



USFWS

Smoke billows from the Black Polaski wildfire in 2006.

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 18), 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-tol-

erant 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 12. 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 bighorn 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.

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 chapter 2, section 2.1 and chapter 3, section 3.8, “Habitat—Upland.”

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 Conser-

Table 12. Historical fire data for the Charles M. Russell and UL Bend Refuges.

<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	—

vation 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 16) 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 chapter 1, section “1.9 Issues Not Addressed,” and to chapter 3, rationale for Upland Objective A7). 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 chapter 3, section 3.8, “Habitat—Upland”). Today, there are approximately 740,030 acres of potential grazing acreage on the refuge; current livestock grazing units are shown in figure 16. 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 number of livestock needed to achieve those objectives. (Refer to the prescriptive grazing explanation in the introduction for “Habitat—Upland” in chapter 3, section 3.8.) 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 chapter 3, section 3.8, “Habitat—Upland”). 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 16). The CCP and EIS 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 16), 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 18 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 described under 4.8, socioeconomics and chapter 5, section 5.10.

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 demonstrate 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 (HDP) 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 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 19 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 19 displays residual cover information collected from the East Indian Butte Habitat Unit (see figure 16). The monitoring data show that this unit does not meet the baseline objective of 70 percent residual cover (red line on graph). This habitat 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 20).

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; 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.

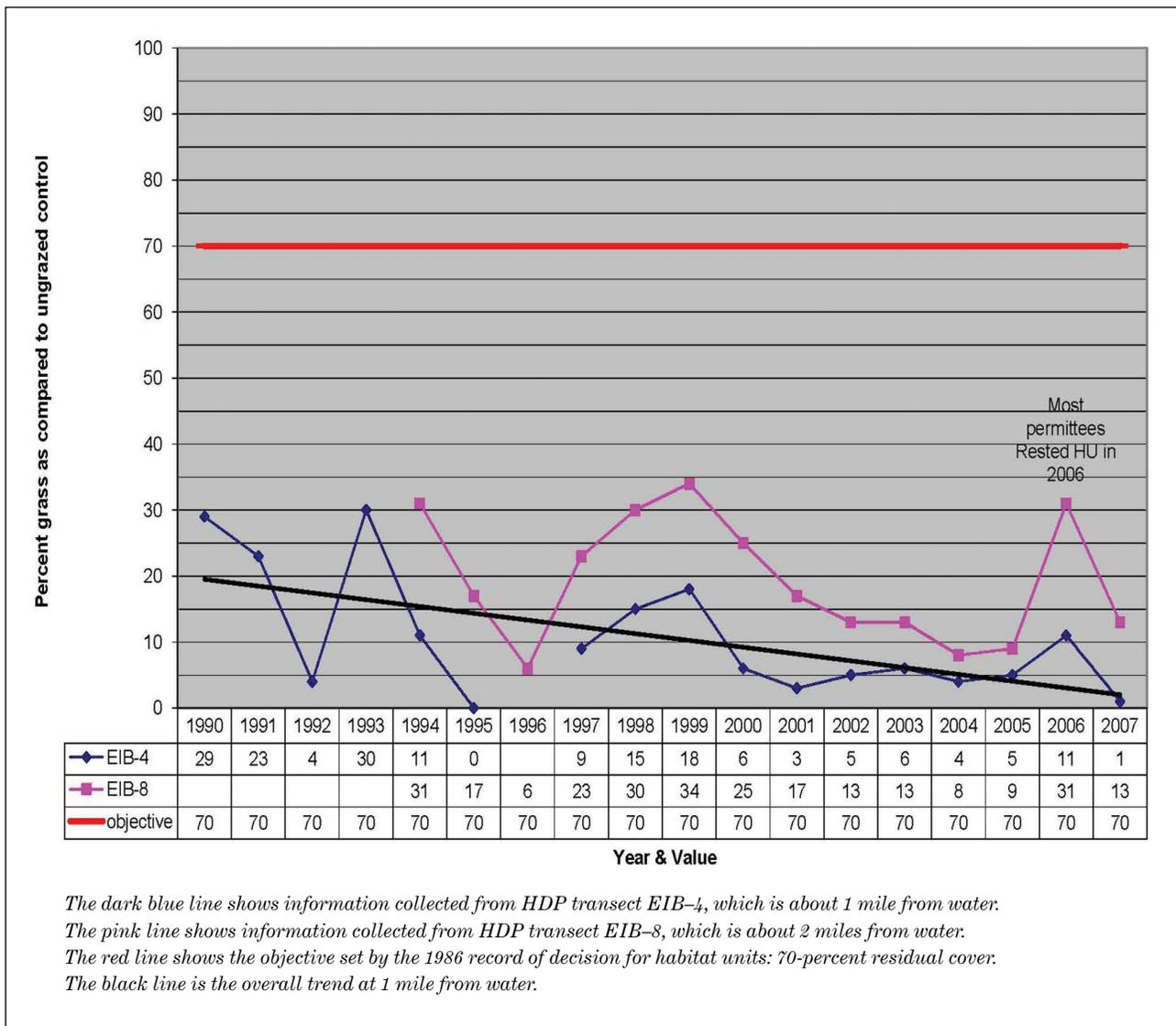


Figure 19. Graph of residual cover after grazing in the East Indian Butte Habitat Unit of the Charles M. Russell Refuge (1990–2007).

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 would likely be affected first by a warming climate with less soil moisture.

In 2005, the refuge staff constructed an enclosure 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 enclosure 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 enclosure. In subsequent years (2007, 2008, and 2009), aspen growth within the enclosure has exceeded the growth outside of the enclosure, with averaging about 7, 34, and 52 inches, respectively, compared to about 4, 12, and 15 inches outside of the enclosure. Current browsing levels prevent the plants outside the enclosure from growing taller. Figure 21 displays these results.

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

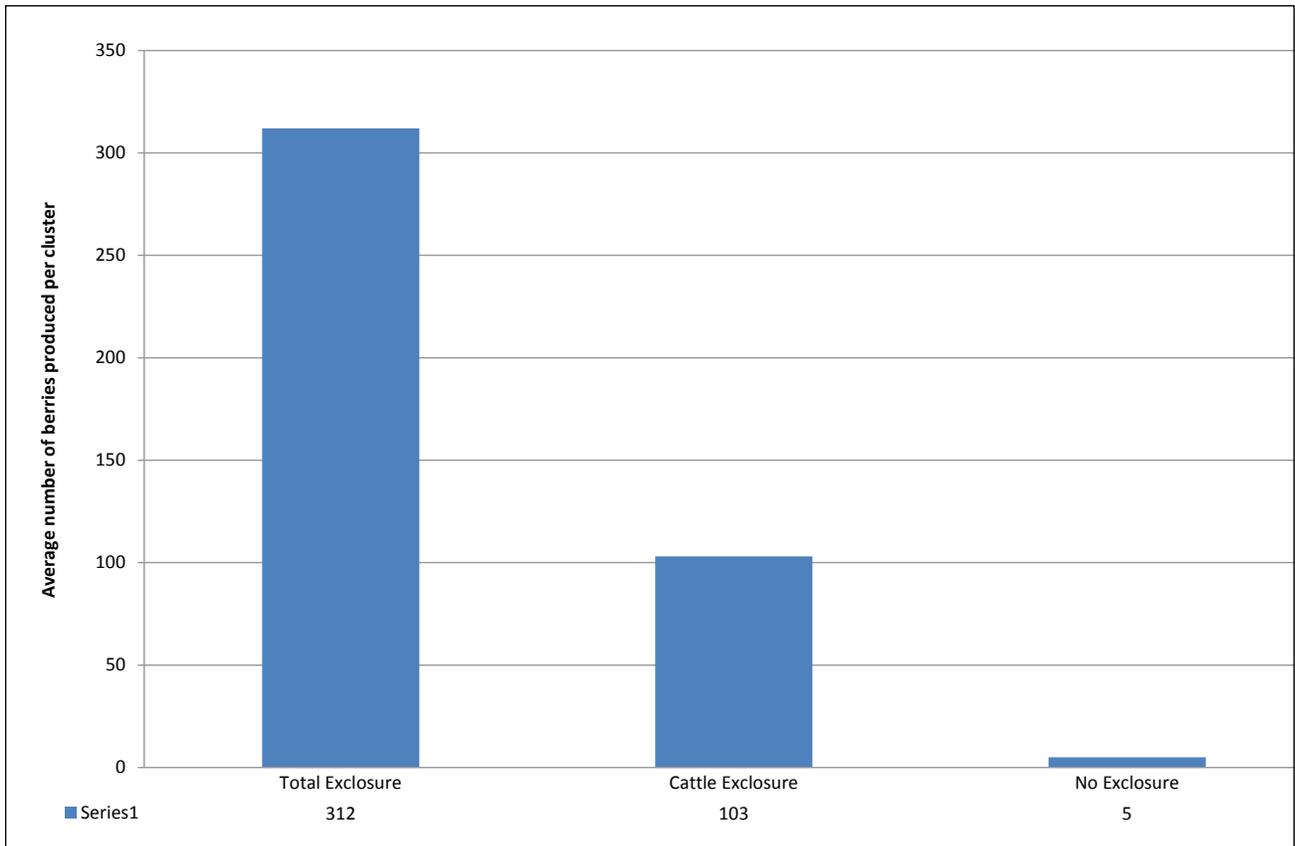


Figure 20. Bar graph of monitoring results for chokecherry fruit production 4 years after fire at the Charles M. Russell Refuge.

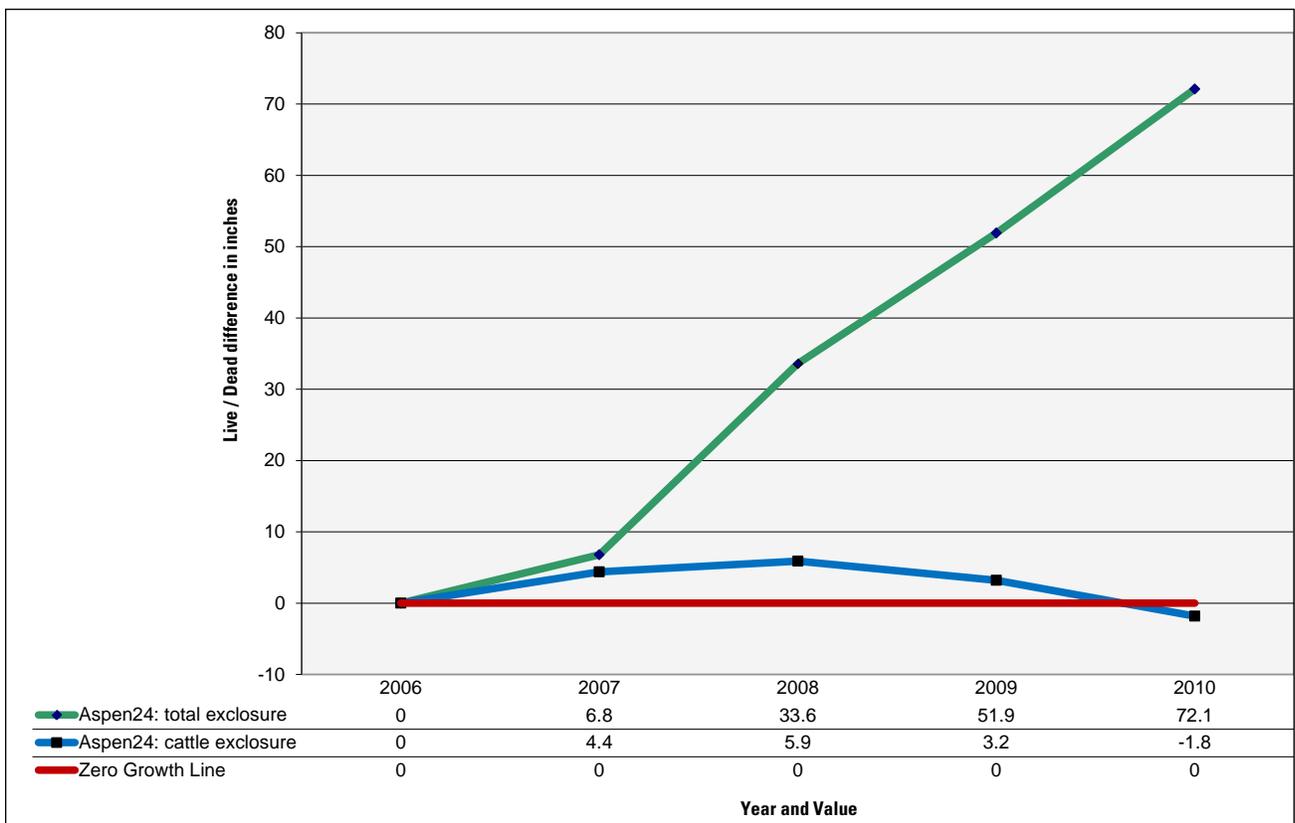


Figure 21. Graph of monitoring results for aspen growth at the Charles M. Russell Refuge.

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 22)

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 23). 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, 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 would 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

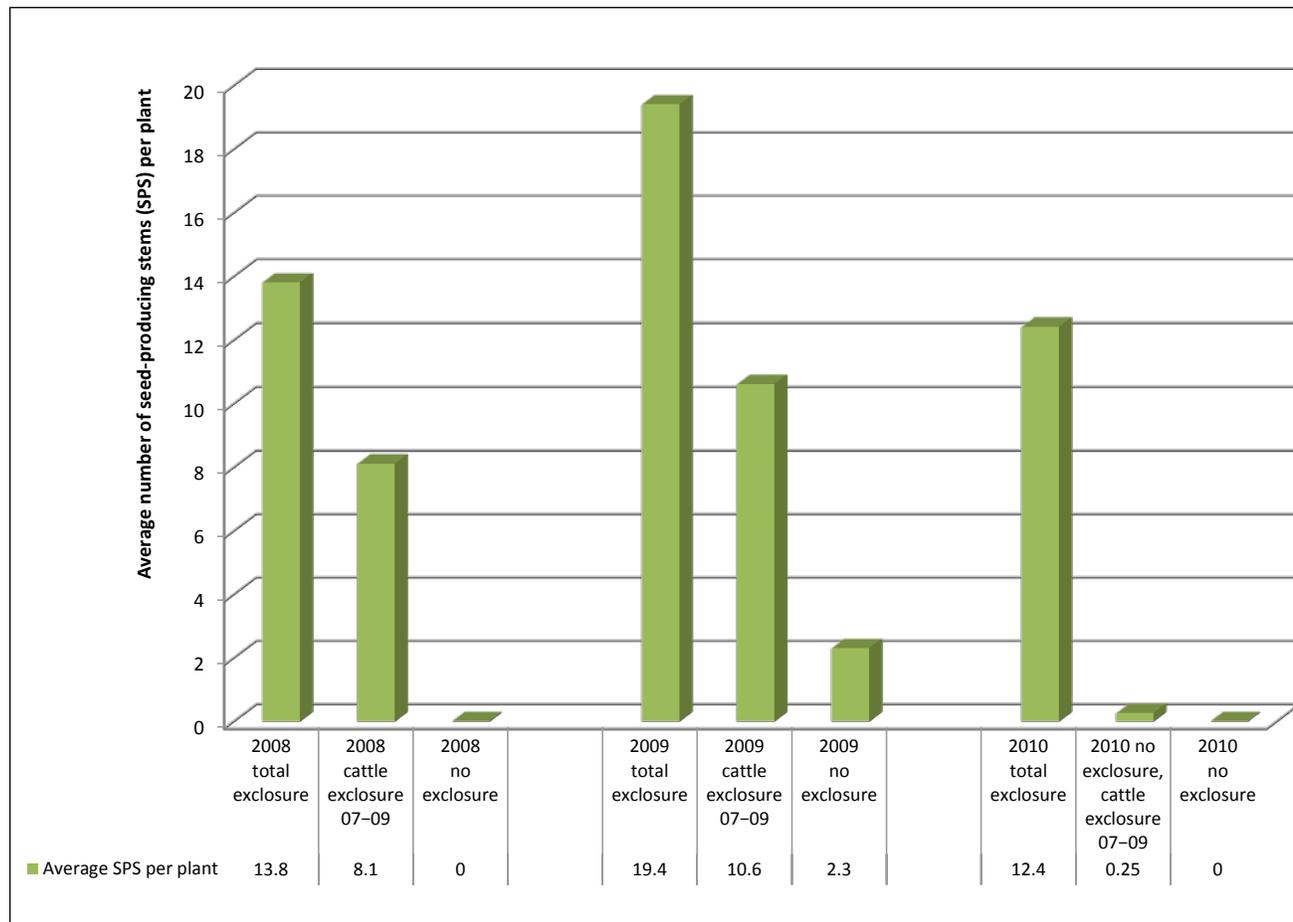


Figure 22. Bar graph of monitoring results for saltbush growth at the Charles M. Russell Refuge.

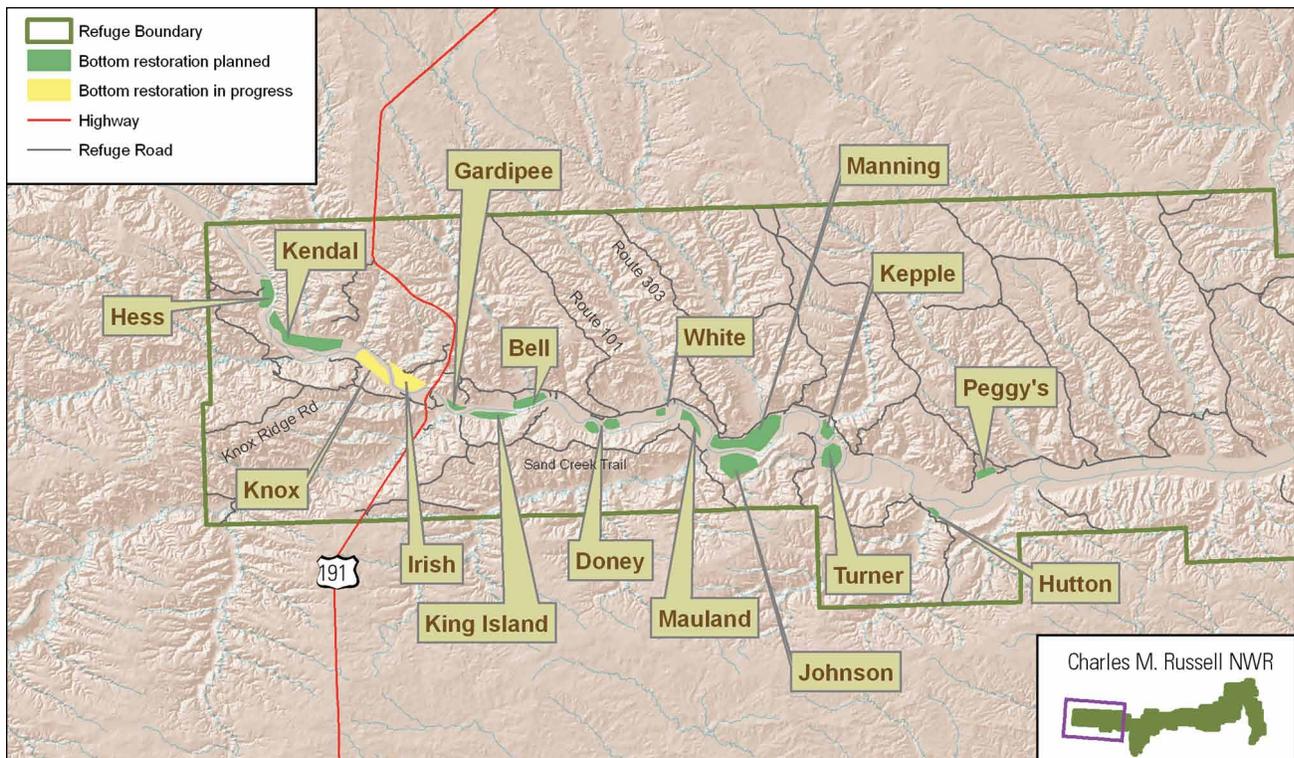


Figure 23. Map of river bottoms in need of restoration at the Charles M. Russell and UL Bend Refuges.

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 what would be 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 20 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 Bot-

tomms (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 establishment occurred in years with a peak mean daily flow greater than 49,434 cubic feet per second (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.

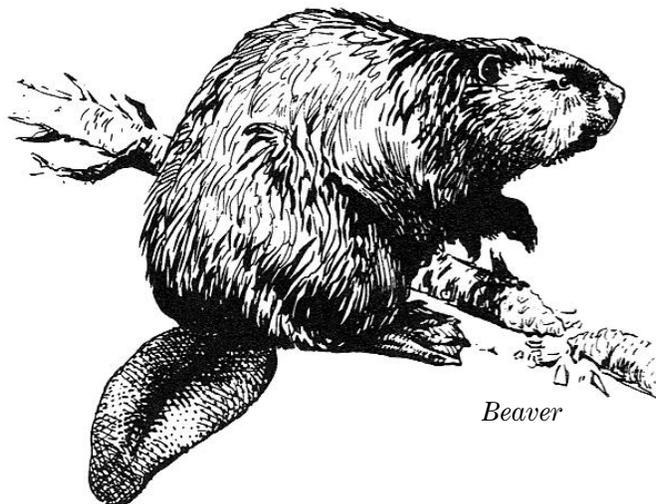
Seedlings become established most years on bare, relatively low surfaces deposited by the river. The high elevation for establishment of all trees dating to before 1978 (relative to the normal river stage elevation) indicates that only individuals established

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 would be 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 surrounding 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 hab-

itat 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 riparian 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 runoff 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 river-flow, 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, Neppel 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 24). However, the Service requested more survey areas where management changes have occurred such as Armells Creek, Rock Creek (west), and Bobcat 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

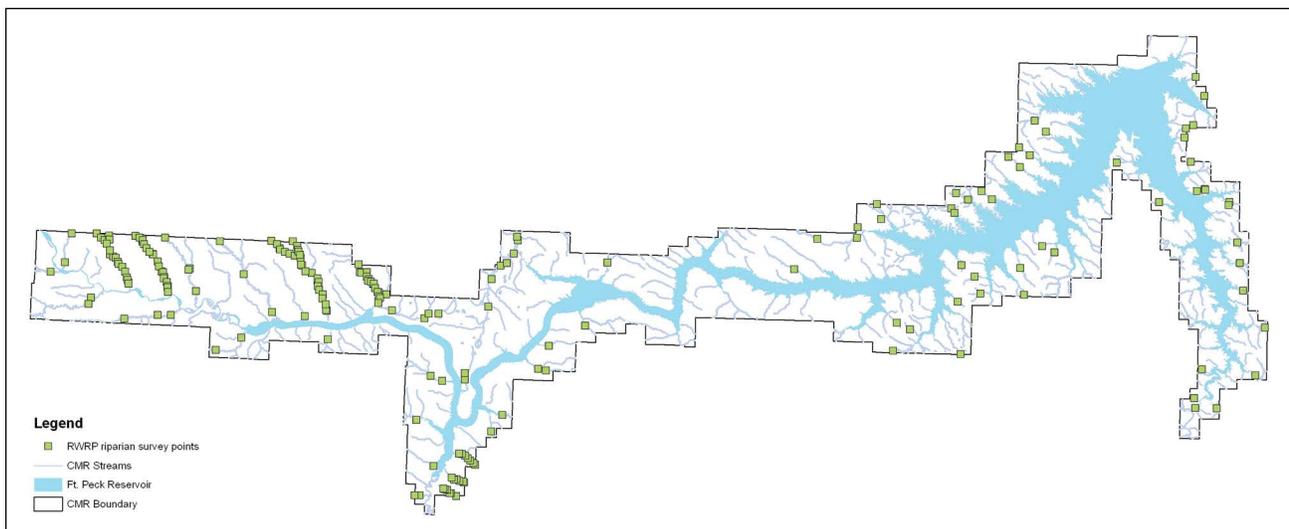


Figure 24. Map of Riparian and Wetland Research Program survey locations at the Charles M. Russell and UL Bend Refuges.

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 13 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 to due 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 would not be as heavily impacted if more riparian areas were improved or created by excluding cattle and keeping elk at lower numbers.

The strategies for the alternatives (“Chapter 3—Alternatives”) stress the importance of working 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.

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 Per-

Table 13. Comparison of riparian area health of 82 streams across the Charles M. Russell and UL Bend Refuges (1995–2009).

Year	Number of polygons	Miles of stream	Riparian acres	Vegetation score* (%)	Soils and hydrology score (%)	Overall score (%)	Health category
All polygons on Charles M. Russell Refuge: assessed in 1995–97 and resampled in 2009							
1995–97	188	88.0	1,284.0	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	27.0	282.7	63	54	58	Nonfunctional
2009	33	27.1	329.0	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	13.0	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	49.0	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).

formance 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 prob-

lem 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 erad-

icate 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 25 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) (refer to table 14). 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). 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 herbivory and fire suppression practices of the refuge. The healthier landscapes on the refuge (places where native plant species populations are diverse and viable) have less Japanese brome and yellow sweetclover.

Table 14. Acreage of treated weeds at the Charles M. Russell and UL Bend Refuges (2008).

<i>Weed species</i>	<i>Treated acres</i>
Leafy spurge	2.47
Russian knapweed	72.90
Saltcedar	30.00
Spotted knapweed	0.71
Whitetop (hoary cress)	6.00
Total	112.07

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 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



USFWS

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

way to treat saltcedar would be inundating 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 snow-pack levels resulted in lake levels returning to above record high water levels. How the elevated lake levels would affect future treatments along the shoreline is unclear. As stated in “Chapter 1—Introduction,” 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 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-collared and McCown’s longspurs, and greater sage and sharp-tailed grouse (North American Bird Conservation 2009). Compounding these declines

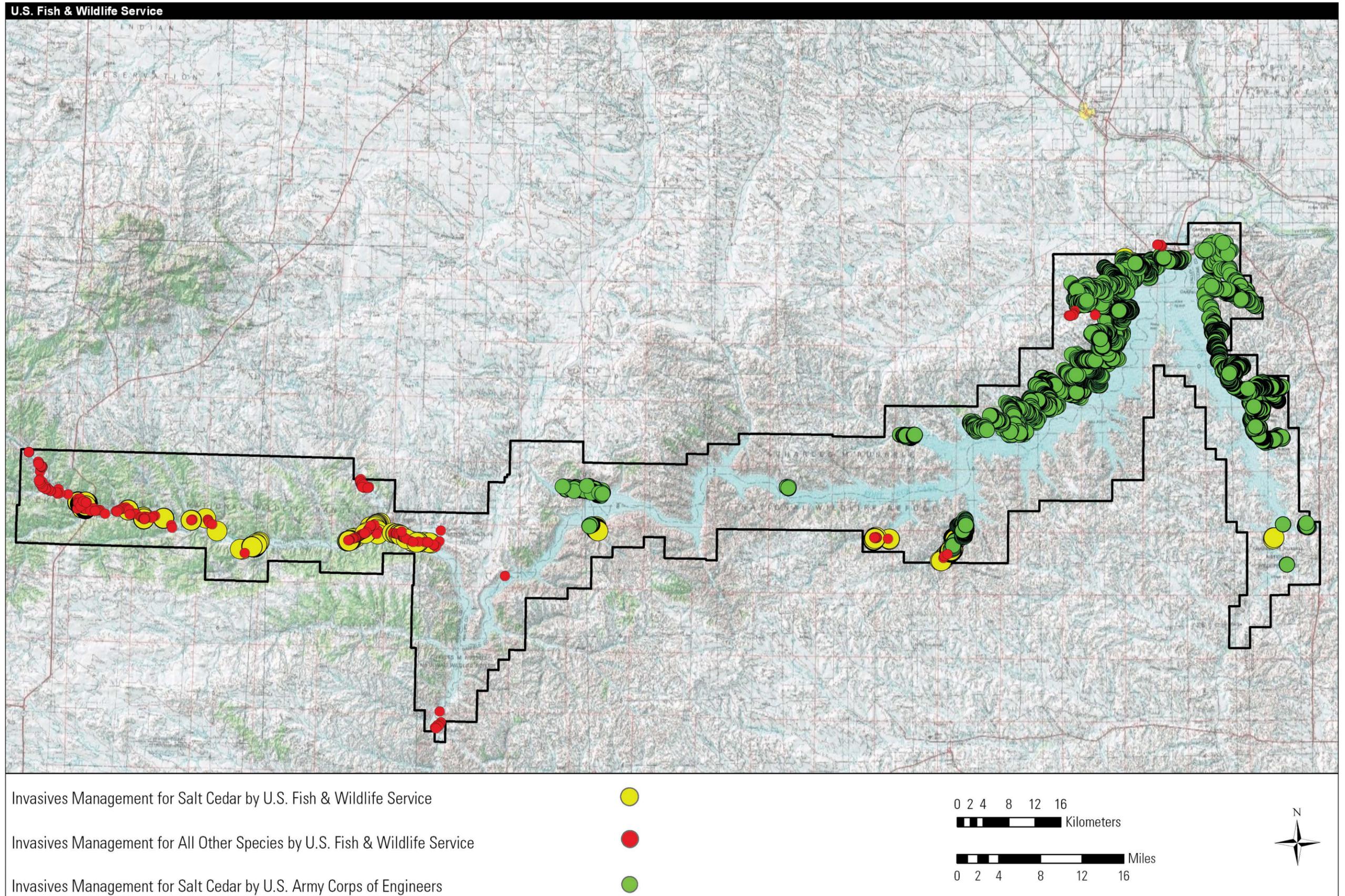


Figure 25. Map of invasive species occurrence at the Charles M. Russell and UL Bend Refuges.

Figure 25 (invasive species)

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 26) 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 27 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, 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.

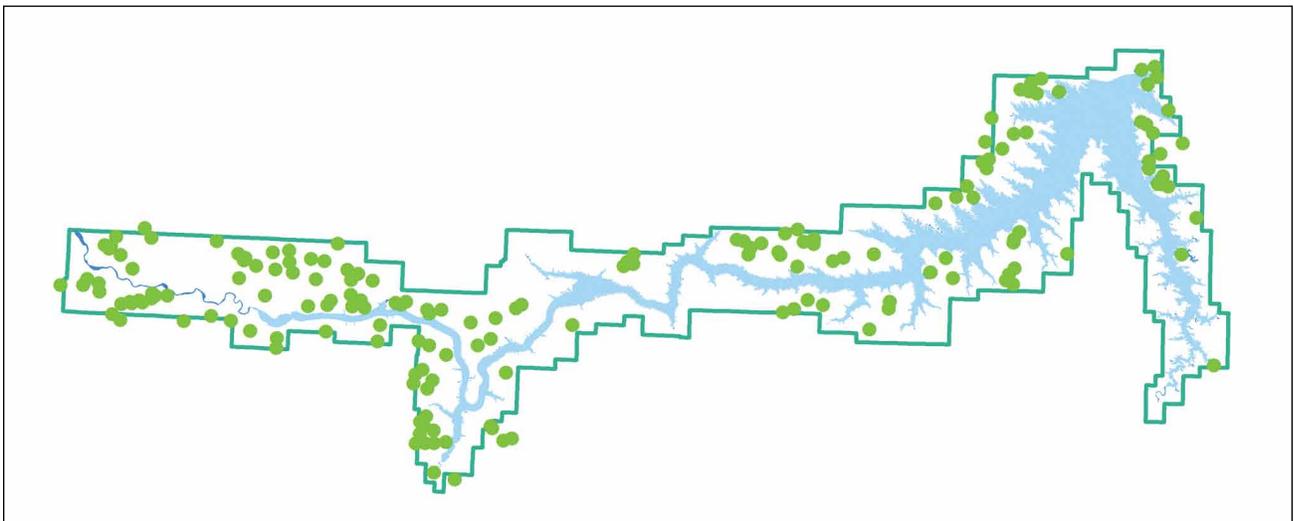


Figure 26. Map of lek locations for sharp-tailed grouse on the Charles M. Russell and UL Bend Refuges.

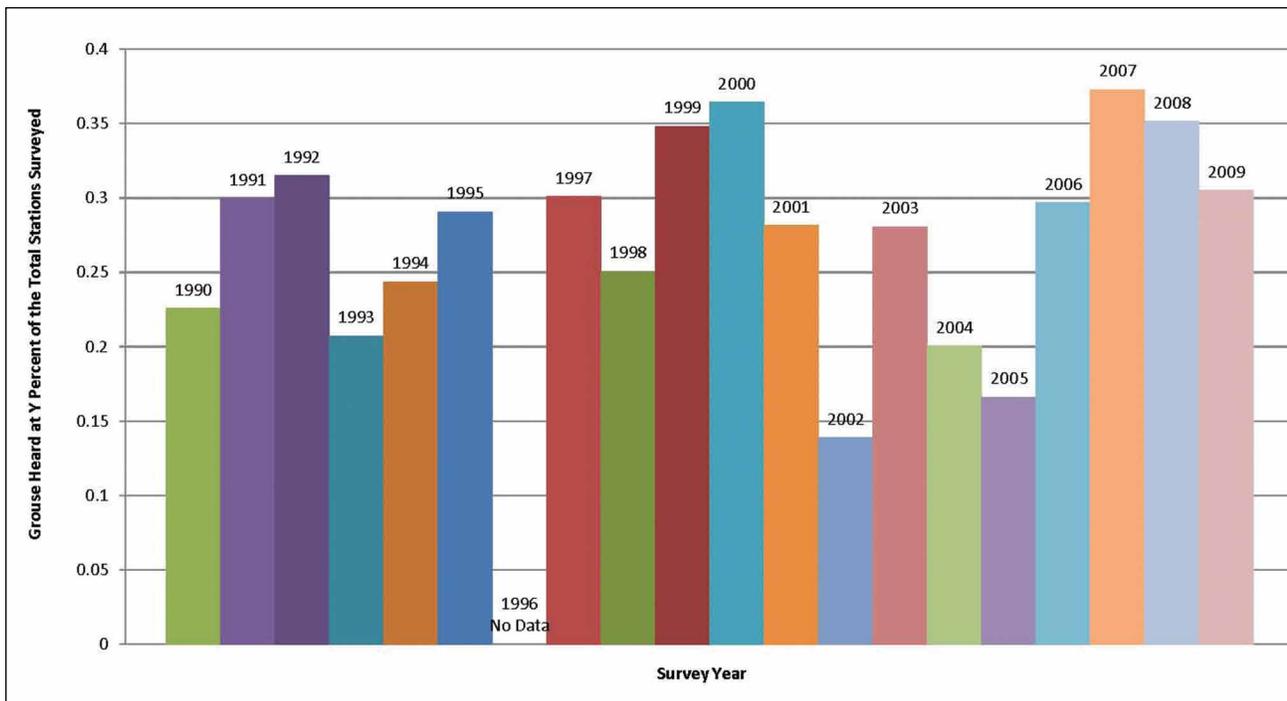


Figure 27. Chart of survey results for the listening route for sharp-tailed grouse on the Charles M. Russell and UL Bend Refuges (1990–2008).

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 chapter 3, section 3.8, "Wildlife—Birds."

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.

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 28) 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 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 portion 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 portions of prairie dogs 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

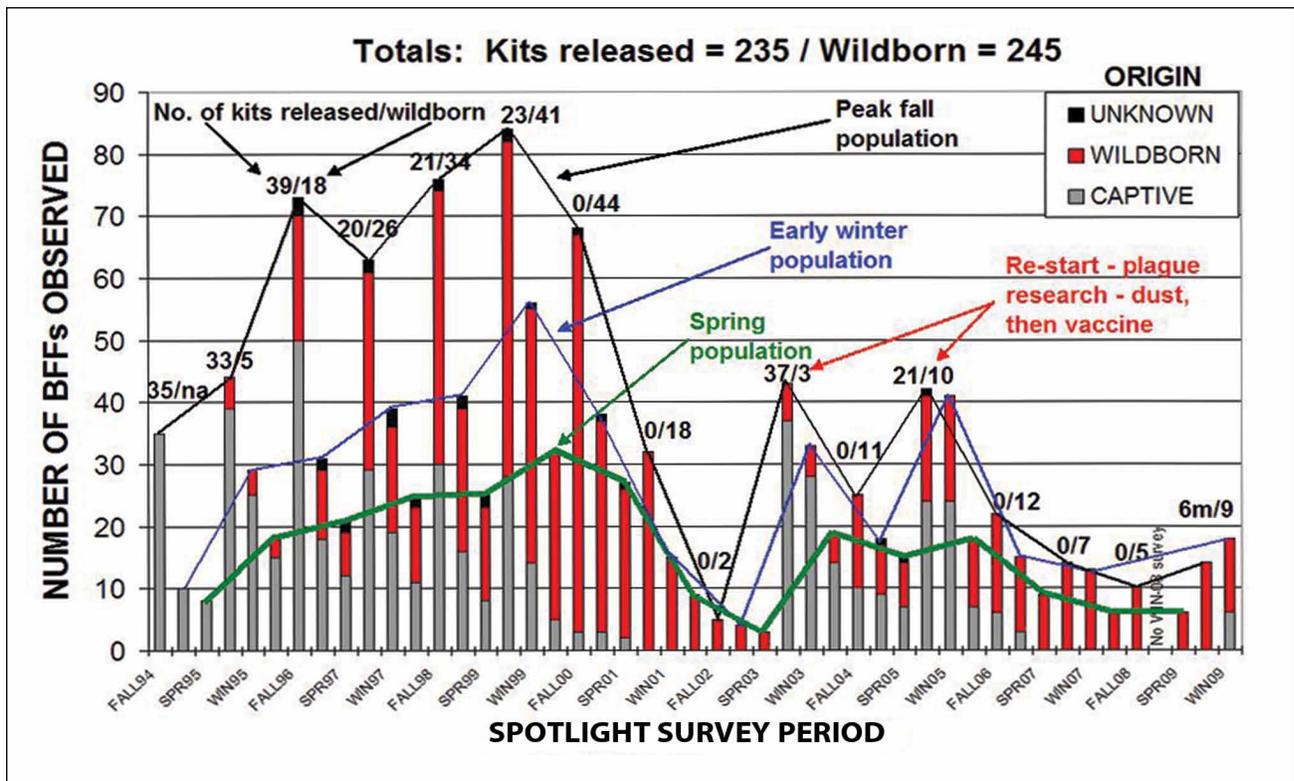


Figure 28. Graph of data for the black-footed ferret population at the UL Bend Refuge.

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 15.

Table 15. Least tern nest success at Fort Peck Lake.

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

*Number of nests producing fledglings. (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 16 shows the stocking history of the Missouri River in Montana.

Table 16. History of stocking pallid sturgeon in the middle Missouri River, Montana (1998–2008).

<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 lake-shore 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 29). 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 (refer to table 17). The amount 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).

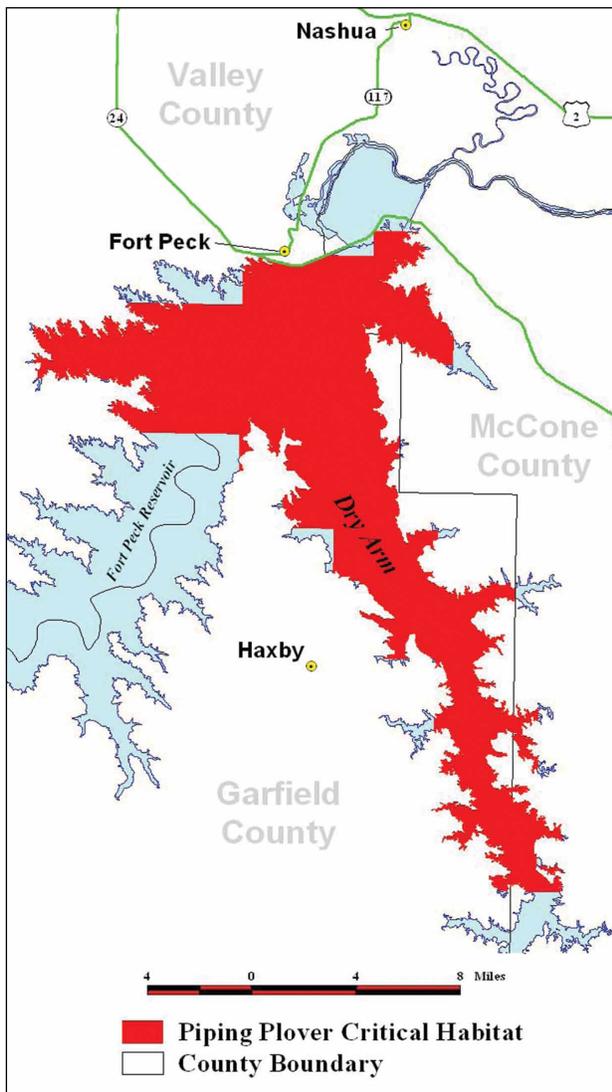


Figure 29. Map of critical habitat for piping plover at Fort Peck Reservoir.

Table 17. Piping plover nest success at Fort Peck Lake.

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).

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 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 30 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. 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

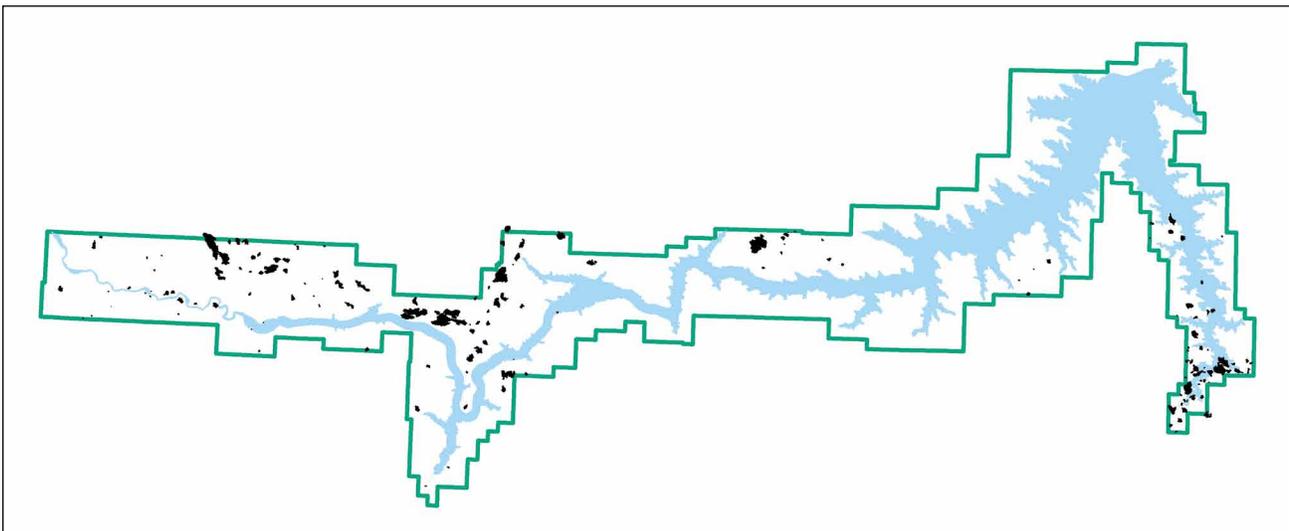


Figure 30. Map of the maximum extent of black-tailed prairie dogs at the Charles M. Russell and UL Bend Refuges (1979–2007).



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Watchful prairie dogs atop their mound.

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. Portions 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 31). 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. Sub-

sequent 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. Harvest 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 would, in turn, benefit mountain plover. Mountain plover occurrence

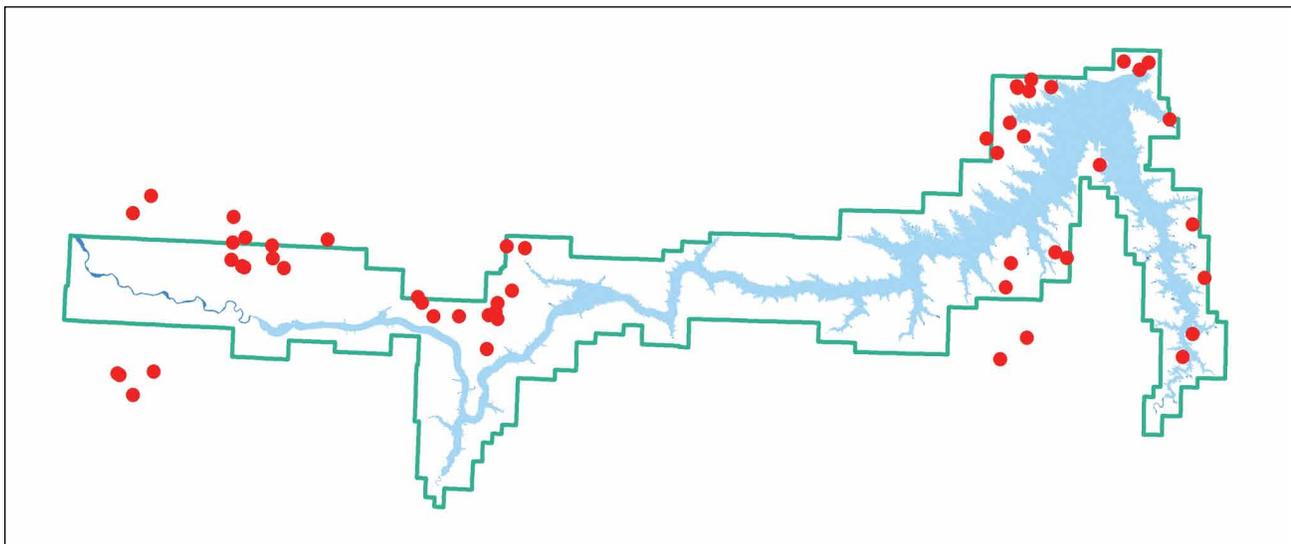


Figure 31. Map of lek locations for greater sage-grouse on and near the Charles M. Russell and UL Bend Refuges.

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 Category 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 32).

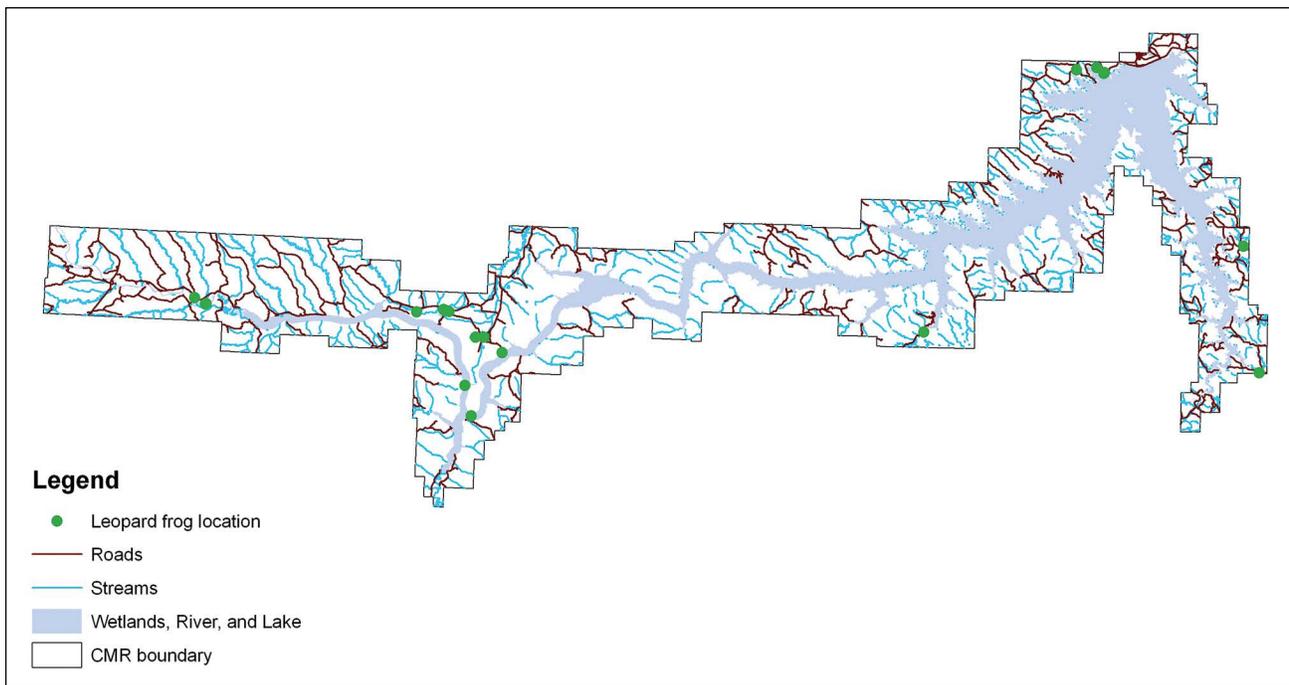


Figure 32. Map of leopard frog locations on the Charles M. Russell and UL Bend Refuges (1996–2009).

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 objectives in chapter 3 for birds and TES and species of concern).

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 would provide the basis for increased populations of muskrat, beaver, river otter, and mink. Cur-

rent population numbers of the remaining furbearer species is unknown, most have undocumented observations by staff and other visitors; however, continued restrictions would 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 would 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 chapter 3, objectives for American bison).

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 chapter 3, objectives for gray wolf).

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 (see 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 9.0 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 18 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.

Table 18. MFWP's elk population objectives, estimates, and needed herd-size reductions for hunting districts covering the Charles M. Russell and UL Bend Refuges.

<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

Mule Deer

Mule deer populations across the refuge fluctuate for a variety of reasons and densities are highly variable (figure 33). 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 deer surveys over the years. A standardized sampling design (figure 34) 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 35). 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 public use for more information about quality wildlife-dependent uses).

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 36).

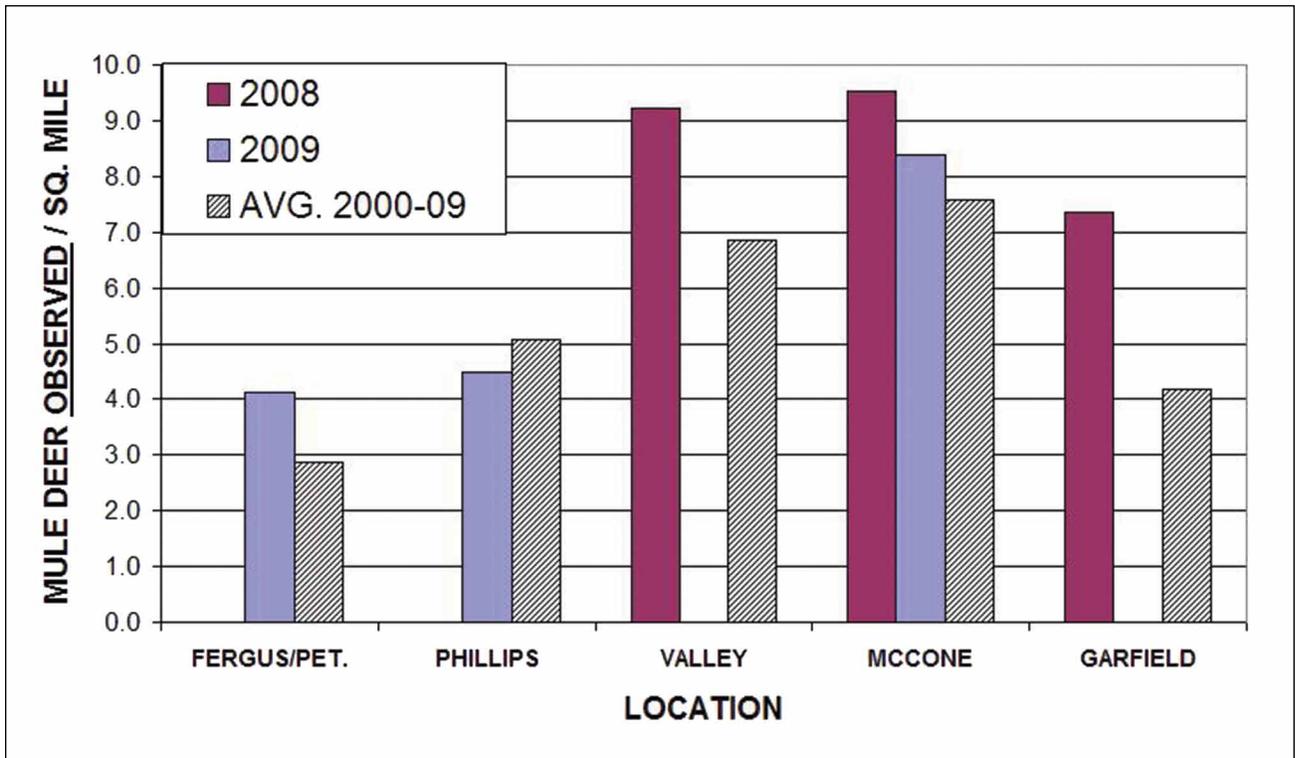


Figure 33. Chart of mule deer densities within six counties covering the Charles M. Russell and UL Bend Refuges.

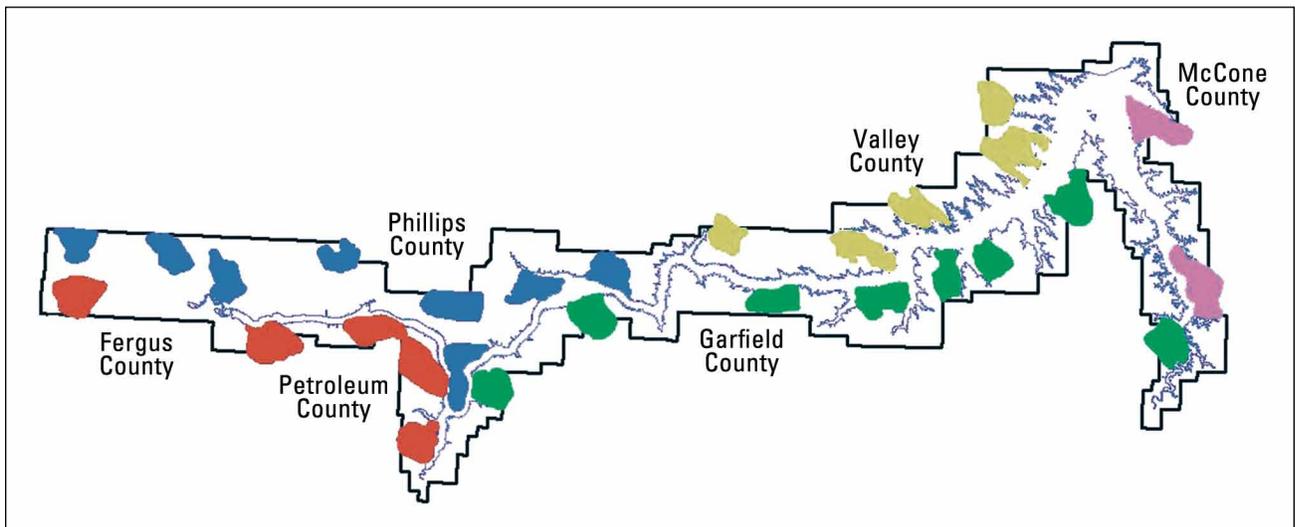


Figure 34. Map of the aerial survey blocks for mule deer and elk at the Charles M. Russell and UL Bend Refuges.

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

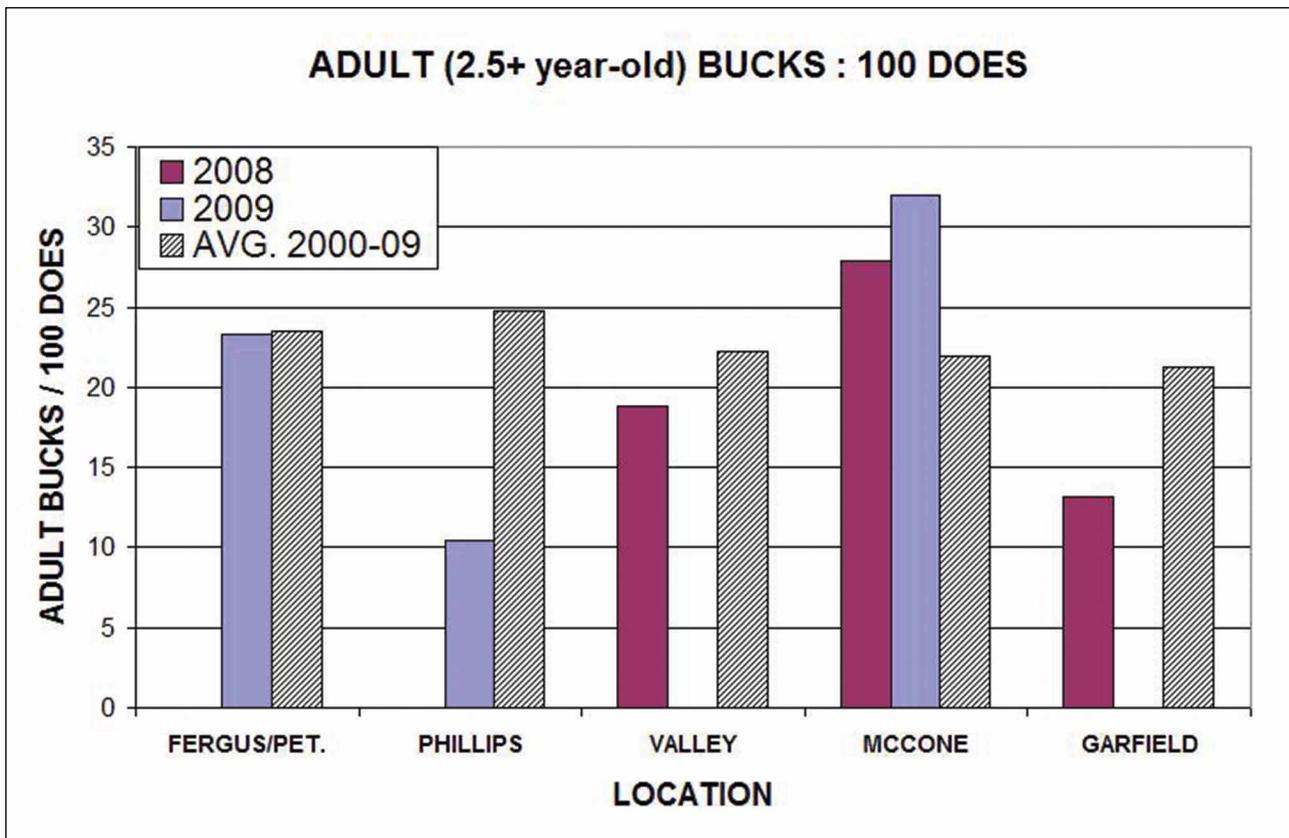


Figure 35. Chart of the ratios of adult mule deer bucks to does within the six counties covering the Charles M. Russell and UL Bend Refuges.

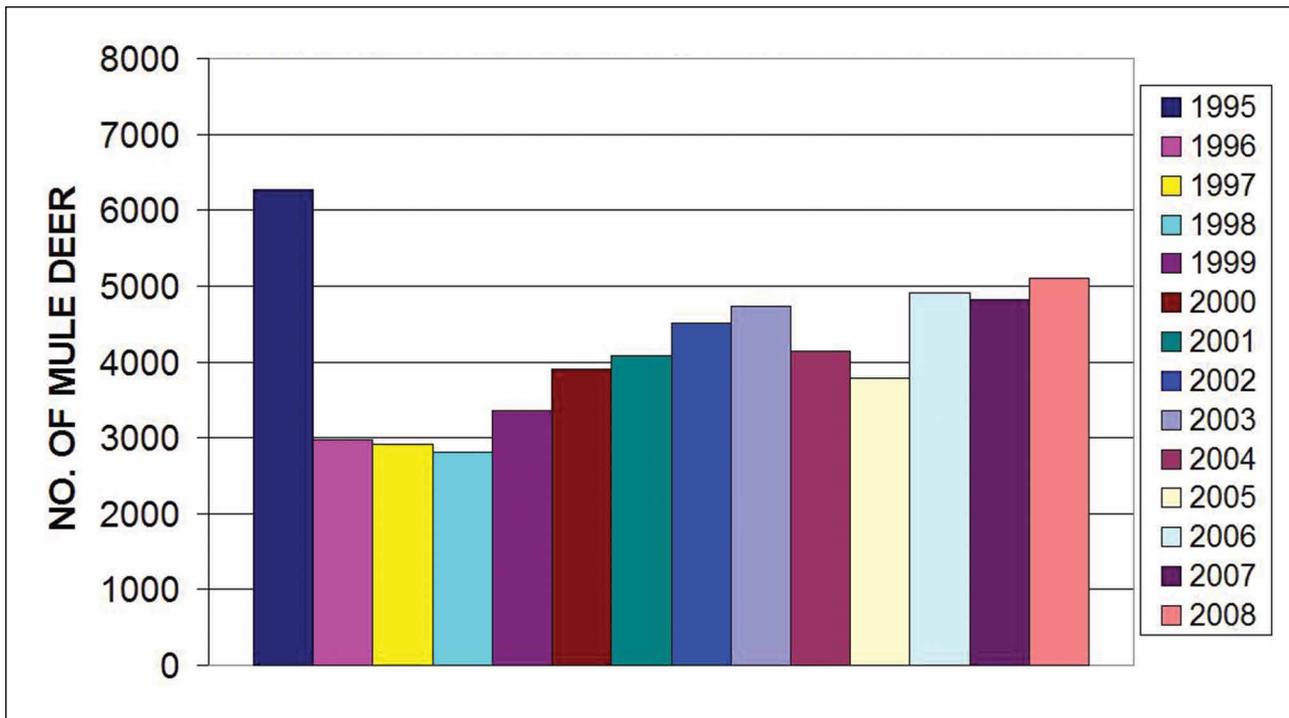


Figure 36. Chart of the number of mule deer harvested in hunting districts on and next to the Charles M. Russell and UL Bend Refuges.

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.

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—Refuge History and Vision”). Pronghorn are a highly mobile species and recent research using 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 37). 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

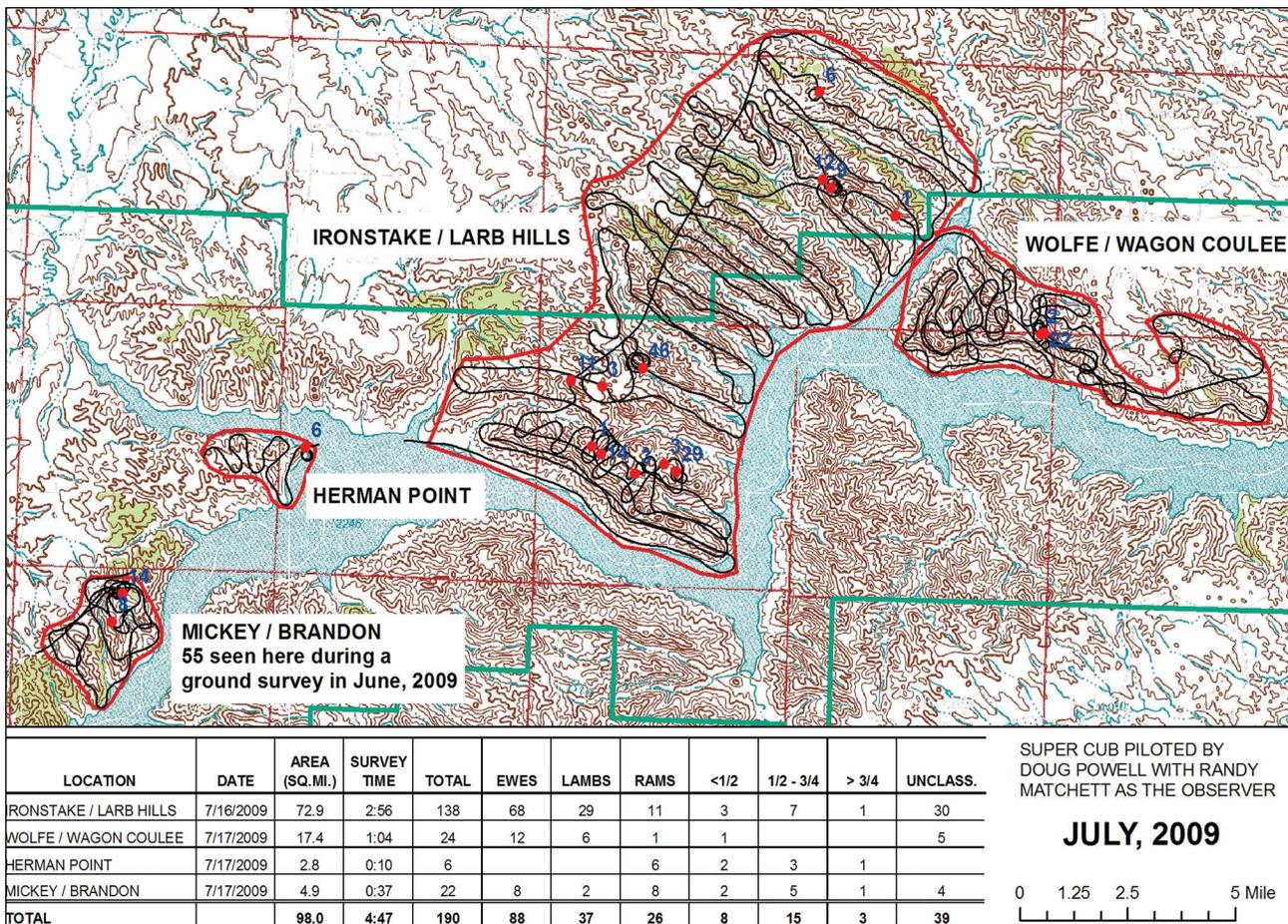


Figure 37. Map of the aerial bighorn sheep survey at the Charles M. Russell Refuge.

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 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 38). Refuge staff are in the early phases of working with landowners, 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.

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, would 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 Missouri 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;

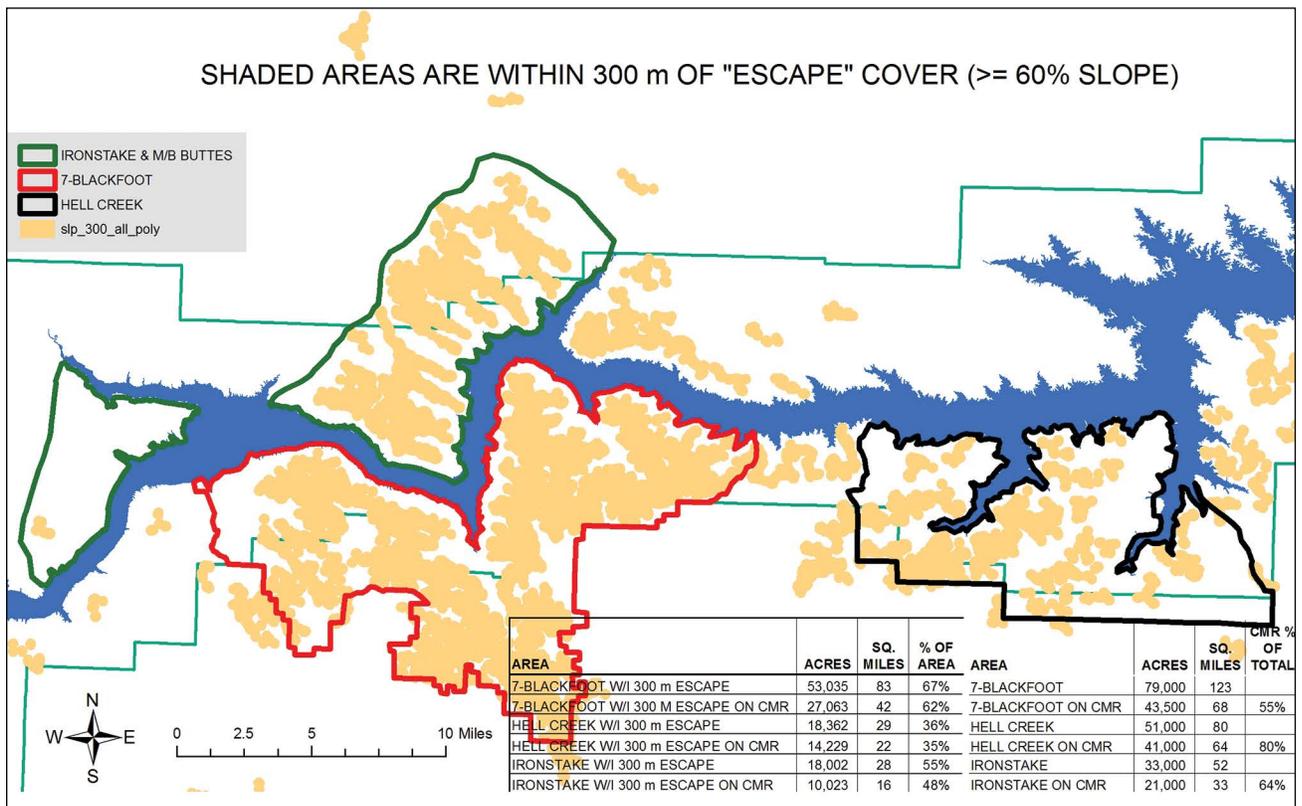


Figure 38. Map of areas within 328 yards (300 meters) of escape cover for bighorn sheep at and around the Charles M. Russell and UL Bend Refuges.

- 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.

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



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Western Painted Turtle

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 spe-

cies 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, wall-eye, 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, who 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, firewater 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, emerald 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. Sauger catch rates 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, wall-eye, 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 species 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 would be 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.

4.4 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 would 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 E.

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 figures 7 and 16). Refer to "Habitat—Upland" in chapter 3 for more information on livestock grazing in the uplands.

Appendix E provides further 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 15.

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 15). 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 natural 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 15).

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 wilderness 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 purposes 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 retained 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 15), 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.

4.5 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 opportunities 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 the socioeconomic analysis in chapter 4).

The Theodore Roosevelt Conservation Partnership conducted a poll of hunters and sporting groups (figure 39). 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 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.

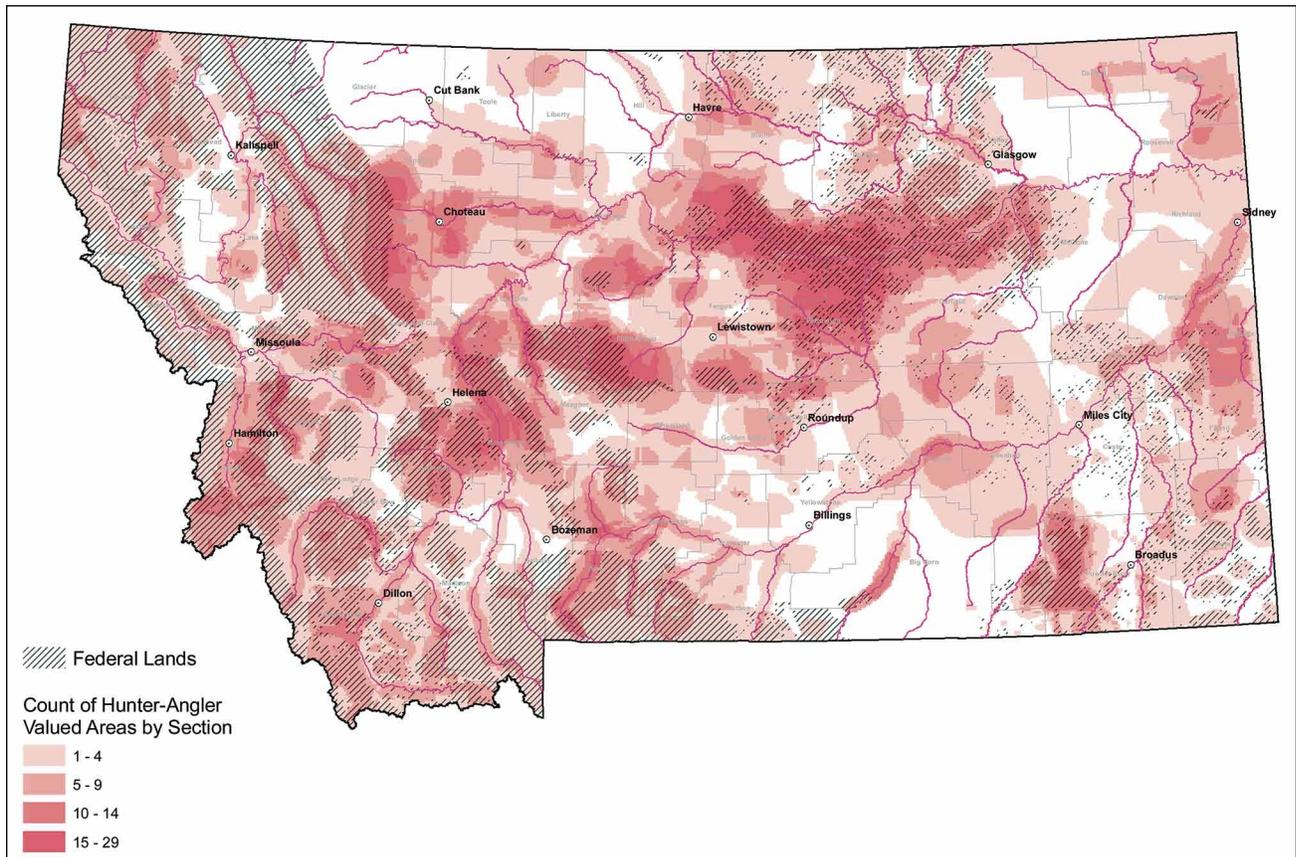


Figure 39. Map of areas in Montana that are valued by hunters and anglers. Source: Dickson (2008).

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 interpretive 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 Lewistown headquarters.



The refuge offers limited programs in environmental education.

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 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

There are approximately 670 miles of refuge roads (see figure 7, alternative A map, in chapter 3). 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 portions 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 counties. Some counties' road books and files will have complete sets of petitioned road records for individual roads. Some will have portions 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 it would be 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 this CCP and EIS. This document would 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 would 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 considered 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 4.1 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 E).

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 15). 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 in chapter 3. Commercial outfitting also occurs on the refuge but is limited to 11 special use permits annually.



USFWS

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

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.

4.6 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. Clima-

logically, it was becoming dryer and Plains Archaic populations tended to inhabit areas with protected water sources. Sites typically occur in basin and foot-hill 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, settlement 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 a majority of the known prehistoric sites

are attributed to this period. This may be because most of the sites are known from surface finds and is logical that the latest materials would be 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 would expand 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 would greatly affect tribal politics and warfare because the loss of population numbers forced certain tribes to create partnerships that would allow 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 opportunities 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 Poplar 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 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 became 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 would be 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 would be hauled up from St. Louis. Goods

including furs, bison robes, and gold would be 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 would not only be able to sell the land, but would also create more traffic for freight as the settlers would need 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

would not be 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 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



Brett Billings / USFWS

Old homesteads dot the landscape.

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 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.

4.7 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 section "4.4, Special Management Areas").

The western part of the refuge is shortgrass prairie with sparse pine forest in the uplands and cottonwoods in the dissected drainages and floodplain areas. 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.

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.

4.8 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 current management (no-action alternative) and proposed management activities (alternatives) affect the local economy. This type of analysis provides two critical pieces of information: (1) a refuge's contribution to the local community; and (2) an analysis that can help in determining

whether economic effects are or are not a real concern in choosing among management alternatives.

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 final 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 19 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 19, 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 Fer-

Table 19. Population estimates for the Nation and the counties surrounding the Charles M. Russell and UL Bend Refuges.

<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	8.0	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	-23.0
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).

gus 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 19.

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 19, 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, the counties of McCone, Petroleum, Phillips, and Valley are expected to lose more than 20 percent of their populations compared to 2000 (table 19). 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 (26.8–28.0 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 40 (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 40. Decline in total employ-

ment 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 19) 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

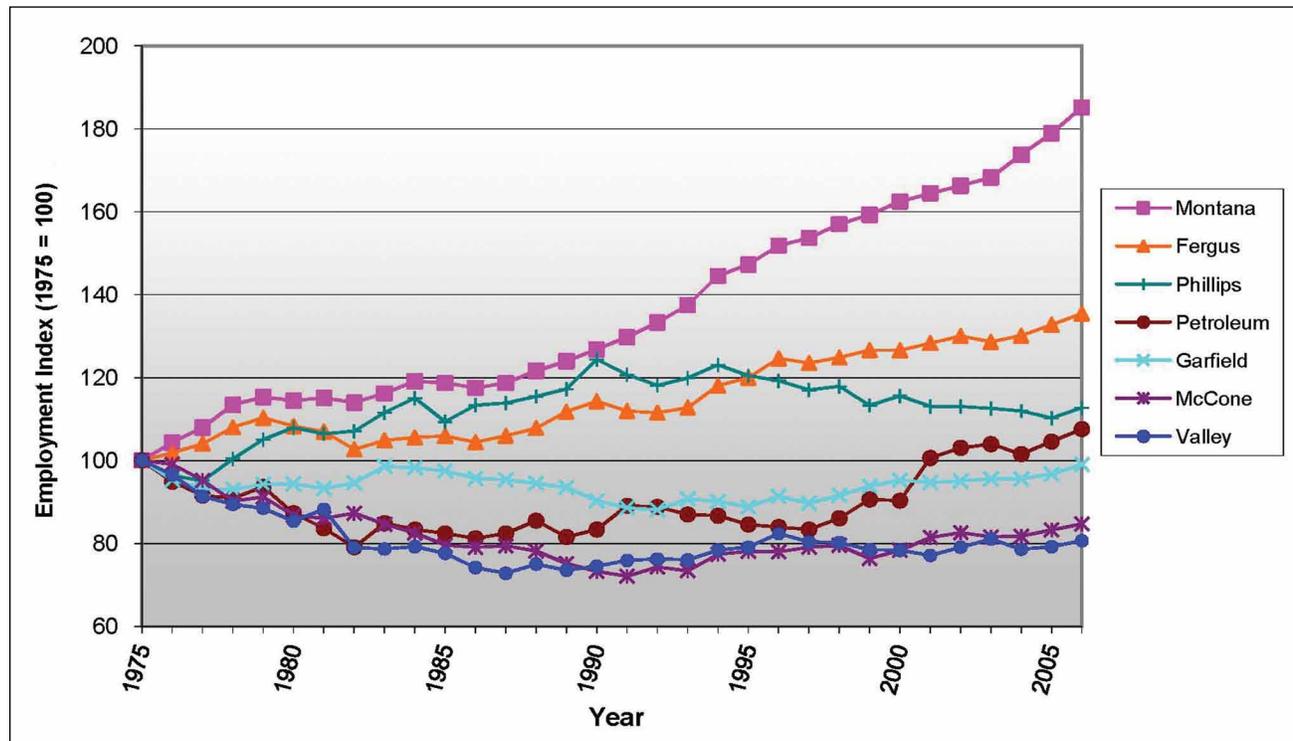


Figure 40. Graph of the total employment index for Montana and the counties surrounding the Charles M. Russell and UL Bend Refuges (1975–2006). Source: U.S. Department of Commerce (2008), CA25.

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.

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 20 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 (39.0–65.5 percent) compared to the State as a whole (27.1 percent; refer to table 20). 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 40, 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 (refer to table 20). 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 21 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

Table 20. 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	22.0	73	19	27	29	23	34	4	8
Fergus County	7,654	11.0	61	6	39	19	27	27	12	6
Garfield County	872	9.0	48	-1	52	20	25	44	27	4
McCone County	1,283	7.0	51	-1	49	15	19	30	30	8
Petroleum County	345	24.0	35	-3	66	45	36	151	30	-4
Phillips County	2,645	-9.0	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.

Table 21. Employment by industry for the counties surrounding the Charles M. Russell and UL Bend Refuges.

<i>Industry</i>	<i>Industry output (\$millions)</i>	<i>Employment (number of full- and part-time jobs)</i>	<i>Labor income (\$millions)</i>
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	119.0	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.

2008). This increase was attributed to a steady increase 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 22. 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

Table 22. 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	4.0

¹Source: U.S. Census Bureau (2007).

²Source: U.S. Census Bureau (2008).

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 21, farming is the largest employer in each of the six counties surrounding the refuge. From 2001 to 2007, agri-

cultural 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 41, 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 (refer to table 23). Garfield County has the high-

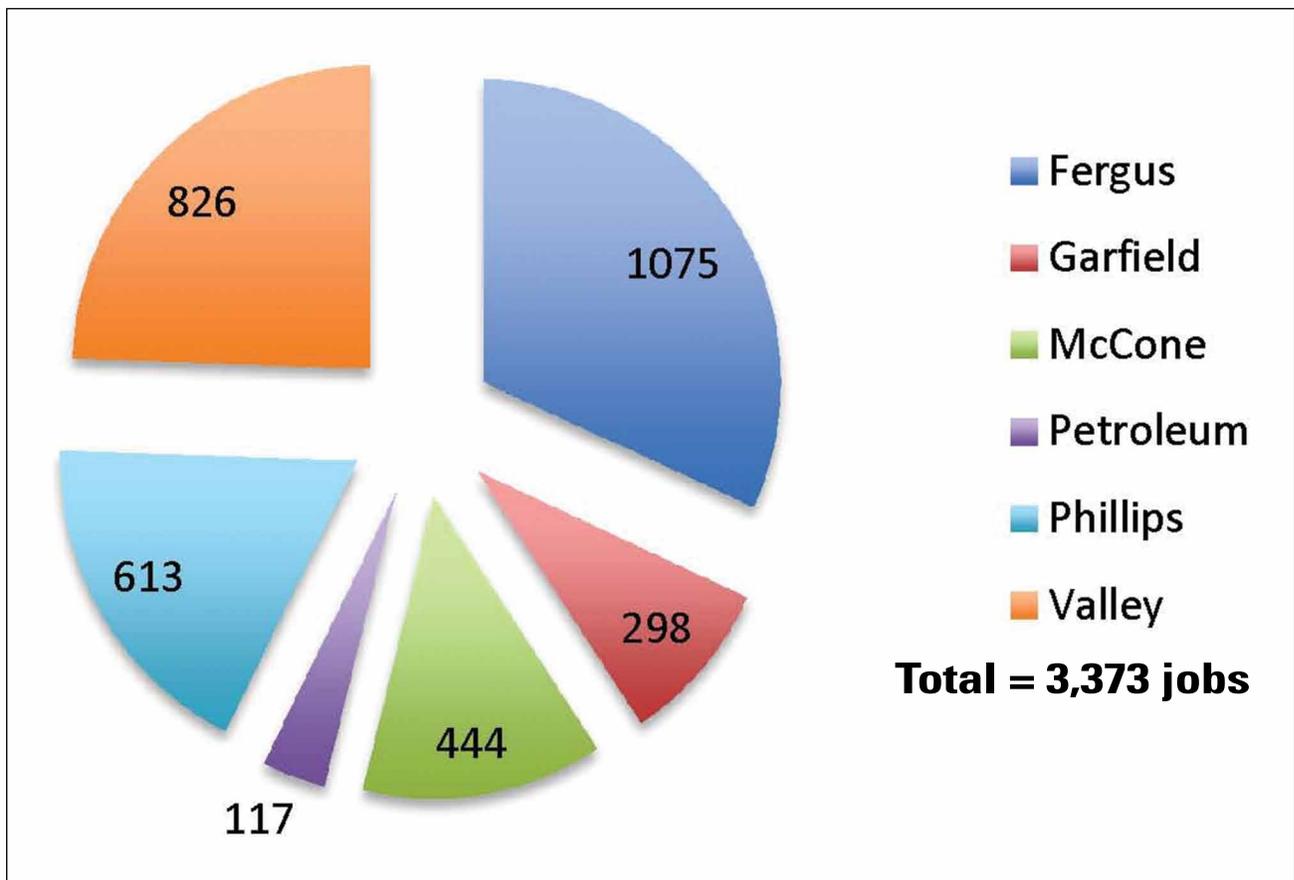


Figure 41. Chart of agriculture employment in the six counties surrounding the Charles M. Russell and UL Bend Refuges. Source: U.S. Department of Commerce (2008).

Table 23. 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.

est proportion of farmers whose primary occupation is farming, while Valley County had the lowest.

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 42). 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 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

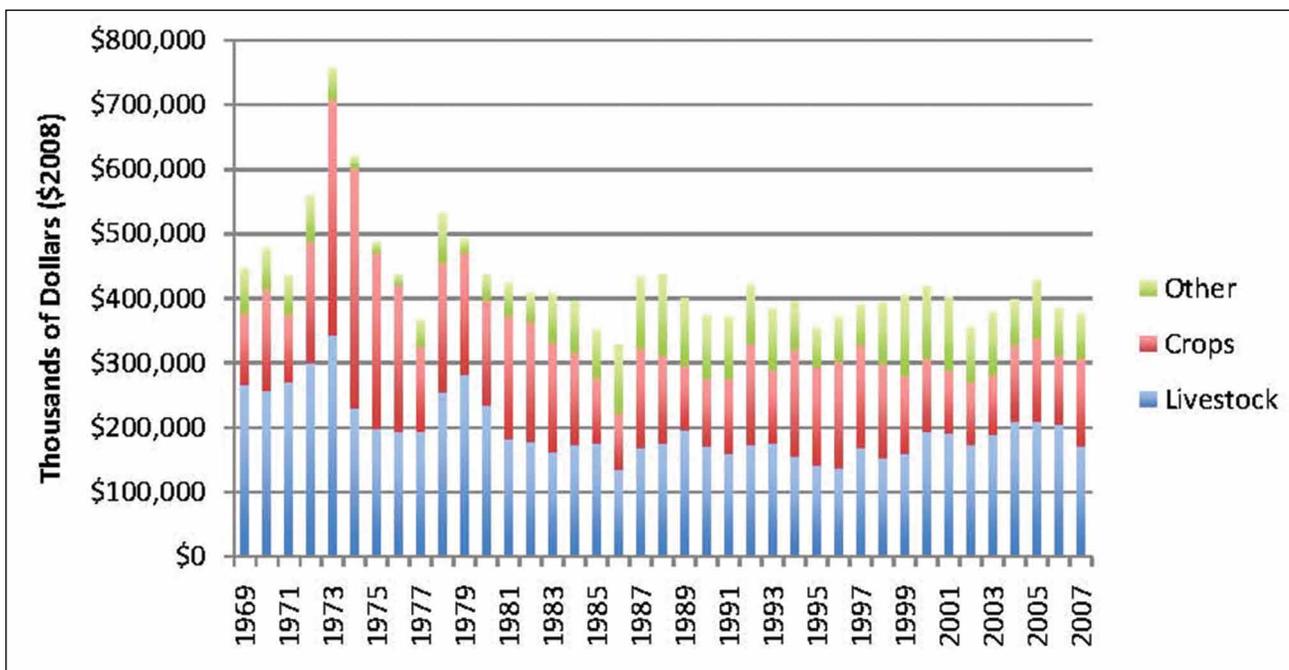


Figure 42. Chart of trends in gross revenues from agriculture in the area surrounding the Charles M. Russell and UL Bend Refuges (1969–2007). Source: U.S. Department of Commerce (2008); other sources of revenue for agricultural operations include Government payments, value of home consumption, machine hire and custom work, rental income, and income from forest products.

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 43, 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 44). As shown

in figure 44, 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 24).

As shown in table 25, 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

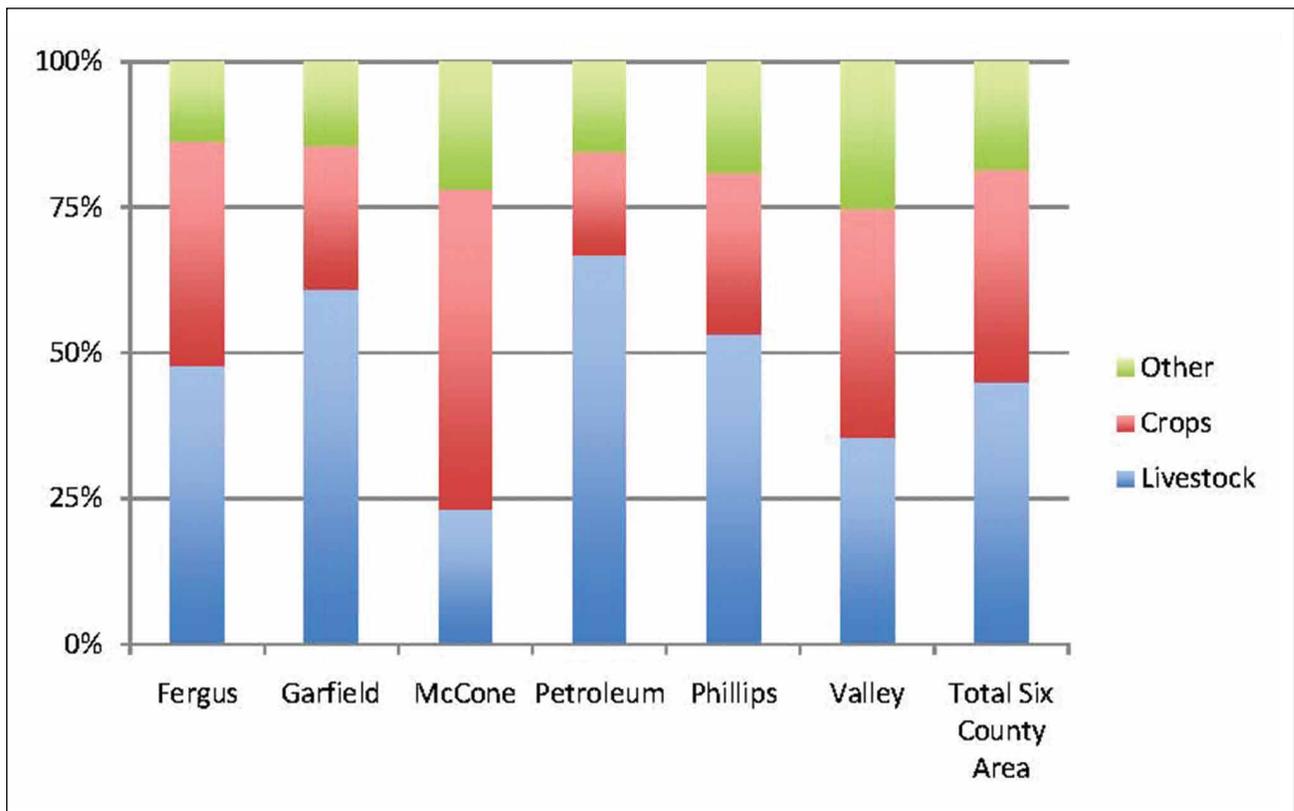


Figure 43. Chart of the breakdown of gross revenues from agriculture for the six counties surrounding the Charles M. Russell and UL Bend Refuges (2007). Source: U.S. Department of Commerce (2008). Other sources of revenue for agricultural operations include Government payments, value of home consumption, machine hire and custom work, rental income, and income from forest products.

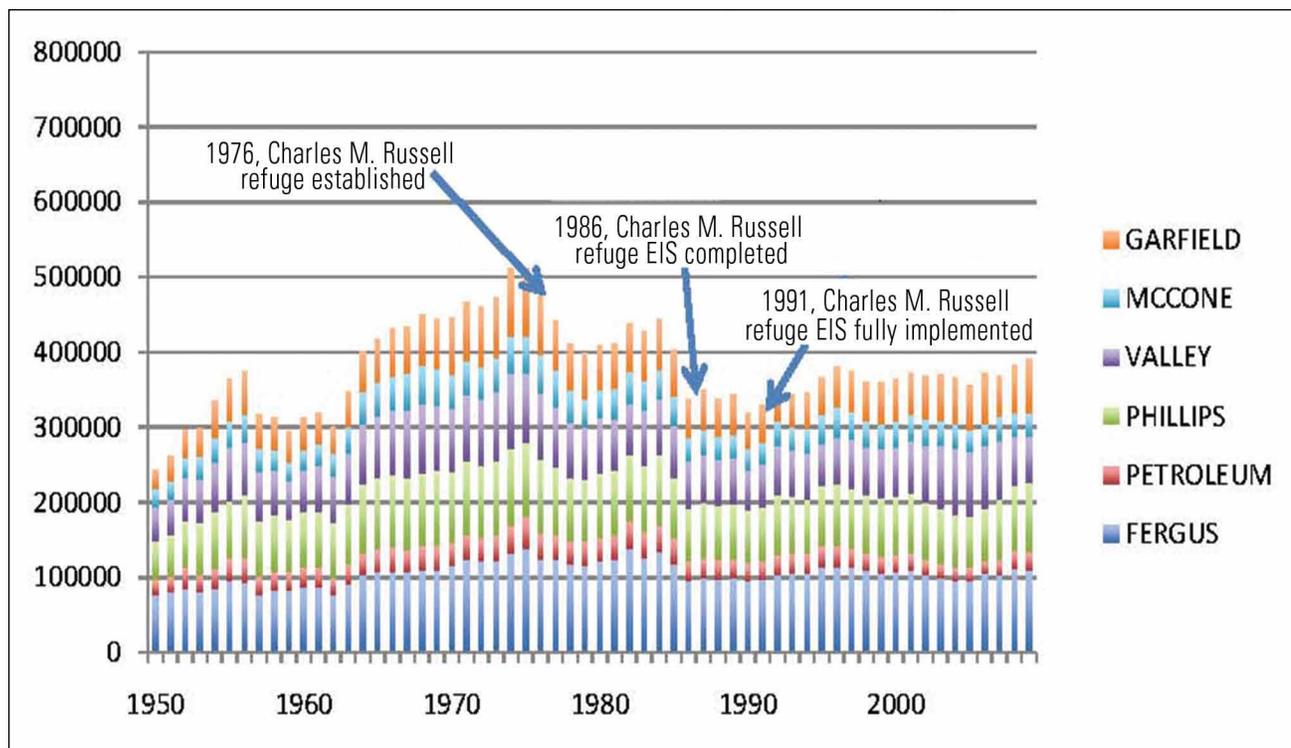


Figure 44. Chart of the cattle inventory for the six counties surrounding the Charles M. Russell and UL Bend Refuges (1950–2009). Source: USDA (2008).

Table 24. Animal inventory and animal unit months of feed needed for the counties surrounding the Charles M. Russell and UL Bend Refuges.

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]

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.

As shown in table 25 and figure 45, 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 visi-

Table 25. Total AUMs for the counties surrounding the Charles M. Russell and UL Bend Refuges (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	7.0	334,773	71.7
McCone	248,911	2,601	1.0	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	1.0	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	7.0	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.

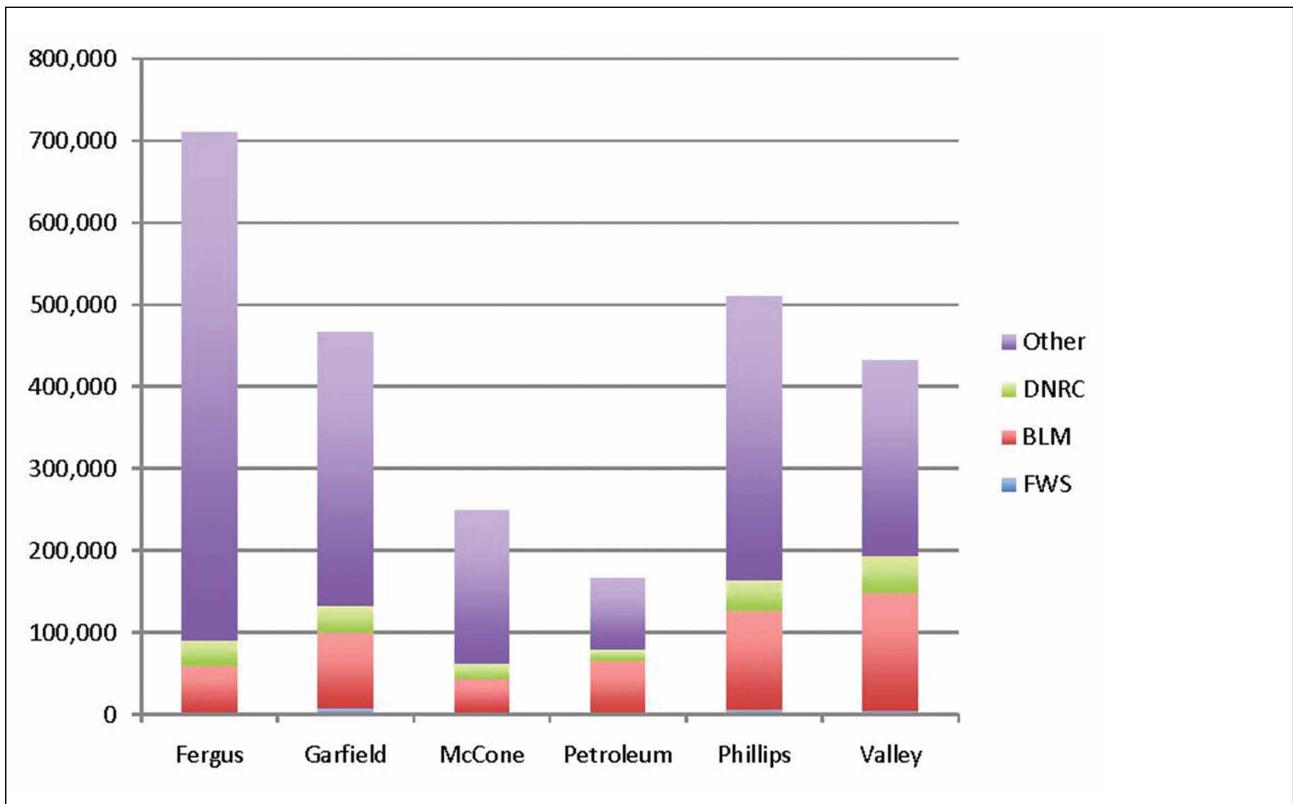


Figure 45. Chart of animal unit months by agency for the six counties surrounding the Charles M. Russell and UL Bend Refuges (2007). Source: USDA (2009).

tors 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 activi-

ties in Montana (FWS 2008e). Of all participants, 31 percent fished for 2.9 million fishing days, 21 percent 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 cap-

ita 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 nonresident 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), visiting 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 ownership. As shown in table 26, 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,

Table 26. Seasonal housing in the counties surrounding the Charles M. Russell and UL Bend Refuges.

County	Seasonal housing units		% of total housing units 2000
	2000	% Change from 1990	
Fergus	187	3.0	3.4
Garfield	293	12.0	30.5
McCone	107	-14.0	9.8
Petroleum	28	-30.0	9.6
Phillips	264	4.0	10.6
Valley	376	43.0	7.8
Total	1,255	3.0	12.0

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.

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 27). 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.

Table 27. 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).

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.

5—Environmental Consequences



USFWS

Large wildfires like the King Island fire in 2006 affect air quality, visual resources, soils, and habitat.

This chapter summarizes and compares the potential effects of implementing the four management alternatives described in chapter 3 on the physical and biological environment, management of special area designations, public use opportunities, cultural and paleontological resources, and other social and economic factors. The environment that would be affected by the alternatives proposed by the Service is described in “Chapter 4—Affected Environment.”

5.1 ANALYSIS METHOD

Under each topic (resource) the actions or things that could affect that resource are discussed. Usually, these are the actions stemming from the objectives and strategies identified in “Chapter 3—Alternatives.” Often the effect of an action cuts across several resources. For example, the use of motorized equipment or vehicles, prescribed fire, livestock grazing, fencing, and hunting have different consequences that are specific to a resource.

The environmental effects are evaluated at several levels, including whether the effects are negative (or adverse in the case of threatened or endangered species) or beneficial and whether the effects are direct, indirect, or cumulative with other indepen-

dent actions. The evaluation of environmental consequences also uses the duration of an effect, whether it is over the long term or short term.

Direct effects are those where the effect on the resource is immediate and is a direct result of a specific action or activity. Examples of a direct effect might include the effect of ungulate grazing or prescribed fire on vegetation or the effect of hunting on wildlife.

Indirect, or secondary, effects are those that are induced by implementation actions, but occur later in time or farther removed from the place of action through a series of interconnected effects. Examples of indirect effects include the downstream water quality effects from an upstream surface disturbance, or the effect that a use along a road could have on nearby plant communities because of the periodic introduction of invasive plants from outside sources.

A cumulative effect is defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions” (40 CFR 1508.7). Reasonably foreseeable future actions independent of the CCP for the refuge are described in chapter 3.

Effects are often described in terms of their context, intensity, and duration:

- *Negligible*—The effect would be at the lower levels of detection (less than 5-percent change, compared to existing conditions).
- *Minor*—The effect would be detectable (a change of 5–24 percent).
- *Moderate*—The effect would be readily apparent, and it would have the potential to become major (a change of 25–50 percent).
- *Major*—The effect would be severe, or if beneficial, it would have exceptional beneficial effects (a change of more than 50 percent).

The duration of effects are described as occurring over the short term or long term. Short-term effects would persist for a period of 1–5 years, and would consist primarily of temporary disturbance due to habitat restoration, prescribed fire, facility construction, and subsequent revegetation efforts. Long-term effects would last more than 5 years after project initiation, and may outlast the 15-year life of the CCP. For example, there could be a long-term benefit to wildlife habitat resulting from a short-term management action.

Organizationally, under each resource the effects that are common to all alternatives are discussed first. This is followed by a discussion of specific sub-topics that are related to the aspect of the environment being affected. If the topic is short, all the alternatives are discussed together, but where there are distinct differences between the alternatives they are broken out by alternative.

In compliance with the provisions of the Improvement Act, the Service has made a thorough assessment of the environmental effects using available science, which is consistent with National Environmental Policy Act and department and bureau policies. Wherever possible, the degree of effect was quantified using known numeric information or modeled estimates, or where extensive monitoring or research provided pertinent numeric information. The Service used GIS data that was provided from several sources including other agencies, organizations and researchers to evaluate and make measurements, and those sources are identified. Although GIS is useful tool for evaluating and answering questions, it is not the same as a formal land survey and discrepancies can exist. Where sufficient numeric information was not available, qualitative or relative assessments were made using scientific literature or professional field experience.

The analysis of environmental consequences is documented in the seven major sections of this chapter:

- 5.4 Environmental Consequences for the Physical Environment

- 5.5 Environmental Consequences for Biological Resources
- 5.6 Environmental Consequences for Visitor Services
- 5.7 Environmental Consequences for Special Areas
- 5.8 Environmental Consequences for Cultural and Historical Resources
- 5.9 Environmental Consequences for Paleontological Resources
- 5.10 Environmental Consequences for the Socio-economic Environment

In addition, the Service analyzed the following aspects of implementing the alternatives, as documented in these sections:

- 5.11 Irreversible and Irrecoverable Resource Commitments
- 5.12 Short-Term Uses of the Environment and Maintenance of Long-Term Productivity
- 5.13 Adherence to Planning Goals
- 5.14 Unavoidable Adverse Effects
- 5.15 Conflicts with Federal, State, Tribal, and Local Agencies

5.2 ASSUMPTIONS

Assessments were based on a variety of information including meetings and other communications with natural resource and other professionals, published scientific information, site monitoring, agency reports, and computer modeling, among other sources. The following assumptions have been made in the analysis presented in this chapter:

- Money and personnel would be sufficient to carry out any alternative selected. This does not constitute a commitment for funding, and future budgets could affect implementation.
- Monitoring programs would be carried out and monitoring activities would be conducted a minimum of once every 5 years, and adjustments or revisions would be made to management as indicated by evaluations (but within the scope of the particular alternative).
- Standard operating procedures would be followed.
- The CCP would be reviewed at 15 years.

5.3 CUMULATIVE IMPACTS

Following the discussion of direct and indirect effects, at the end of each topic (physical environment, biological environment public uses, special

areas designations, cultural and paleontological, and social and economic conditions), the anticipated cumulative impacts of each alternative and the reasonably foreseeable actions are disclosed. Reasonably foreseeable actions are described near the end of “Chapter 3—Alternatives.”

The cumulative effects discussion focuses on four broad categories of reasonably foreseeable actions:

- Federal land management activities
- State wildlife management
- nongovernmental conservation activities
- regional demographic and economic changes

5.4 ENVIRONMENTAL CONSEQUENCES for the PHYSICAL ENVIRONMENT

The following sections discuss the effects of implementing the alternatives on the physical environment.

EFFECTS on CLIMATE CHANGE

The specific effects of the Service’s actions with respect to influencing climate change at a global level are addressed in this section. The likely effects of climate change on the refuge’s habitat and wildlife resources are addressed under the biological environment.

All Alternatives

Over 15 years, the refuge would implement departmental and bureau policies about climate change including biological planning, landscape conservation, monitoring and research, becoming more carbon neutral in day-to-day refuge operations, collaborating with others on climate change, and educating the public and others. This would be achieved by adopting specific objectives and strategies for habitat management or public use (refer to the climate change sections in chapters 1 and 3 for a complete discussion). To reduce the effects of climate change stressors, the refuge would protect the heterogeneity of species and structure, protect grassland types across environmental gradients, promote connectivity and corridors to facilitate migration, restore natural fire regimes, and promote sustainable herbivory. In the long term, habitat management actions would benefit the refuge’s vegetation and habitats, which are important for carbon sequestration and reducing the loss of carbon currently stored in the terrestrial biosphere.

Carbon dioxide from motorized vehicles, boats, and equipment from public and activities and refuge operations would continue to contribute directly or indirectly to climate change. It is estimated that about 10,000 vehicles use the auto tour

route annually (refer to access in chapter 4) and many visitors stop at the contact stations while traveling through to other places. With an annual visitation of nearly 250,000, the number of motorized vehicles including boats would exceed 100,000 annually (based on an estimated 2.5 persons per vehicle). However, when compared to other tourist attractions in western Montana such as Glacier National Park, which receives 2 million visitors annually (National Park Service 2008), the refuge’s direct contribution to carbon emissions from refuge operations and refuge visitation would be relatively low. The differences in visitation numbers between the alternatives would be negligible for climate change (see visitation projections under the next section on air quality). Nonetheless, under all alternatives the Service would be committed to driving cleaner vehicles, increasing fuel efficiency or reducing driving. A transportation plan would be developed including identifying options for alternative forms of transportation.

Fire

The Great Plains, including the refuge area, evolved with fire on the landscape. Fire, whether a wildfire or prescribed fire, would release carbon dioxide (CO₂) directly into the atmosphere from the biomass consumed during combustion. In the Missouri River Breaks where wildfire is inevitable due to lightning strikes or human causes, modeled wildfire scenarios show that landscapes managed by prescribed burning would store more carbon as compared to landscapes where constant fire suppression leads to higher intensity wildfires (Hurteau and North 2009). It is likely that prescribed fire has similar smoke effects as a wildfire because the aboveground grass fuel is all consumed. In other areas where there are more trees, prescribed fire is likely to produce less emissions than a wildfire, particularly ones that consume large stands of trees. Alternative A would provide the least carbon storage for reduction of carbon gases due to constant fire suppression followed by high-intensity fires across a broader area (refer to the below sections on air quality and habitat for more information), followed by alternatives B and C. Alternative D would store the greatest amount of carbon over the long term because the wider use of light prescribed fire is expected to lead to fewer and lower intensity wildfires.

Conclusion

Implementation of the CCP under any alternative would negligibly affect global climate change. All alternatives would provide positive benefits for carbon sequestration due to the large amount of vegetated land the refuge provides. Carbon dioxide emissions from motorized vehicles would occur under all alternatives, although the effects on global

climate change (given the differences between the alternatives) would be negligible. Alternative A would provide less benefit for carbon storage due to constant fire suppression and higher intensity fires over the long term, followed by alternatives B and C. Alternative D would store the greatest amount of carbon over the long term. Implementing carbon neutral refuge programs also would be positive steps for reducing the refuge's carbon emissions.

Mitigation

Reducing the carbon footprint of the refuge by driving fuel-efficient vehicles, considering more road closures, upgrading offices to make them more energy efficient, conducting more teleconferencing, recycling, and setting an example for the public and partners would all be positive ways to mitigate for the Service's contributions to carbon emissions (refer to air quality below for more information).

EFFECTS on AIR QUALITY

Effects on air quality occur from several sources including motorized vehicles, boats, prescribed fire, and wildfires.

All Alternatives

Under all alternatives, the class 1 air shed within UL Bend Wilderness would continue to be protected and monitored. Short-term increases in particulates from a large wildfire would result in direct, negative effects to air quality that could vary from negligible to major depending on the acreage and fire conditions, but overall the long-term effects to the class 1 air shed in UL Bend would be negligible as a result of the implementation of any alternative.

Implementation of all alternatives would result in varying levels of equipment usage. Construction of public use facilities, habitat restoration activities, and ongoing refuge management including operating motor vehicles or conducting wildlife surveys would require the use of motorized equipment including the use of aircraft, causing localized increased dust, carbon monoxide and hydrocarbon emissions. Equipment usage by the refuge would have an overall negligible effect on air quality in the region, and any negative effects could be mitigated by best management practices (refer to mitigation).

Emissions from Motorized Vehicles or Boats

Some effects are common to all and some are specific to the alternatives.

All Alternatives. Emissions including dust, carbon monoxide, and hydrocarbon from motor vehicles would occur in varying degrees under all of the alternatives. Road use, especially of dirt, gravel, or other soft-surface roads, generates and disperses dust in levels that vary depending on soil moisture con-

tent, particle size, and traffic volume (Havlick 2002). Nearly all of the refuge's roads are dirt, and emissions from dust particulates would be common during dry periods. Emissions from motorboats would be the same regardless of which alternative was selected. The Service would develop a transportation plan under all alternatives that would address parking, congestion, and other issues.

Alternative A. Under alternative A, motor vehicles would continue accessing the 1.1 million-acre refuge on 670 miles of road open to the public. Visitation would remain near current levels of 250,000 (refer to effects on the socioeconomic environment in section 5.10). During the fall months, as many as 175 vehicles have been counted at one time in the elk-viewing area. These localized and concentrated emissions including dust and hydrocarbons would continue to occur during periods of high use, which is typically during the fall hunting season or in the spring when paddlefish fishing is popular.

Alternative B. Five hundred sixty-four miles of road would remain open for motor vehicle access. In some localized areas, there would be fewer particulates (dust) and hydrocarbon emissions from road closures because of a larger footprint where there were no vehicles. There would be a modest increase in visitation (253,000) over the long term, which would result in negligible to minor increases in emissions (less than 10 percent) from vehicles. Closing 106 miles of road would not reduce the concentrated number of motorized vehicles using popular viewing areas during the fall months or paddlefish fishing in the spring, and short-term increases in emissions during these periods would continue.

Alternative C. Similar to alternative A, motorized vehicles would access the refuge on 670 miles of road, and on some roads, there would be improvements (for example, gravel for all-weather access), which would likely increase the number of vehicles using the refuge. Long term, there would be a moderate increase in the number of visits to the refuge (275,500), which would increase emissions by a minor amount, particularly during high-use seasons.

Alternative D. Under alternative D, there would be a modest number of miles of road closed (21), plus 15 miles seasonally, as compared with alternative A, which is less than 5 percent. But as with alternative B in some localized areas, there could be fewer emissions, especially in areas that are next to wilderness, increasing the overall footprint of an area where motorized vehicles were not used. Long term, there would be modest additions in visitation to 258,000 visits, which would raise emissions by a minor amount, particularly during high-use seasons.

Fire

Some fire effects are common to all alternatives and some are specific to each alternative.

All Alternatives. Prescribed fire would be used in all alternatives, although the acreage burned annually in alternative A would be minimal. All prescribed fires would be subject to approved fire management plans, and factors such as weather conditions, fuel conditions, adequate firebreaks, and preparedness of fire management and emergency response crews would be assessed before using prescribed fire.

In Montana, the open-burning season is March 1 through November 30. The periodic use of fire could result in short-term, localized increases in particulates and decreased visibility. The refuge would be assessed a fee based on particulate matter produced by prescribed fires (refer to air quality in chapter 4). The amount of smoke and particulates generated by a prescribed fire would depend on variables such as wind, soil and vegetation moisture, and fire intensity. Although the objectives and strategies for prescribed fire vary for alternatives B, C, and D, the differences in increased particulates or decreased visibility would not be significantly different when compared to the entire land base on the refuge. Alternative C would have less prescribed fire than alternatives B and D. Alternative A would have the least amount of short-term increases in particulates stemming from the use of prescribed fire. The use of prescribed fire in any alternative would have negligible long-term effects on air quality.

Wildfires on the refuge are usually concentrated in June, July, and August during the height of tourist season. Depending on the size and intensity, small wildfires would result in minor to moderate short-term increases in particulates and decreased visibility in localized areas. Nevertheless, for a large wildfire, increases in particulates could have major, short-term, negative effects to a larger region (refer to the uplands section under vegetation in chapter 4).

Alternative A. The large wildfires of 2003 and 2006 directly affected the visual and air quality of the refuge's class 1 air shed, UL Bend Wilderness, as well as the downwind communities of Jordan, Fort Peck, and Glasgow. These types of short-duration negative effects from wildfire would continue into the near future. Effects would vary from negligible increases in emissions to major, short-term, negative effects.

Alternatives B and D. These alternatives would make greater use of prescribed fire or naturally caused fires to reduce hazardous fuel and fuel buildup. In the long term, this could result in fewer large wildfires that produce more smoke and particulates. Alternatives B and D would incorporate the most patch burning to reduce fuel buildup, with alterna-

tive D having the greatest emphasis. The increased emphasis of pyric herbivory would allow the refuge to spread impacts over an 8-month burning period.

Wildfires would continue to have significant, short-term, negative air quality effects, but these effects would be lessened as more acreage is treated with prescribed fire. The service would continue to follow protocols and guidelines established in the Montana/Idaho Airshed Operating Guide (MIAG 2010). Critical smoke concerns would be addressed in each individual burn plan.

Alternative C. As compared to alternative A, alternative C would have slightly more prescribed fires. With a greater emphasis on public and economic uses, there would be fewer prescribed fires than under alternatives B and D.

Fine fuel such as grass would decrease, which would initially result in fewer wildfires escaping initial attack efforts and, therefore, having less air quality effect. As grassland encroachment by woody fuel such as trees increased, tree stand density and biomass volume would increase significantly. Eventually wildfires would consume this fuel and, in the process, release significant amounts of particulate matter with significant, negative effects on air quality and visual resources.

Conclusion

The implementation of any alternative would have negligible long-term effects on the class 1 air shed in UL Bend Wilderness. The use of equipment for habitat restoration or construction of public use facilities would also result in negligible effects to air quality on the refuge. Overall, the emissions from motor vehicles or the use of aircraft by the public or the Service would stay relatively low for much of the year, although short-term concentrations of higher emissions during popular use seasons would continue. As compared to alternative A, road closures under alternatives B and D would increase the areas with no emissions, but those improvements may be offset by increases in visitation of some localized areas where there were no emissions, thus resulting in only minor beneficial effects.

The use of prescribed fire, which results in localized, short-term increases of particulates, would be the least under alternative A. However, without prescribed fire to reduce fuel buildup and restore a more natural fire regime, the severity of wildfires would likely be greatest under alternative A. Alternatives B, C, and D would result in more frequent, short-term, negligible effects from prescribed fire and less frequent severe wildfires with short-term moderate to major effects. Overall, the implementation of any alternative would have negligible long-term negative effects on air quality in the area.

Mitigation

The Service could minimize emissions and particulates by following best management practices when using motorized equipment or conducting restoration activities. These practices include limiting tilling during windy periods, reducing the footprint of bare soil, and using vehicles that are more fuel-efficient and well-maintained. As identified under alternatives B, C, and D, a well-thought-out visitor services plan and transportation plan could identify ways to diversify and spread out visitors more during popular seasons or perhaps offer tours or find other methods of reducing short-term concentrations of higher emissions.

All prescribed fires would be started in accordance with an approved fire plan that includes a smoke-management plan. Effects of prescribed fire can be mitigated by ignition patterns, for example, only burning when convection is good to excellent so heat and smoke quickly rise or with winds that preclude smoke from critical areas. Using a management response as described in an approved fire management plan would enable the Service to respond quickly to changing conditions, thus reducing some of the risk of severe wildfires developing. Reducing a buildup in fuel and restoring a natural fire regime would also reduce the risk of larger wildfires.

EFFECTS on VISUAL RESOURCES

As discussed in chapter 4, the refuge has outstanding scenic values and special management areas where scenic values are important to preserve. Scenic resources could include a large landscape view of the refuge, wildlife viewing in a natural setting, or close-in views of vegetation, topography, water, and wildlife. Effects on visual resources are often qualitative in nature depending on the individual, location, and time of year. Effects from facilities and structures, fire, grazing, and other habitat and wildlife management programs were assessed.

Facilities, Structures, and Camping Areas

The Service manages several primitive recreation areas (USACE recreation areas are not evaluated, refer to “Chapter 4—Affected Environment”). Additionally, a network of roads crisscrosses the refuge. The Service uses fencing and other equipment for managing habitat.

Most of the scenic values of the refuge, including the special management areas identified in chapter 4 (section 4.4), along with wildlife viewing and the rugged and remote vistas, would be largely preserved and maintained but, in localized areas, the scenery could be interrupted or marred by facilities and structures, management activities, or other negative effects.

The primitive recreation areas managed by the Service would continue at Slippery Ann, Rock Creek, Turkey Joe, Withrow Bottoms, Jones Island, and Rocky Point, in addition to a few outgranted areas that have no facilities (Bear Creek and Bob Cat) (see figure 15 in chapter 4). Although, tents, camping gear, and the minor losses of vegetation marking the campsite could be visible in foreground views and in some places from higher vantage points, these are low-key facilities, and any effect would be negligible.

Under all alternatives, the small cluster of buildings located at Sand Creek Field Station, Jordan, UL Bend, and the Fort Peck Interpretive Center would exist with the Interpretive Center at Fort Peck Field Station being the most visible. Under alternatives B, C, and D, a small science or interpretive center would be built at Sand Creek Field Station. There could be some short-term negative effects from construction of new facilities or structures such as trails, viewing blinds, kiosks, and parking areas that would cease following construction. The installation of alternative energy structures such as solar panels or a small wind turbine at any of the stations would be negligible (see the photo in chapter 4, section 4.5, “Refuge Headquarters and Field Stations”). Any use of alternative energy structures would be carefully sited to limit any visual effects on trails or the river.

A three-strand wire fencing scheme would be used across the refuge for a variety of purposes (refer to “Chapter 4—Affected Environment”). Although there are some differences in how fencing would be used between the alternatives and the amount of fencing, generally the effects on visual resources would be negligible even in foreground views. Currently, fencing does not block wildlife viewing in the elk-viewing area where cross fences are used or fences are located away from the road.

Havlick (2002) states that the effects of roads on public lands can be lumped broadly into two categories: use effects and presence effects. Among other effects such as edge effects, just the presence of a road can have a long-lasting visual effect on the landscape. From differing perspectives, the same road could be either a “boon or bane” (Havlick 2002). On the refuge, roads would likely be visible from higher vantage points or looking down ridgelines and from further away in many areas of the refuge. Areas where severe rutting and braiding occurs particularly during wet seasons would result in localized negative effects. The visibility of roads decreases up to 20 percent in proposed wilderness units as compared to refugewide (see figure 46).

The 670-mile network of roads would continue under both alternatives A and C. Alternative C would have about 16 miles of road improvements such as graveling the roads for better access along

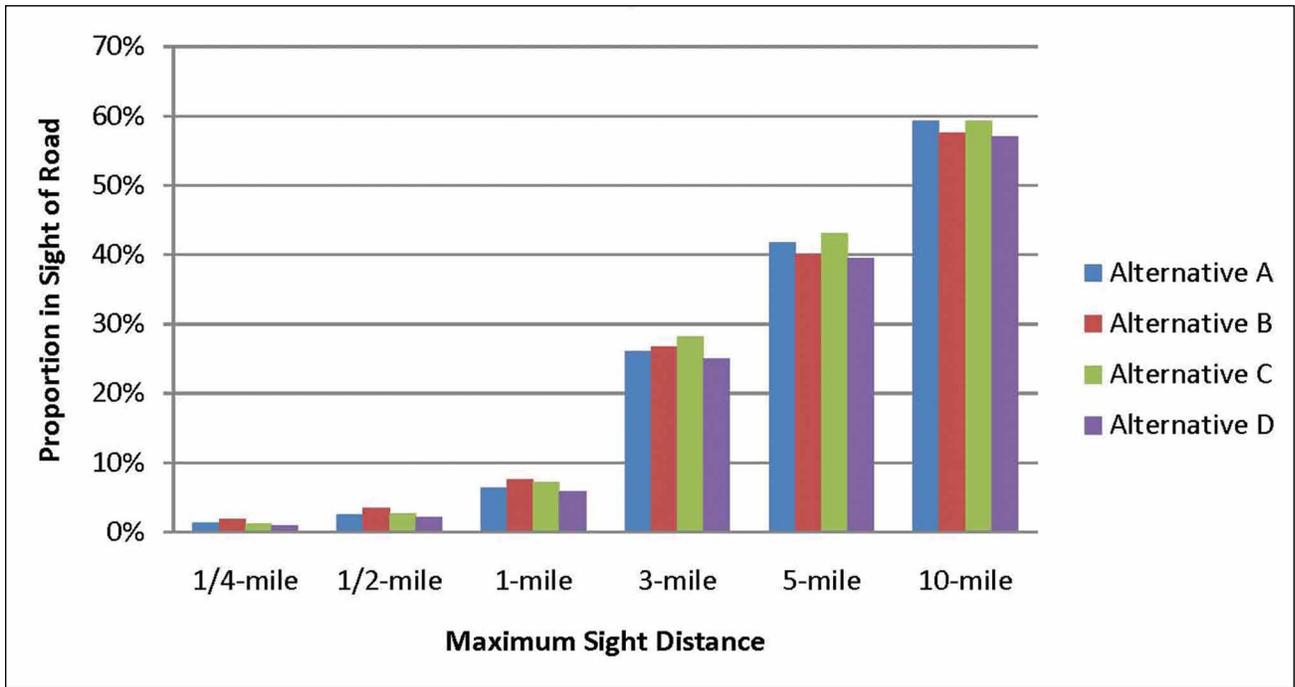


Figure 46. Chart of the visibility of roads from proposed wilderness units and wilderness study areas in the Charles M. Russell and UL Bend Refuges by CCP alternatives. *Source: The Wilderness Society (2009).*

Knox Ridge (Route 209 and Route 108). Knox Ridge would also be considered for graveling under alternative D. In a few localized areas, the visibility of roads could increase because of road improvements from more vehicles and dust. Roads under alternatives A and C would have the greatest visibility (see figure 47). As shown in figure 47, percentage wise

the differences in visibility between alternatives A and C and B and D are negligible to minor, but in some localized areas, the differences could be more pronounced particularly from vantage points that were further away.

Closing 106 miles of road in alternative B, would result in about 16-percent fewer roads than under

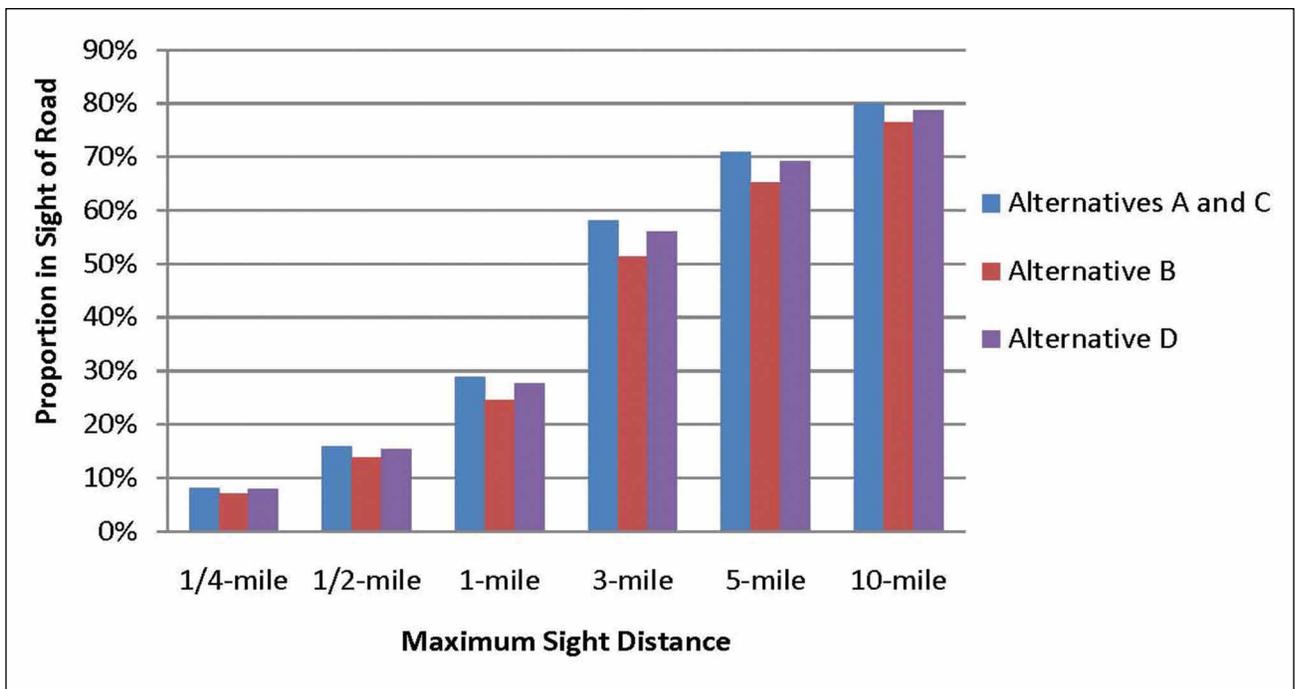


Figure 47. Chart of the visibility of roads refugewide by CCP alternative for the Charles M. Russell and UL Bend Refuges. *Source: The Wilderness Society (2009).*

alternatives A and C. Under alternative D, the amount would amount to less than 5-percent fewer roads. However, in several areas, the footprint of areas without roads would increase, which would benefit scenic values by a negligible to minor degree, particularly in the eastern part of the refuge under alternative B and a lesser extent in alternative D. Seasonal closures in alternative D would have negligible effects on visual resources.

Overall, the differences in total road miles and road visibility between the alternatives would be negligible.

Habitat Management

The effects for these activities are broken out below.

Invasive Species. In general, the Service's ongoing weed management efforts in all alternatives would benefit scenic values. The proliferation of weeds moving up drainages, or blowing in from other areas or being transported from outside sources would continue regardless of the alternative selected, and controlling invasive species in cooperation with USACE and others would be a priority. Reducing saltcedar infestations would be an ongoing effort by the Service and USACE.

Restoration of the river bottoms on the western part of the refuge would decrease weedy species, which would improve the quality and diversity of views in these areas under all alternatives. During the restoration process, there would continue to be bare, patchy, or weedy areas for several years, but in the long term, scenic values would improve. As compared with alternative A, alternative C would have the greatest potential for moderate to major localized benefits, while alternatives B and D could potentially result in moderate long-term benefits.

Wildland Fire. During a prescribed fire, there would be short-term, localized negative effects to visual resources as a result of smoke (refer to air quality above). Blackened vegetation would be visible in localized areas immediately after a fire. Depending on the time of year and moisture levels, many areas would green up within several weeks, but some trees and shrubs that were affected would take longer to recover. Across the refuge, negative effects would be negligible in the short term from the use of prescribed fire. In the long term, implementing a patch-burning program under alternative B and, to a greater extent, under alternative D would create a greater mosaic effect as compared to alternative A, where little prescribed fire would be used. This would increase species diversity of both plants and wildlife, resulting in beneficial effects for scenic values and wildlife viewing. Alternative C would not use prescribed fire to this extent.

As with prescribed fire, blackened vegetation would be visible after a wildfire. During and immediately after a fire, there could be moderate to major negative effects on scenic values in localized areas. Generally, grasses and other vegetation quickly green up by the following year, reducing the visual contrast. Furthermore, some areas could have large crown fires that may cause significant visual scarring of the landscape for many years (refer to wildfire suppression under vegetation in section 5.6 below). The visual scarring would decrease in the long term.

Livestock Grazing. The use of grazing as a management tool may result in short-term and long-term effects on visual or scenic resources in some areas due to manure, trampling, livestock trails, and most significantly, degradation of riparian areas. Livestock grazing would continue under all alternatives, although there would be differences in the timing and application of prescriptive grazing or annual between the alternatives (refer to the soil discussion for specific percentages below). Not all areas of the refuge are currently grazed (see figure 16 in chapter 4), and areas that were rested or no livestock grazing occurred, there would be fewer visual effects as compared to areas that are grazed frequently (refer to the discussion on grazing and monitoring under riparian areas and wetlands in chapter 4). On the refuge, some of the proposed wilderness units are under a prescriptive grazing program, and negative visual effects would likely decrease in the long term, benefiting some users. There would be several proposed wilderness units where annual grazing would still occur in the short term and, in these areas, impacts would continue to be apparent and negatively affect some visitors. In areas where prescriptive grazing has been applied, or where riparian areas are fenced, signs of visual degradation of the resource would decrease over the long term.

Conclusion

Most of the Service's structures, fencing, and facilities would have negligible effects to visual resources including special management areas. In localized areas, the effects would be greater. Roads would have the greatest potential to affect visual resources because of number and extensive area they cover (670 miles). Overall, the differences in the total road miles between alternatives would result in negligible to minor differences in visibility (see figures 46 and 47 above).

The use of prescribed fire would result in short-term negative effects to visual resources and long-term benefits due to an increase in species diversity. These impacts and benefits would be greatest under alternatives B and D and to a lesser extent under alternative C. There would be little impact or benefit under alternative A. Wildfire would result in short-

term and potentially long-term effects on visual resources in some areas from loss of vegetation or where severe scarring of the landscape occurred.

The degree to which refuge visitors are negatively affected by the visual effects of livestock grazing varies by type of user and location of use. The greatest potential impact would occur under alternative A and to a lesser degree under alternative C, where there may be minor to moderate effects on some users. In alternatives B and D, where there would be a greater emphasis in moving toward a prescriptive grazing regime and riparian area restoration, there could be moderate benefits to scenic resources in areas that are currently being affected.

Mitigation

Hardening and delineating campsites that are impacted would reduce the spread and overall visibility of the site. Restoring closed roads would benefit views by creating larger patches of undisturbed habitat. Successful revegetation efforts in the river bottoms would reduce visual effects from invasive species. An approved smoke management plan would be required for any prescribed fire and would help to minimize negative visual effects.

EFFECTS on SOUNDSCAPES

Like visual resources, effects on the natural acoustical environment from external noises are often qualitative in nature. These would result of public use activities and other management activities.

Public Use

Many restrictions would remain in effect, thus minimizing sound impacts. These would include seasonal and day-of-the-week restrictions on motorized boat access along the Upper Missouri Breaks Wild and Scenic River, prohibitions on motorized access in UL Bend Wilderness and the proposed wilderness units, prohibitions on aircraft landing in upland areas, and designated landing zones on Fort Peck Reservoir (refer to soundscapes in chapter 4). Similar to visual resources, effects from various mechanized noises would vary on the user, type of noise, and location. Wilderness users would likely have a greater expectation of solitude and from being away from external noises. Several roads border these areas, and it could be possible to hear sounds along the edges from motorized equipment or vehicles including four-wheel-drive vehicles, ATVs, and quadricycles. These would be short-term negative effects that would decrease with distance.

Because alternative C would look to improve road access and maximize public use, in localized areas, noise effects could increase as compared to alternative A. Under alternative C, there would be about 76 miles of graveled roads, and under alternative D there

would be about 65 miles of graveled roads compared to alternative A with 60 miles and those areas would see increased use. Proposed road closures under alternative B and to a lesser extent in alternative D would augment the buffer zone of several proposed wilderness units providing minor benefits for soundscapes.

Construction of viewing facilities, the science, or the interpretive center in alternatives C and D, parking lots, and road maintenance would require the use of heavy equipment for site excavation, grading, and other activities. This equipment would produce higher, short-term noise levels in the immediate vicinity of the construction activities. Noise levels would return to existing levels after construction or maintenance ceases.

Public hunting would continue to be a popular activity under any alternative. Gunshots associated with the sound of a variety of weapons could be audible from on- and off-refuge, depending on hunter location, wind, and topography. Some nonconsumptive users (those who only take part in such activities as wildlife viewing, photography, and interpretation) could be negatively affected by the sounds of gunshots, and nonconsumptive use is generally increasing on the refuge. Presumably, not all hunters fire their weapon during their visit, and given the immense size of the refuge, the overall effect on noise levels and nonconsumptive users would be negligible.



Eastern Kingbird

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Habitat and Wildlife Management

Restoration activities in all alternatives would require the use of motorized equipment, which would result in short-term minor increases in noise levels in the immediate vicinity of the restoration activities. Noise levels would return to existing levels after the activity ceases. Similarly, the use of aircraft to conduct wildlife counts would also result in distractions

and disturbance for and could negatively affect wilderness users. Overall, the Service's use of aircraft for wildlife monitoring or other purposes is low and is not likely to increase to any degree over the long term.

Conclusion

Although there are several potential external noises that could affect visitor experiences, many restrictions and policies in place would limit external noises and these would continue to benefit visitors, wildlife, and the special management areas (refer to section 4.4 in chapter 4). All alternatives would result in negligible to minor effects due to motorized boats, road use, and facility construction. Road closures could reduce the effects in alternatives B and D. The effect of gunshot noise from hunters would be negligible.

Mitigation

Over the next few years, the Service expects to assess the amount of motorized boat access to upland areas, which would provide baseline information about the extent of this type of use. Refuge staff would develop a transportation plan under all alternatives, and through this planning effort, ways to address potential negative sound effects would be addressed.

EFFECTS on SOILS

Habitat management activities and public use activities have a variety of effects on soils.

Restoration Activities in River Bottoms

Restoration generally involves disking and tilling of the soil, planting food crops to remove weeds, applying herbicides, limiting livestock in restoration areas, and burning areas for invasive plant removal. Under all alternatives except B, the Service would actively restore approximately 15 former agricultural fields plus two fields that are currently being restored. The number, timing, and intensity of restoration efforts would vary by alternative. Alternative A would have the least aggressive schedule, and restoration would occur when money and staff time permitted it. Alternative C would have the most aggressive restoration schedule with 50–60 percent of the restoration completed within 15 years. Under alternative B, the bottomlands would not be restored, but would become permanent food plots. Alternative D would restore 20–30 percent of the fields within 15 years, and native plantings could follow after weeds have been removed.

Restoration activities would result in short-term minor disturbances of soil resources during site preparation and planting. Disking and tilling of soil has the potential to result in localized, short-term erosion, soil loss, and the release of soil particles (dust) into the air. Once restoration activities were

complete, soil protection and productivity would be maintained long term.

Wildland Fire

When used as a habitat restoration tool, prescribed fire would temporarily reduce vegetation in a treatment area. Generally, the use of prescribed fire would stimulate new plant growth and increase the vigor of existing plant communities. However, prescribed fire has the potential to cause short-term, soil erosion and loss resulting from the loss of vegetation. Alternative A would result in negligible soil erosion and loss, because little prescribed would be used, as compared to minor negative effects in alternatives B, C, and D.

At a minimum, large wildfires would temporarily reduce vegetation in an area. If severe enough—for example, a large crown fire in overgrown decadent vegetation—a wildfire could result in moderate to major, short-term and long-term severe sterilization of soil, subsequently leading to further loss of vegetation and soil erosion. Alternative A likely would result in the most soil erosion and loss due to continued fire suppression. In alternatives B, D, and to a lesser degree in C, there would be more use of prescribed fire to reduce heavy fuel buildup, as compared to alternative A.

Livestock Grazing

With defined habitat objectives, livestock grazing can stimulate new plant growth and increase the vigor of plant communities. However, livestock tend to use the same trails to access water or graze in riparian areas, which has resulted in localized major, soil compaction, long-term losses of vegetation, soil erosion and sedimentation. These effects are particularly evident in areas with higher stocking rates or where there is also heavy grazing by wild ungulates such as elk (refer to livestock grazing in riparian areas in chapter 4).

Under all alternatives, livestock grazing would continue either prescriptively or through annual grazing. Alternatives A and C would continue the annual grazing regime across half (currently 55 percent) of the refuge with some movement toward prescriptive grazing when possible. Under existing conditions, several units are not meeting the objective of 70-percent residual cover (refer to vegetation monitoring in uplands in chapter 4), and the short-term and long-term effects from soil erosion and loss would likely continue compared with lands where prescriptive grazing was used. In some habitat units such as the Big Dry Arm where there is more forage allocated to cattle (refer to vegetation, uplands, and livestock grazing later in this chapter), moderate to major negative effects from soil compaction, erosion and loss of soil would continue. In areas where a pre-

scriptive grazing regime was applied with defined habitat objectives and a comprehensive monitoring plan, soil compaction, erosion, and loss could be reduced in the long term. Thirty-four percent of the refuge is currently is prescriptively grazed. Although alternative B would convert to prescriptive grazing over 50–75 percent of the refuge within 4–7 years, because of the emphasis on maximizing wildlife populations including large ungulates, it could take longer for vegetation and subsequently soils to recover particularly in areas that continued to be heavily grazed by elk. Alternative D would implement prescriptive grazing over 50–75 percent of the refuge and a comprehensive monitoring program within about 9 years and, in the long term, this would benefit soil resources due to greater vegetation cover.

Fishing

Under all alternatives, negative effects on soils would continue to occur during the spring paddlefish season when refuge roads and riverbanks are frequently wet and muddy. In localized areas, compacted soils and erosion would be moderate to major.

Roads

In all alternatives, maintenance of nearly 137 miles of road by the refuge and 90 miles by the counties would reduce soil erosion and loss. During wet periods, unmaintained roads often become rutted and braided resulting in short-term and long-term effects from soil disturbance and erosion. Refuge-wide effects on soils from roads are minor, but in localized areas, moderate to major negative effects from soil erosion would occur. Under alternative C, several roads would be considered for all-weather access (graveled), and one road (Knox Ridge) would be considered under alternative D. Properly maintained, all-weather access roads could reduce rutting and braiding and soil disturbance over the length of the road. Activities related to upgrading a road would likely increase the overall width of the road resulting in direct, short-term negative effects on soils.

Camping

Under all alternatives, camping would be allowed along the river, in the primitive campgrounds the Service manages and most areas on the refuge. Motorized vehicles must stay within 100 yards of a road to camp. In a few popular camping sites or areas, there are varying levels of effect from minor vegetation loss to denuded vegetation, soil compaction, and soil erosion and loss.

Public Use Facilities (excluding roads and camping areas)

Currently, under alternative A, there are only a handful of facilities such as kiosks, hunting blinds, pull-outs, and few new facilities that would be built. Under

alternative B, there would be a 5–10 percent increase in new facilities as compared to alternative A. In alternative C, there would be a 5–15 percent increase in new facilities, and under alternative D, a 10 percent increase. In alternatives C and D, a science or interpretive center with parking facilities would be built at the Sand Creek Field Station. This would require soil excavation, grading, and other surface disturbances. Temporary increases in soil erosion would occur during construction of new facilities, resulting in direct, short-term effects on soils. The anticipated footprint of soil disturbance for the science or interpretive center would be about 1–3 acres within the Sand Creek complex. Long-term losses in soil productivity could occur from construction of visitor-related structure. The effects from these activities on soils would be negligible considering the small area that would be affected compared to the size of the refuge.

Management of Cultural and Paleontological Resources

Effects on soils from excavation of cultural resources during surveys would be temporary and negligible as most areas are already disturbed or eroded. As with public use facilities, under all alternatives, the excavation of paleontological resources (refer to paleontological resources in chapters 3 and 4 and later in this chapter) would result in direct, short-term increases in soil disturbances during any digging of fossils. Large equipment would be used. The footprint of soil disturbance would vary by the size of the dig but would be limited to the area needed for the dig and estimated to be less than a few acres. Effects from these activities on soils would be negligible considering the small area that would be affected. In the foreseeable future, most excavations would occur in the central part of the refuge in the Hell Creek formation where fossils are often exposed. In localized areas, there would be temporary increases in soil erosion, but permittees would be required to reclaim areas. As compared with alternative A, under alternative C, an increase in opportunities for research would increase the area of soil disturbance.

Conclusion

In all alternatives, the Service's restoration of 15 former agricultural fields would cause short-term minor disturbances of soil resources, followed by long-term minor benefits. The use of prescribed fire in all alternatives would result in short-term, localized soil erosion and loss due to the temporary loss of vegetation. These short-term effects would be negligible for alternative A, and minor under alternatives B, C, and D. Large wildfires would likely lead to greater soil erosion and loss due to greater fire severity and vegetation loss compared to prescribed fires. The potential for severe major effects would be greatest

under alternative A, while alternatives B, C, and D would use prescribed fire more lightly across the landscape to produce a patchwork effect for vegetation.

Negative effects from livestock grazing on soils would continue in areas where annual grazing was used, and would be reduced in areas under prescriptive grazing. Alternatives A and C would continue to have moderate to major negative effects on soils in some areas, with long-term improvement in areas under prescriptive grazing. Under alternatives B and D, improvements from prescriptive grazing would be greater.

The Service would continue to provide for several public use activities including road access, camping, and fishing that would negatively affect soil resources. Under all alternatives, these general refuge-wide effects would be minor, but in some localized areas, moderate to major negative effects would continue to occur from roads, camping areas, and heavily used fishing areas. Construction of a science center or interpretive center at Sand Creek Field Station would result in temporary increases in soil erosion during any construction, with negligible long-term effects. Cultural resources and paleontological excavations under all alternatives would result in localized soil disturbances. The overall effects on soils would be negligible.

Mitigation

The Service could minimize losses in vegetation and subsequent soil disturbance and loss by ensuring that the best management practices were followed during construction activities, restoration of the river bottoms, or excavation of paleontological resources. Better definition of popular campsites or fishing areas or hardening sites would limit negative soil effects from these public use activities. Planning for these actions should be incorporated into the visitor service's step-down plan and the transportation plan.

Similarly, by managing grazing areas with prescriptive grazing or reducing annual grazing to lighter grazing levels, limiting livestock grazing during the hot season and fencing cattle out of riparian areas, the Service would minimize soil erosion and loss over the long term.

Permittees for paleontological excavations would be required to reclaim areas.

EFFECTS on WATER RESOURCES

Effects on water resources were evaluated based on existing information on the distribution and quality of water at the refuge and potential for refuge activities to negatively affect water resources.

Water Development, Water Rights, and Water Quality

Under all alternatives, select stock ponds would be maintained and rehabilitated, although the num-

ber and schedule would vary by alternative. Riparian habitat would be restored where possible and standard watershed management practices would be enforced. Water rights would be adjudicated and defined. Under alternative B, the Service would work to restore water quality for fish and wildlife habitats by addressing soil erosion from livestock and wildlife grazing and public use activities. Under alternative C, future water developments would be allowed on site-specific basis and consideration of effects. Alternative D would encourage more natural water development within streams such as increased flow, pools, and beaver ponds. The Service would assess the uses and needs of current reservoirs and restore the hydrologic condition of those reservoirs when they were no longer needed for wildlife or livestock. Additionally, the Service would work with others to restore dynamic hydrological processes where possible.

River Bottom Restoration

All alternatives except B would restore the 15–17 river bottoms (former agricultural fields) although the timing would vary. In localized areas during restoration activities, particularly under alternatives B and C, planting crops for reduction of invasive plants could result in short-term, direct negative effects on water quality in the Missouri River particularly if herbicides were applied to large areas. The Service judiciously applies all herbicides; therefore, any negative effects would likely be short term and negligible overall. Using best management practices during restoration activities would limit any potential negative effects on water quality.

Riparian Area Restoration

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 on altering an existing stream ecosystem or even creating an entirely new ecosystem (Kauffman and Krueger 1984).

Many streams on the refuge are intermittent, lasting only a short time. Under all alternatives, any restoration activities would be conducted when streams are dry or minimal flow to minimize the direct introduction of sediments. Planned revegetation and stabilization of the stream channels would reduce the potential for stream sedimentation during precipitation events. More benefits from improved streamside habitat conditions would include bank stabilization and the retention and removal of sediments and pollutants from the water.

Invasive Species

Herbicides and prescriptive grazing would be used under all alternatives for invasive species management. The Service carries out its invasive species program in a variety of habitats including areas where there are water impoundments or riparian areas. Under all alternatives, the invasive species program would be carried out through an approved stepdown plan. All personnel who use chemicals would be trained in the proper application of where, when, and how to apply them. All chemicals would be required to be safely stored and identified. Under alternatives B, C, and D, the Service would step up efforts to stop encroachment of saltcedar, Russian olive, and other invasive species. Short-term, negligible effects could occur to water quality due to soil erosion or sedimentation, but following required protocols would greatly limit the potential of influencing water quality downstream.

Livestock Grazing

Because this issue is closely connected with riparian area health, it is addressed under riparian areas and wetlands in section 5.6 below and is not discussed further here.

Wildland Fire

Fire (wildfire or prescribed fire) could have either positive or negative effects on the physical, chemical, and biological structure of aquatic systems. The effects of fire on water quality depend on the fire size, intensity, and severity (Neary et al. 2005). It also depends on the nearness of fires to streams and other water sources as well as the timing of fires in relation to precipitation events. Direct effects could include increases in temperature, ash, nutrients, and charcoal. The indirect effects of fire could include increases in sediment deposition and turbidity, and alterations channel morphology. There can be increased sedimentation and turbidity, increased stream temperatures, and increased concentrations of nutrients resulting from surface runoff. Wildfires and prescribed fires, on forestlands, shrublands, and grasslands have the potential to decrease on and offsite water quality, and should be mitigated (National Wildlife Coordinating Group 2001).

The magnitude of the effects of fire on water quality is primarily driven by fire severity and not necessarily by fire intensity (Neary et al. 2005). The more severe the fire, the greater the amount of fuel consumed and nutrients released and the more susceptible the site is to erosion of soil and nutrients into the stream, where they could potentially affect water quality (Neary 2005 et al.). Wildfire is usually more severe than prescribed fire (refer to chapter 4, “Fire Ecology in the Uplands”). As a result, wildfire is more likely to produce significant negative effects on water quality.

Under alternative A, prescribed fire would not be used to any significant degree. Alternatives B and D would use the most prescribed fire. Once prescribed fire was fully implemented, it would be expected to reduce the intensity and severity of future fires; subsequently, negative effects to water resources would be reduced over the long term. Under alternative C, the limited use of prescribed fire would continue the buildup of woody fuel. Refer to further discussion of fire effects on the uplands in section 5.5.

Public Use

Construction activities involved in developing facilities, structures, parking areas, viewing blinds, or other facilities, in addition to existing public use activities could result in indirect, short-term effects to water resources due to erosion, sedimentation, and contamination. The extent of facility development and corresponding effects would vary among the alternatives with alternative A having the least potential for negative effects with few if any new facilities built or developed. Alternative B would have a few new facilities (5 percent greater than alternative A), alternative C would have about 15 percent more, and alternative D would have about 10 percent more. Considering the relatively small amount of facility development and likely distance from water, the any subsequent effects would be negligible.

Conclusion

Activities related to river bottom restoration, riparian area restoration, public use activities, and invasive species could result in negligible short-term effects on water quality.

Mitigation

By limiting the amount of bare soil, using soil erosion barriers, limiting the use of herbicides, hardening popular public use areas, and following other best management practices, the Service would reduce potential negative effects on water quality as a result of areas any of its activities related to restoration, invasive species management or public uses.

To reduce potential water quality and fisheries effects during herbicide spraying, best management practices would be incorporated as follows: (1) apply herbicides according to the label; (2) flag on the ground any streams or wetlands in any area to be sprayed; (3) consider factors such as weather reports to ensure minimal rainfall within 24 hours of spraying; (4) use treatment methods that target individual plants in riparian and wetland areas where possible; (5) consider other methods such as manual control or hand pulling; (6) certify and fully train all personnel; and (7) apply the lowest rate effective for meeting weed control objectives.

Mitigation measures would limit the use of prescribed fire during drought conditions and use ignition techniques that lessen the intensity of the burn (small, numerous spot fires that burn together and then out, instead of a continuous head fire that burns with a greater intensity). A detailed description of burning conditions and techniques would be included in the fire management plan and in each prescribed burn plan.

CUMULATIVE IMPACTS on the PHYSICAL ENVIRONMENT

None of the proposed alternatives would result in cumulative effects on climate change, air quality, visual resources, soils, soundscapes, or water resources when combined with the activities described under chapter 3, section 3.9, foreseeable activities.

The long-term benefits of various management actions on global climate change may result in cumulative benefits when combined with current and future programs and initiatives, such as the Department of Interior Climate Change Initiative, to reduce carbon emissions and mitigate the effects of climate change on refuges. The overall cumulative benefit, however, would be negligible.

5.5 ENVIRONMENTAL CONSEQUENCES for BIOLOGICAL RESOURCES

This section analyzes the effects of the actions on vegetation communities or habitats and the wildlife resources of the refuge. In general, it follows the organization of “Chapter 4—Affected Environment.”

EFFECTS on UPLANDS

Implementation of varying approaches to upland habitat management under the alternatives would result in a range of effects on the condition, structure, and function of upland vegetation.

All Alternatives

Both prescribed fire and wildfire have positive and negative effects, because different species of plants and wildlife respond differently to the effects of fire. The short-term negative effects of fire on a specific species are usually compensated by the long-term benefits to the overall plant and wildlife community.

Prescribed fires can be very labor intensive. Implementation of the alternatives would result in varying levels of equipment use and associated effects. Prescribed burning in wilderness or proposed wil-

derness units would require using the minimum tool necessary to accomplish management objectives, per Federal wilderness policy. Negative effects from prescribed fire would vary by project and by location, but would generally result in short-term, localized effects that would be offset by long-term benefits.

Wildfire is a natural occurrence that will continue to significantly alter the landscape of the refuge. Not all wildfire is unwanted or destructive. Naturally occurring wildfires would be managed for multiple objectives, and human-caused wildfires would be suppressed using tactics and strategies that result in the least damage to values at risk and costs while providing for firefighter and public safety. Fewer opportunities would be available in alternatives A and C, because most wildfires result in short-term negative economic effects to livestock grazing interests. All suppression efforts would be evaluated to ensure the least human impact on the natural resource as possible, while allowing for the timely control of the incident.

Under all alternatives, the Service would seek to renew the 20-year mineral withdrawal that is currently in place for all locatable minerals on Charles M. Russell National Wildlife Refuge. The permanent withdrawal would be maintained for locatable minerals on UL Bend National Wildlife Refuge (Chapter 4, Affected Environment). The mineral withdrawals would continue to provide long-term benefits for the uplands (and other areas) from future mining claims. Under alternatives B, C, and D, the Service would seek permanent withdrawal for leasable and locatable minerals.

Management Approaches

The general effects of the management approach for uplands under each alternative are evaluated.

Alternative A. This alternative would maintain the current management emphasis of fire suppression, annual livestock grazing, invasive species control, and water development. The Great Plains evolved through a complex interaction of fire and grazing (refer to uplands in chapter 4), and the continued emphasis on constant grazing and fire suppression across the uplands would greatly limit the composition, structure, and functioning of vegetation, resulting in continued loss of plant diversity and habitat function (FWS 2001).

The past and present effects of current management are represented by existing conditions and are described in chapter 4. For example, fire-intolerant species such as big sagebrush and junipers have benefited at the expense of sentinel plants such as chokecherry, green ash, and golden currant. Likewise, grazing and fire suppression have reduced or locally eliminated palatable forbs. Upland habitats

would be increasingly vulnerable to continued loss of palatable plant species, loss of ancient trees due to fuel buildup when fires occur, and increased insect and invasive plant infestations. These conditions are the result of more than 120 years of fire suppression and livestock grazing. While the management approach under alternative A would continue these conditions and their negative effects over the long term, the incremental effect of alternative A would be minor.

Alternative B. The Service would actively manage and manipulate wildlife habitat using both natural ecological processes and active management practices to promote target and focal wildlife species (refer to section 3.8 in chapter 3 for descriptions of focal, target, and sentinel species). The target and focal species would be primarily animals that are important game species such as elk, mule deer, bighorn sheep, pronghorn, sharp-tailed grouse, and sage-grouse. Different parts of the refuge would be managed for different species. This approach would improve the overall composition, structure, and functioning of habitat refuge-wide. However, the emphasis on managing for individual species may not result in improvements in biological integrity within individual habitat units and could be harmful to the habitat in some areas if overbrowsing continued.

The overall effects on habitat quality, integrity, and resilience would vary geographically based on the target and focal species that are chosen and the management tools that are used (primarily fire and grazing). As an example, management strategies for sharp-tailed grouse (a plains species) would be different than those for greater sage-grouse, which were originally more abundant in the Great Basin region. The refuge is located in the Great Plains where fire and large ungulates are major drivers of the ecosys-

tem as compared to the Great Basin region. By using fire and grazing to manage habitat for sharp-tailed grouse, which use a broad range of habitat gradients including relatively dense herbaceous cover and shrubs, riparian areas, and open conifer (Connelly et al. 1998), it would likely result in a diverse and resilient landscape that would provide for a wider range of other species including other special status bird species. In contrast, management of the landscape primarily for big sagebrush and greater sage-grouse habitat or a monoculture of big and silver sagebrush (Zwickel and Schroeder 2003) would result in less resilience and would benefit few other species (Schroeder et al. 1999).

Some areas would require management practices that favor vegetative diversity, ecological processes, and sentinel species and would result in localized benefits. Other areas would continue management practices that emphasize grazing, fire suppression, and uniform grass production and would result in localized negative effects and overbrowsing. Overall, this management approach would improve habitat conditions and habitat function and diversity, resulting in moderate long-term benefits to upland vegetation.

Alternative C. Under alternative C, the Service would manage uplands to emphasize wildlife-dependent recreation (primarily hunting opportunities or wildlife viewing) and livestock forage needs. The Service would conduct a program of prescriptive grazing and pyric herbivory on appropriate habitat units. In most areas, the current management conditions and disturbance cycles (constant grazing and limited fire) would prevail.

This management approach would be similar to existing conditions, with more emphasis on improving the uplands for wildlife and livestock grazing and balancing use by wild and domestic ungulates. This approach would more closely follow NRCS guidelines for improving grass cover and vigor, which promotes tall, productive grasses and provides the most forage for ungulates. The added use of prescribed grazing, fire, and range condition monitoring would provide more tools to reach desired rangeland conditions. These changes in rangeland conditions, however, would not necessarily translate to improvement in overall habitat resilience and diversity. Early successional species, including sentinel forbs and shrubs, would not be a management priority. Implementation of alternative C would result in minor long-term benefits for upland vegetation.

Alternative D. Under alternative D, the Service would mimic and restore natural processes on the refuge, managing for a diversity of upland plant species. This approach would restore the historical disturbance cycles of sporadic fire and grazing (pyric herbivory) and recreate the habitat conditions in which



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A sharp-tailed grouse presents his courtship display.

native species of plants and wildlife evolved and are most adapted.

Alternative D would incorporate a broad range of disturbance factors on the landscape, facilitating the development of a diverse and changing mosaic of habitat conditions with high heterogeneity. This approach is based on the resiliency concept, which is described in “Chapter 3—Alternatives.” For example, the combination of prescribed fire, prescribed grazing, and other active management techniques would likely result in an improvement in highly palatable shrubs (such as saltbush, winterfat, silver sagebrush, and chokecherry) and forbs (such as purple prairieclover, dotted gayfeather, and Maximilian sunflower), as well as vigorous and diverse grasses. Specific management would be based on sentinel species monitoring.

This approach would not optimize vegetation conditions for livestock or any single wildlife species and would result in less area focused on uniform grass production. However, the Service would monitor the diversity and health of focal bird species that are important to the uplands. Instead, it would promote a dynamic and shifting mosaic of vegetation that provides a variety of vegetation at different successional stages, which ultimately supports habitat for a variety of wildlife species including focal bird species. Implementation of this approach would result in major long-term benefits for upland vegetation.

Livestock Grazing, Prescribed Fire, and Other Practices

The effects of achieving each alternative’s objectives for grazing, prescribed fire, and other practices are evaluated below.

Alternative A. Some of the vegetation management objectives outlined in alternative A would benefit habitat conditions. Successful implementation of efforts to increase deciduous shrub quality and quantity through prescribed fire and plantings would provide minor, localized benefits. However, successful reestablishment of shrubs would be difficult due to grazing by ungulates (both wild and domestic), and the overall acreage goals are relatively small. The benefits on vegetation and habitat conditions would be negligible.

The gradual transition to prescriptive grazing under alternative A would result in long-term, minor benefits. While recent reductions in grazing numbers (AUMs) have already benefited vegetation in some locations, these benefits have not resulted in a recovery of sentinel plants and may be offset by increases in native ungulates. More fencing of one habitat unit and parts of the refuge boundary may result in minor to moderate benefits to vegetation in localized areas, but the overall effect on the refuge would be negligible.

The refuge would continue to burn about 525 acres of upland habitat per year. There would be short-term benefits to deciduous shrub quality and quantity, because fire creates new, succulent growth, but overall benefits to habitat would be negligible due to the small acreage being treated. Livestock grazing would be restricted on prescribed burn units, but negative effects from native ungulates on these isolated, small, patches would intensify as ungulates are attracted to new growth from burn areas. Prescribed burns would include areas of isolated and dense stands of ponderosa pine and Douglas-fir. Small portions of these areas would also be hand thinned. Benefits to forested areas would continue to be minimal as the acreages treated would be relatively small.

Alternative B. The implementation of a prescriptive grazing plan under alternative B for over half of the refuge lands would generally benefit vegetation conditions and the viability of sentinel species. This would be complemented by the removal of 25–50 percent of the interior fences, which would allow wild and domestic ungulates to access burned areas. This would benefit the burned area as well as the unburned areas that are allowed to rest. However, management of some localized areas may result in negligible to minor effects if the targeted wildlife species favors a single plant species or specific vegetative condition. For example, Baird’s sparrow prefers tall vegetation, whereas mountain plover prefers short prairie grasses (refer to birds in chapter 4).

Once the patch-burning program was fully implemented, about 2,500 acres of upland habitat would be treated each year with prescribed fire. These burned patches would be purposefully located across the entire refuge and would have a significant positive effect on fire-adapted plants, fire-dependent plants, and highly palatable plant species. Formerly diverse upland communities would respond with an increased abundance of fire-adapted shrub species such as saltbush, winterfat, silver sagebrush, and gray rubber rabbitbrush. The current monoculture of relatively unpalatable and fire-intolerant big sagebrush would gradually diversify into a natural mosaic of heterogeneous plant communities, resulting in moderate, long-term benefits.

There are numerous old-growth stands of forest on the refuge. When feasible, the Service would thin the forest’s volatile, fire-prone understory with mechanical treatment or prescribed fire, or both. Once treated, these stands would be less prone to be consumed by wildfire, which would preserve old-growth trees that in some instances exceed 750 years of age.

Douglas-fir and ponderosa pine have gradually encroached into what was formerly treeless needlegrass–wheatgrass prairie. Prescribed fire is the most

cost-effective tool to set back this encroachment. Sites with the greatest encroachment would be targeted for prescribed fire and lower priority units would be treated by wildfire managed for multiple objectives. The use of prescribed fire would result in long-term benefits supporting efforts to reestablish natural prairie; reducing highly volatile hazardous fuel; revitalizing decadent, fire-dependent vegetation; and restoring natural ecological processes.

Alternative C. The prescriptive grazing program under alternative C, while less aggressive than alternatives B and D, would generally result in minor to moderate benefits to vegetation conditions, although the scale of the benefits would be more limited than the other action alternatives. Prescribed fire on habitat units with prescriptive grazing, as well as on those identified to have fair to poor range condition, would benefit the range conditions and some sentinel plants. This would be complemented by the removal of interior fences in areas where prescriptive grazing is applied. The combination of these factors would better establish ecological gradients and heterogeneity between the habitat units, benefiting the overall conditions and improving forage for both wild and domestic ungulates.

Habitat units with an excessive fuel load of grass, shrub, or forest would be evaluated for wildfire risk and, if compatible with management objectives, increased use by grazing ungulates would be allowed to reduce the fire danger. There may be some areas, such as heavily forested slopes, where prescribed fire or mechanical treatment may be the only option to reduce the risk. It would be important to strike a balance between the needs of wildlife and improved forage for livestock and lower fire danger. Effects would be positive for reducing fire danger and economic benefits to the permittee. There may be decreased plant vigor due to increased use but, under a prescriptive grazing program, this could be minimized.

Prescriptively grazed habitat units that are in fair to poor range condition would be rested to allow the vegetation to recover to the point that the units could be treated with prescribed fire. Once treated, grazing may be allowed but at a level that would promote species diversity and increased plant palatability, vigor, and heterogeneity. Because a permittee could be required to use other grazing units until rested units recover, this may have an initial negative effect on the permittee. However, the increased biomass production resulting from prescribed fire could be better used by grazing ungulates and should ultimately be a positive effect. Effects on native vegetation would be positive.

Alternative D. The effects of vegetation management objectives under alternative D would be similar to alternatives B and C, but would more aggressively promote biological diversity. The extent of prescrip-

tive grazing (50–75 percent of the refuge) would be the same as alternative B and more than alternative C. However, a pyric herbivory dynamic would be applied to the entire area where prescriptive grazing is used. The construction of boundary fencing and removal of interior fencing on 10–25 percent of the refuge would improve wild and domestic ungulate access to burned areas. If successfully carried out, the combination of these and other management approaches are anticipated to benefit upland vegetation over the long term.

Wildfire

As the northern Great Plains climate continues to change, it is expected wildfire frequency and intensity will increase. The past decade has produced the most intense and largest wildfires the area has seen since establishment of the refuge. Even though the northern Great Plains is an ecosystem that evolved with fire, historically, fires did not burn with near the intensity. This is mostly due to past grazing practices that reduced fine fuel (grass) and fire suppression, which resulted in a massive buildup of woody fuel from Douglas-fir and ponderosa pine.

The effects of achieving each alternative's objectives for wildfire are evaluated below.

Alternative A. Under alternative A, wildfires would increase in size and intensity as the natural fire regime continues to be altered. Large blocks of forest would most likely be eliminated. These conditions could result in moderate to major detrimental effects on vegetation.

Alternatives B and D. Wildfires would continue to increase in intensity and severity until the Service established a seminatural burn mosaic across most of the landscape, which may not occur during the life of this CCP. Eventually, a seminatural fire-return interval would be established across the landscape, which would have a positive effect on fire intensity and severity. Wildfires would continue to occur, but with the gradual reduction of hazardous fuel using prescribed fire and mechanical treatments, a natural mosaic of burned and unburned fuel would begin to appear across the landscape. This mosaic would limit the potential of wildfires to consume vast parts of the refuge during any one event. The refuge would use wildfire to benefit natural resources and to reestablish natural fire regimes. The short-term negative effects of wildfire would gradually change into a positive effect on species diversity, plant palatability, plant vigor, and heterogeneity.

Alternative C. With an increased emphasis on economic uses in alternative C, much of the forested habitat would see greater use by grazing ungulates. This would reduce the fine fuel that carries a fire but would also continue to alter the natural fire regime. Wildfire size and intensity should decrease as the

fine fuel that carries a fire was significantly reduced by grazing. However, this would also continue to dramatically alter the natural fire regime of the area and result in significant buildup of woody fuel. In the short term, the number of fires would decrease in intensity and severity. Eventually a wildfire would burn through these areas with considerably greater intensity than is normal, inflicting far more damage to the habitat. This was experienced on the refuge in 2003 and 2006 when more than 100,000 acres of refuge habitat (mostly dense stands of trees) were consumed by fire. These type of fires usually engulf entire landscapes and leave very little unburned mosaic. In addition, these fires consume practically all but the most isolated pockets of old-growth forest.

Water Impoundments

Artificial water impoundments, stock ponds and reservoirs, contribute to the degradation of nearby vegetation by facilitating the congregation of large animals and the development of radiating stock trails to and from these water sources. Alternative A would not change management of water impoundments, resulting in minor, long-term, negative effects by allowing the current conditions to persist. The aggressive removal of almost all water impoundments under alternatives B and D would result in major localized benefits to vegetation near the impoundments. Under alternative C, long-term efforts to evaluate water impoundments for rehabilitation, removal, or new pond development would have a negligible to minor benefit on nearby upland vegetation.

Wildlife Management

The effects of achieving each alternative's objectives for wildlife management are evaluated below.

Alternative A. Continued management of big game populations under alternative A to achieve target levels outlined in the 1986 EIS record of decision could contribute to long-term negative effects on some sentinel forbs and shrubs. Monitoring at some sites has shown that wild ungulate populations have exacerbated the effects of livestock grazing on highly palatable forbs and shrubs or have offset the gains made by reduced livestock numbers. If ungulate population targets are based on habitat condition (such as the "good to excellent condition" expressed in the objective) these effects could be reduced. Overall, continued big game management under alternative A would result in minor, incremental negative effects on upland vegetation.

Alternative B. Under alternative B, the effects of wildlife management objectives on vegetation would vary based on the habitat and needs of target and focal species. Wild ungulate objectives could result in minor benefits to habitat conditions if they were successfully carried out in concert with prescrip-

tive grazing plans and meeting habitat needs of target and focal species. Unsuccessful implementation of those objectives could result in minor to moderate negative effects to vegetation in localized areas due to overgrazing by all ungulates. The elimination of predator control in alternative B potentially could benefit vegetation if the uncontrolled predators reduced ungulate numbers, thereby reducing wild and domestic grazing pressure.

Alternative C. The wildlife management objectives in alternative C, which seek to maintain a balance between big game and livestock numbers, would result in minor benefits to upland vegetation conditions if they were successful. However, it would be difficult to achieve this balance because of the competing and additive demands of wild and domestic ungulates for the same forage, and the differences in scale at which MFWP's big game objectives and the refuge's grazing targets are set. Therefore, the implementation of wildlife management objectives would likely result in upland vegetation conditions that are similar to existing conditions (negligible long-term effects).

Alternative D. Wildlife management in alternative D would complement the vegetation management approach. Big game population targets would be managed to promote ecological resilience while minimizing negative effects on sentinel plants. This would provide a comprehensive approach to total ungulate (wild and domestic) use. This management approach to wild ungulates would contribute to the overall benefits to upland vegetation. However, it could be difficult to effectively limit big game populations through hunting if major reductions were necessary. The elimination of predator control would help limit big game populations.

Expansion of prairie dog populations would improve the overall diversity of upland habitats and would provide another disturbance factor that would increase diversity and heterogeneity. Under alternative A, prairie dog populations would be able to expand up to 10,000 acres, resulting in minor benefits. Under alternatives B, C, and D, the Service would more actively seek to expand prairie dog colonies to at least 10,000 acres, resulting in moderate benefits to upland vegetation diversity.

Invasive Species

Much of the upland areas have not been mapped for invasive species as much of the treatment efforts have been focused along the river corridor. The Service would continue mapping for invasive species along roads, running the weed wash station in the fall, and requiring horse users to use weed-seed-free hay. Many of these existing preventive actions would continue to benefit upland areas by preventing and detecting large infestations from occurring. Under

alternatives B, C, and D, the Service would increase its detection and treatment efforts of invasive species in the upland areas.

Roads and Access

While the existing 670 miles of road are important for administrative, recreational, and emergency access, excessive roads can fragment vegetation and provide conduits for invasive plants. The effects of fragmentation are more important for wildlife, but should nonetheless be considered for vegetation. The effects of achieving each alternative's objectives for access are evaluated below.

Alternative A. Alternative A would maintain the current number of roads, resulting in negligible effects over the long term.

Alternative B. The closure of about 106 miles of road under alternative B would result in moderate benefits to vegetation in areas next to the closures. Once closed, most roads recover without restoration. While the actual proportion of total roads to be closed would remain small, the selected closures would restore large blocks of unfragmented vegetation and habitat. Closing roads could have negative effects in localized areas from overbrowsing if harvest objectives are not met. Working with MFWP before implementation of road closures or allowing for game retrieval could limit those effects.

Alternative C. Efforts to expand recreational access and upgrade roads and facilities would result in localized negative effects on vegetation next to the improvements. Alternative C would improve about 16 more miles to all-weather access (gravel), which is about six feet wider than a bladed dirt road. This would result in a loss of about 11.6 acres of vegetation in addition to any disturbance that would occur from road work such as putting in culverts or the temporary storage of gravel. Invasive weed infestations would likely occur unless weeds were controlled after disturbance. The overall effects on upland vegetation, however, would be negligible.

Alternative D. The beneficial effects of 21 miles of road closures and an increase in the number of seasonal closures (road 315 and game retrieval roads along road 440, 331, 332, and 333) would be similar to alternative B, but less extensive. Benefits from road closures could be slightly diminished by invasive plant infestations if roads were unsuccessfully restored. As with alternative C, improving the Knox Ridge Road would result in some localized negative effects on vegetation, but overall the effects on the area would be negligible. Alternative D would improve about 5 more miles to all-weather access (gravel), which would be about six feet wider than a bladed dirt road. This would result in a loss of about 3.6 acres of habitat in addition to any disturbance

that would occur from the road work. Allowing access on closed roads outside of proposed wilderness areas for game retrieval would allow for harvest objectives to be met, benefitting upland habitats.

Conclusion

Implementation of alternative A would continue the current management approach and vegetation conditions, resulting in minor, short-term, incremental effects. However, the long-term implications would be moderate to major negative effects on upland habitat composition, structure, and function.

Alternative B effects would vary depending on the target and focal species that are chosen for each habitat unit. Some areas would have moderate to major benefits, while benefits to other areas would be negligible. Overall, the implementation of alternative B would result in long-term moderate benefits to upland habitat composition, structure, and function.

Alternative C would result in minor benefits to upland habitat composition, structure, and function over the long term. There would be about 11.6 acres of vegetation lost from improving about 16 miles of road to all-weather access, and overall this would have a negligible effect on upland vegetation.

Alternative D would benefit habitat conditions and the viability of sentinel species and promote biological diversity and integrity. Implementation of alternative D is anticipated to result in long-term, major benefits to the composition, structure, diversity, and function of upland habitats. There would be about 3.6 acres of vegetation lost from improving about 5 miles of road to all-weather access, and overall this would have negligible effect on upland vegetation.

Mitigation

Several measures have been built into the alternatives to mitigate for negative effects on upland areas from excessive livestock or wild ungulate grazing. The Service would carry out a more comprehensive monitoring program to fully assess effects on plants by all ungulates. Moving toward a greater reliance on prescriptive grazing, particularly in alternatives B and D, and to a lesser extent in alternative C would help to limit negative effects. Controlling the numbers of ungulates (domestic and wild), using fire to move ungulates to other areas, reductions in livestock grazing, expanding boundary fencing, removing fencing, and management of water structures are all examples of measures that would be incorporated into the plan.

Disturbance along any road corridor from road improvements under alternatives C and D would increase invasive weeds, which could negatively affect native plant communities and wildlife habitat. These effects could be reduced by designing road improvements to minimize ground disturbance, developing and implementing a weed management

plan before and during any disturbance while improving the road, and monitoring and controlling weeds during and after disturbance. Several measures could be put into place to mitigate negative effects from these improvements.

EFFECTS on RIVER BOTTOMS

Figure 23 in chapter 4 identifies the river bottoms that would be restored.

All Alternatives

The establishment of healthy, native plant communities is the best long-term defense against invasive weeds (Riley and Wilkinson 2007). While it is nearly impossible to remove all invasive plants, the planting of native forbs, shrubs, and grasses combined with ongoing monitoring and spot treatments would remove many of the large monotypic weed patches that currently exist in many river bottom areas. By planting and cultivating native plants, more seed sources will also be available for the spreading of seeds to other locations. Reestablishment of healthy native plant communities would benefit the ecosystem and a suite of native bird and wildlife species.

River bottoms tend to be fire-exclusive environments by their very nature. Subsurface moisture allows for greener, lush vegetation, which restricts fire development and growth. Great Plains cottonwoods are easily killed by low intensity fire and these areas would not be targeted for prescribed burning and would not be negatively affected. The river bottoms that were farmed in the past are now infested with invasive plants. Prescribed fire would be used in these units to prepare the seedbed for planting of native vegetation.

Alternative A

The initiation of five to seven restoration efforts in the river bottom would benefit these habitat areas by improving native species composition, habitat resiliency, and the historical character of these plant communities. However, these benefits would be limited to the areas that are successfully restored. The minimal commitment of resources and personnel to river bottom restoration in alternative A could lengthen the timeframe and ultimately reduce the success of restoration efforts. Untreated areas would likely continue to be overtaken by expanding invasive weed patches, which would ultimately increase the rate of spread and the cost of restoration. Livestock grazing could be used to reduce weeds under certain conditions (FWS 2011b). Overall, alternative A would result in minor to moderate benefits to river bottom habitats.

Alternative B

Seed removal and planting of wildlife food crops or agricultural crops such as alfalfa would bene-

fit affected areas by reducing or removing weeds by competing with weeds for resources and space. These plantings would also provide wildlife value, particularly for large ungulates.

The planting of nonnative monoculture crops could reduce the plant diversity in some areas, reducing available habitat for some bird and wildlife species. The attraction of wild ungulates to these areas could also exacerbate negative effects on nearby riparian areas. The reapplication of herbicide, and the need to replant cover crops over time could provide opportunities for invasive plants to reinvade the bottomlands over time, reducing the long-term effectiveness of these efforts.

Overall, weed reduction efforts outlined in alternative B would result in minor to moderate benefits to river bottom habitats.

Alternative C

The effects and benefit of river bottom restoration through partnerships with cooperative farmers in alternative C would be similar to alternative B, with some exceptions. Cooperators would plant river bottoms to nonnative crops for multiple years to make it profitable (and to reduce or eliminate invasive plants), and would then plant to native forbs and grasses. One of the main benefits of this approach is that the first step of the process (planting economic cover crops) would occur more quickly because the cooperators would do most of the onsite work using their own equipment. It is not clear how long it would take to successfully carry out the second step of the process (planting native forbs and grasses).

In addition to the negative effects described under alternative B, the restoration approach proposed under alternative C would result in the need to apply herbicide over the entire area at least twice, once to remove invasive plants before planting crops, and again to remove the crops before planting native seeds. Another drawback would be the increased number of wild ungulates that would be conditioned to frequent planted areas. Besides the subsequent negative effects on nearby riparian areas, the continued browsing and grazing of wild ungulates could also decrease the chances of survival of newly emerging native plants.

Overall, the alternative restoration approach outlined in alternative C would result in minor to moderate benefits to river bottom habitats over the long term.

Alternative D

The bottomland restoration efforts in alternative D would be similar to alternative C, but with a less aggressive approach. These efforts would result in minor benefits to river bottom habitats over the long term.

Conclusion

Each of the alternatives would use a different approach to treating river bottoms, and all would result in minor

to moderate benefits to river bottom habitats over the long term. The minimal commitment in alternative A would lengthen the timeframe for restoration. Alternative B would have a more comprehensive and aggressive approach, although the application of herbicides and the planting of cover crops could provide opportunities for invasive plants to reinvade the bottomlands, reducing long-term effectiveness. The effects of implementing alternative C would result in the need to apply herbicides several times. Alternative D would be similar to C but would involve a less aggressive approach. While each alternative differs in its approach to restoration, all alternatives would result in minor to moderate long-term benefits to river bottom habitat.

Mitigation

Mitigation measures are primarily discussed under soils. Adhering to best management practices in disking, tilling, and applying herbicides would limit negative effects from restoration of river bottoms.

EFFECTS on RIPARIAN AREAS and WETLANDS

The effects on riparian areas were assessed as part of the Service's work with the Riparian and Wetland Research Program.

Method Used to Analyze Effects

Sources of information used to assess the level of effect on riparian areas included (1) scientific literature on the effects of management activities of riparian areas, (2) site-specific assessment of the refuge's riparian areas, and (3) professional judgment of refuge biologists and other professional biologists and ecologists familiar with the refuge's riparian areas. The Service also consulted with members of the National Riparian Service Team, an inter-agency effort to accelerate riparian area restoration primarily in the Western United States. Ultimately, the Service contracted with Paul Hansen, a riparian area ecologist who worked with the National Riparian Service Team in developing a functional stream analysis, to conduct a followup riparian area assessment. Earlier, Hansen had evaluated riparian communities on the refuge in the mid-1990s. Information from Hansen's assessment in 2009, in addition his work in the mid-1990s was used in the effects analysis. Past and current riparian area assessment and monitoring efforts are described in chapter 4.

Management Approaches

The action alternatives (B, C, and D) identified several strategies to improve the health of those streams identified in poor condition based on the survey done in 2009 by Paul Hansen (Ecological Solutions Group 2009).

Alternative A. Under alternative A, there would be few specific strategies undertaken to restore riparian

and wetland areas outside of what is currently done (i.e., keeping livestock away from most riparian areas and invasive species control). Nonetheless, based on improvements seen with the 2009 survey, the continued transition toward implementing prescriptive grazing and other activities such as harvest management and invasive species control would result in negligible to minor incremental benefits in the overall health of riparian areas on the refuge. However, localized sizes could continue to experience a negative trend (refer to livestock grazing below).

Alternative B. Under alternative B, within the first few years, the Service would carry out actions to restore the health of the streams identified as non-functional (unhealthy) or functional at risk (healthy but with problems). These actions may include more research and contract work to determine effective strategies that should result in significant improvement in riparian area and wetland health and function over 15 years (strategies would include reestablishing vegetation along willow banks using willow cuttings, applying stream stabilization techniques, restoring beaver colonization, limiting livestock access to wetlands, improving stock ponds for amphibians, and other ideas). When reassessed by year 10–15, using the Ecological Solutions Groups' Lotic Wetland Assessment Survey, it is estimated that 85 percent of the 82 miles (about 70 miles) would improve to the next level (nonfunctional to functional at risk or functional at risk to healthy), and 95 percent of the reaches on the refuge assessed in 2009 as healthy would be maintained. Alternative B has the most aggressive overall approach for transitioning to a prescriptive grazing component, which should result in significant improvements during the next survey period. However, potential increases in elk populations or invasive species could offset the benefits in some areas (refer to the discussion under livestock grazing).

Alternative C. Similar to alternative B, many of the same strategies for improving riparian area health would be used under alternative C. However, with the emphasis on maximizing wildlife-dependent recreation and economic uses, it is estimated that 60 percent of the 82 miles of stream (49 miles) would improve to the next category. There would be fewer resources available to put toward restoring streams on the refuges, and the transition toward implementing prescriptive grazing would be more similar to alternative A, resulting in localized areas with negligible improvements.

Alternative D. As with alternatives B and C, all of the strategies for improving riparian area health would be used in alternative D. There would be an aggressive approach for streambank stabilization that would be similar to alternative B, but there could be

slight decrease in the miles of streams that would be estimated to improve over 15 years (75 percent of the 82 miles of stream (61 miles)). The transition toward implementing prescriptive grazing would be quicker than under alternatives A and C but less aggressive than under B. Additionally, there would be more resources dedicated to improving wildlife-dependent recreational opportunities than under alternative B. Unlike alternative B, the focus would not be on maximizing elk populations, so the difference in miles of stream improvement compared to B could be negligible.

Invasive Species

The localized short-term effect of invasive plant management may be a moderate negative trend in riparian area health with the initial removal of “cover” to trap sediment. If restoration occurs, the long-term effect with restoration may be a minor to moderate positive effect on riparian area health. Much of the gain in health rating on riparian areas refugewide due to increased vegetation cover is offset by the further invasion of invasive plants (Ecological Solutions Group 2009).

Water Impoundments

Artificial water impoundments (stock ponds and reservoirs) provide for alternative watering sites away from riparian areas releasing these areas from negative effects of large animals. However, impoundments also contribute to the degradation of riparian area health downstream by preventing and reducing the flow regime. Precipitation and runoff levels would determine the amount of sedimentation deposition below the impoundment, building a floodplain on which riparian vegetation may establish and capture more sediment. Improvements to the water impoundment, including more woody species along part of the edge, could have a moderate positive effect on riparian area wildlife species that use lentic wetlands (Pilliod and Wind 2008, Taylor and Tuttle 2007).

Alternative A. Alternative A would not change management of water impoundments, resulting in minor long-term effects by allowing the current conditions to persist.

Alternatives B and D. The removal of water impoundments on the refuge in alternatives B and D would result in major to moderate localized benefits for riparian habitat surrounding the existing impoundments. Immediate effects include increased instream waterflow, sedimentation, and floodplain building. Restoring hydrologic function of streams and drainages would have a moderate to major benefit for riparian areas that are affected by altered hydrology. These benefits would also result in moderate

positive benefits on riparian area wildlife species that use lotic wetlands such as beaver.

Alternative C. Under alternative C, long-term efforts to evaluate existing water impoundments for rehabilitation, removal, or new pond development would have a negligible to minor benefit on riparian area health, compared to existing conditions.

Livestock Grazing

Alternatives A, B, C, and D all include livestock grazing at varying levels. Livestock grazing in riparian areas affects water quality, stream morphology, hydrology, soils, streambank vegetation, and aquatic and riparian area wildlife (Belsky et al. 1999, Hansen 1992, Kaufman and Krueger 1984). A livestock grazing management strategy designed for an area should be tailored to the conditions, problems, site potential, objectives, and livestock management consideration on a site-specific basis that will best meet the resource needs. Hansen (1992), Meehan and Platts (1978), and Platts and Wagstaff (1984) found no grazing system that was compatible with healthy aquatic ecosystems.

Riparian health assessment surveys in 1995 and 1997 indicated the riparian areas across the refuge on average were not functioning (Cook et al. 1996, Parker and Hansen 1996, Thompson and Hansen 1999). Hansen (1992) stated that livestock grazing is a compatible use in riparian-wetland areas only when the functions of the riparian system guide the development of the grazing strategy. This includes sediment filtering, bank building, water storage, aquifer recharge, energy dissipation, potential of the site, and the needs of the riparian vegetation. Riparian areas grazed without above considerations have a major negative effect (Belsky et al. 1999, Kaufman and Krueger 1984, Hansen 1992). Management changes since the 1985 EIS include a significant reduction in AUMs refugewide and the construction of fences along the Missouri River and other streams across the refuge. Excluding livestock from riparian areas using fencing has allowed riparian areas to improve, thereby increasing riparian function (Ames 1977, Duff 1983, Hollow et al. 2001). However, if cattle were not excluded from other riparian areas, then any benefits of the exclosures to riparian areas would be negligible due to increased use by native ungulates (Miles 1996).

Alternative A. Alternative A would largely maintain the current management approach of annual livestock grazing and a prescriptive component that includes rest and light grazing. Over 15 years, there would be a gradual implementation of prescriptive grazing. The past and present effects of the current management regime are represented by existing conditions and are described in chapter 4.

Based on 2009 surveys completed on most of the same locations as in 1995–97, riparian area health on the refuge has improved over the past 14 years with most of the improvement seen in the soil and hydrology. Implementation of alternative A would improve riparian habitat in general, but localized sites could continue to experience a negative trend. The 2009 survey shows the current trends to be improving in some areas with no livestock. An example of this is in the UL Bend Refuge where 100 percent of the area was rested and the riparian area health assessment increased 58 percent from nonfunctional to healthy (Ecological Solutions Group 2009). However, if AUMs are reduced but cattle are not fenced out of riparian areas then no change in riparian area health would be expected and a negative trend would occur. This is evident in the area between Rock Creek (east) to Fort Peck Dam where total AUMs in the habitat units decreased slightly but the riparian area health assessment decreased 24 percent from healthy to functioning at risk.

Overall, the continuation of current grazing management practices under alternative A would result in negligible to minor incremental benefits to riparian habitat over the long term. However, some localized areas would continue to decline, resulting in moderate, long-term, negative effects on some riparian areas.

Alternative B. Under alternative B, the Service would actively manage and manipulate wildlife habitat using both natural ecological processes and active management practices to promote specific target and focal wildlife species.

The potential benefits of implementing prescriptive grazing across 50–75 percent of the refuge and fencing riparian areas are moderate refugewide, but potentially could vary from major to negligible benefits at local sites. Fencing cattle away from the river and shorelines would have a moderate to major benefit on riparian habitat. The woody draws from Rock Creek (east) to Fort Peck would experience major long-term benefits due to fencing along riparian areas. However, excluding livestock from riparian areas could potentially have a long-term negative effect on upland sites as wild and native ungulates are displaced (refer to uplands above).

Elk are an example of the target wildlife species under alternative B. The Service would actively manage and manipulate elk populations at the highest levels possible. These potential increases in elk populations could offset the benefits of livestock management on riparian habitat due to increased elk browsing. An example of this is the Slippary Ann Elk Viewing Area, where, during the fall, hundreds of elk gather for a few months. The short-term effect is moderate and may be major over the long term.

The effects from aggressive restoration along 50 percent of streams would depend on precipitation, site potential, fencing, and prescriptive grazing (Ecological Solutions Group 2009). The short-term benefits to the refuge as a whole would be moderate with possible long-term benefits being major for previously degraded, currently nonfunctioning areas. However, the benefits for an area that was functioning at risk could be minor or negligible. The long-term benefits could be major with an increase in vegetation capturing sediment for floodplain building.

The benefits of increased monitoring would be major if prescriptive grazing occurs in the monitored area. If negative effects are found, rapid adaptive management can occur, lessening the effect. A few weeks of unauthorized use or overgrazing could 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 would negate any positive riparian-wetland habitat response (Myers 1981).

Overall, the implementation of livestock grazing management objectives in alternative B would result in moderate, long-term benefits to riparian habitats refugewide. However, some localized areas could continue to be degraded and increased browsing by wild ungulates could offset some of the benefits.

Alternative C. Under alternative C, the Service would manage riparian habitats to emphasize wildlife-dependent recreation (primarily hunting and fishing opportunities) and livestock forage needs. Prescriptive grazing would be gradually applied on up to 50 percent of the refuge. The overall management approach for alternative C would be similar to existing conditions (alternative A) in areas with annual grazing and similar to alternative B where prescriptive grazing is applied. The effects of these approaches on riparian habitat would be similar to alternatives A and B, depending on where prescriptive or annual grazing approaches are used.

Alternative D. Under alternative D, the Service would mimic and restore natural processes on the refuge, managing for a healthy riparian area. Prescriptive grazing would be applied on 50–75 percent of the refuge. Actions are the same as alternative B only the magnitude of the effects may be different. Overall, alternative D includes a more aggressive approach to riparian habitat protection and management, and therefore the long-term benefits would be greater, ranging between moderate to major.

Wildlife Management

Under all alternatives, continued management of furbearer, threatened and endangered species, fish, reptiles, amphibians, small mammals, and most birds would have no effect on riparian areas.

Alternative A. Continued management of big game populations under alternative A to achieve target levels outlined in the 1986 EIS record of decision may result in minor, incremental, negative effects on riparian area health, due to increased grazing and browsing pressure on riparian habitat areas.

Continued management for bald eagle migration habitat and to improve or maintain riparian habitat are moderate refugewide, but potentially could have varied benefits to local sites depending on site potential, restoration techniques, and precipitation.

Alternative B. Under alternative B, the effects of big game management objectives on riparian area health would vary depending livestock management and spatial interactions between wild and domestic ungulates and riparian habitat. This could result in minor benefits to riparian habitat conditions refugewide with varied localized effects. If wolves were to naturally recolonize the refuge, the presence and management of wolves on the refuge would provide predation pressure on wild ungulates, which would benefit riparian area health by potentially reducing wild ungulate grazing pressure in some areas. If wild bison were reintroduced to the refuge, their presence as another large ungulate could result in negligible to minor effects on riparian area health. Restoring riparian habitat in the tributaries in an effort to promote furbearers could result in moderate to major benefits to riparian area health.

The effects of fish management objectives would be the same as those described above under “Water Impoundments”—short-term negative effects followed by long-term benefits. Removal of fish passage impediments could result in minor to major benefits to habitat conditions.

Alternative C. The overall big game management objectives in alternative C would depend on livestock management and may result in minor, incremental, negative effects on riparian area health refugewide with varied localized effects. The effects of wild bison or wolf management, should these animals occur on the refuge, would be negligible. The effects of fish management would be the same as those described above under “Water Impoundments”—negligible to minor benefits.

Alternative D. Big game objectives in alternative D would result in an incremental positive trend, with minor to moderate benefits to riparian area health. The elimination of active predator removal and incorporation of wolf management objectives on the refuge would provide predation pressure on wild ungulates, which would benefit riparian area health by potentially reducing wild ungulate grazing pressure in some areas.

The effects of management objectives for wild bison, furbearers, and fish would be the same as described under alternative B.

Roads and Access

While roads are important for administrative, recreational, and emergency access, excessive roads can disrupt natural drainage patterns when water is diverted and prevented from infiltrating into soils. Soil compaction increases runoff, soil displacement, and funneling of water leading to increased erosion. Negative effects from roads result in introduced sediment into streams, snowmelt redirection and concentration, and surface flow production. Roads can affect both the volume of water available as surface runoff and the efficiency by which waterflows through a watershed. More water and sediment in channels alter their physical structure, usually with negative effects on aquatic habitat. When culverts fail, large amounts of sediment can be delivered directly to the channel and from there down into lower streams potentially affecting sensitive fish habitat (Douglass et al. 1999). Indirect effects from roads on riparian areas include negative effects on wildlife that use riparian areas, particularly reptiles, amphibians, small mammals and birds (refer to wildlife sections below).

Alternative A. Alternative A would maintain the current number of roads, resulting in negligible effects over the long term.

Alternatives B and D. The closure of about 106 miles of road on the refuge in alternative B could result in moderate refugewide benefits, though the effects to local sites would vary. Benefits from road closures could be slightly diminished by invasive plant infestations if roads are unsuccessfully restored. In alternative D, the beneficial effects of road closures (21 miles) would be similar to alternative B, but less extensive (minor benefit). Graveling Knox Ridge road in alternative D would have minimal negative effects on riparian areas.

Alternative C. Under alternative C, efforts to expand recreational access and upgrade roads and facilities on the refuge could result in localized negative effects on riparian area health in the immediate vicinity of the improvements. The overall effect on riparian area health, however, would be negligible.

Conclusion

Under alternative A, the continuation of current grazing management practices would result in minor to moderate incremental benefits in some riparian areas over the long term. However, some localized areas would continue to decline, resulting moderate long-term negative effects. The implementation of livestock grazing management objectives in alternative B would result in moderate, long-term benefits to riparian habitats refugewide. Some localized areas could continue to be degraded, and increased browsing by wild ungulates could offset some benefits. Alterna-

tive C would be similar to alternative A, but where prescriptive grazing occurred, long-term benefits would be similar to alternative B. Under alternative D, the actions would be similar to alternative B, but the magnitude of effects would be different. Alternative D would include an aggressive approach to riparian habitat protection and management, and the long-term benefits would be greater, ranging between moderate to major.

The continued use of water impoundments under existing conditions would result in minor, long-term, negative effects on riparian areas under alternative A. Alternatives B and D, which would remove nearly all water impoundments would result in moderate to major localized benefits for areas surrounding the impoundments. Some rehabilitation of water impoundments would occur in alternative C having a negligible to minor benefit.

The continued management of big game populations in alternative A could result in minor, incremental, negative effects on riparian area health due to increased grazing and browsing. The effects under alternative B would vary depending on spatial interactions between wild and domestic ungulates and riparian habitat. Under alternative C, effects would be similar to alternative A and would depend on livestock management. Big game objectives in alternative D would result in an incremental positive trend in riparian area health. Reducing active predator removal would provide predation pressure on wild ungulates, potentially reducing grazing pressure in some areas.

Alternative A would maintain the current road configuration, resulting in negligible effects to riparian area health. The closure of roads in alternatives B and D would have varied (minor to moderate) benefits to riparian areas. Alternative C would have negligible effects.

Overall, the long-term benefits to riparian habitat would be minor under alternative A, moderate under alternative B, minor to moderate under alternative C, and moderate to major under alternative D. In all alternatives, localized, moderate, negative effects would still occur from grazing.

Mitigation

In addition to the mitigation measures discussed under soils, the alternatives incorporate several measures for mitigating negative effects on riparian areas and wetlands from excessive grazing by livestock or wild ungulates. These include using prescriptive grazing and fire for improved ungulate management, using exclosures to fence off riparian areas, rehabilitating stock reservoirs that are no longer needed, planting riparian species, strategic placement of salt or mineral blocks, establishing or improving off-stream watering sites, installing stable access points to limit

streambank trampling, requiring permittees to keep livestock out of riparian areas, restoring beaver colonization, and monitoring effects.

EFFECTS on SHORELINES

USACE controls reservoir levels and has primary jurisdiction for management of the lakeshore areas. Most of the issues related to any action the Service would take that would affect shorelines are addressed under threatened and endangered species, invasive species management, uplands, river bottoms, and riparian and wetland areas. There would be some delineation of routes down to the river for public access when water levels were low (refer to fishing objectives, rationale, and strategies) but the effect on shoreline vegetation would be negligible.

Mitigation

No mitigation would be required.

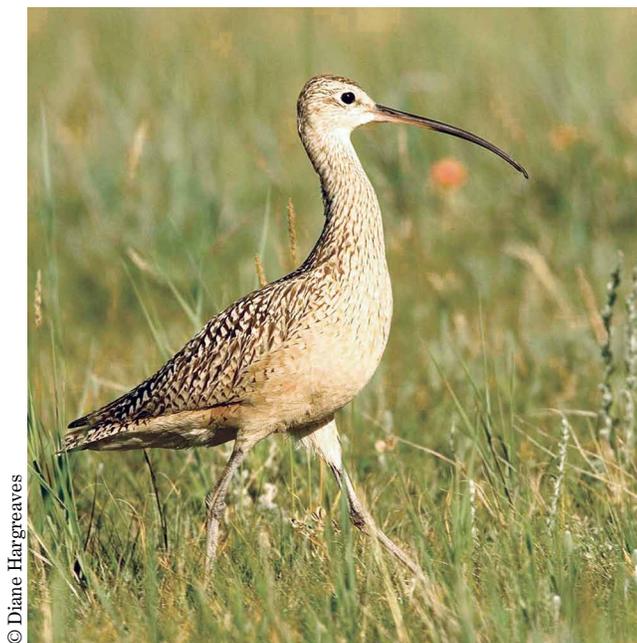
EFFECTS on BIRDS

This section addresses the effects on grassland birds, waterfowl, colonial-nesting birds, shorebirds, raptors, owls, and neotropical migrants stemming from the actions in the CCP and EIS. This includes a discussion of riparian areas, invasive species, fire, grazing, public use and access, special management areas, and monitoring. Sage-grouse and Sprague's pipit are addressed under threatened and endangered species and species of concern.

Riparian Areas

Riparian areas are extremely important for birds because they not only provide cover and food but also serve as a seasonal water source particularly during migration and the brood-rearing stages. High plant species diversity, insect abundance and berries make both riparian areas and hardwood draws extremely attractive to grassland and migratory neotropical birds. Grazing by domestic livestock or heavy browsing by elk has direct negative effects on birds that use riparian areas and hardwood draws by (1) reduction and elimination of vegetation layers, (2) reduction and elimination of new replacement shrubs and trees in riparian areas and hardwood draws, and (3) reduction and elimination of seed and fruit production as well as the insects that depend on the green parts of highly palatable plants.

Although the refuge has fenced livestock out of many riparian areas, it has not been possible to fence livestock out of all areas, and in localized areas under all alternatives, there would be a continued loss of shrub layers and overstory recruitment, which is important for birds. The specific effects of the alternatives would correspond with the effects of grazing on riparian habitat: minor to moderate incremental bene-



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The long-billed curlew nests in wet and dry uplands.

fits for alternative A, moderate long-term benefits for alternative B, variable for alternative C, and moderate to major long-term benefits for alternative D. In all alternatives, riparian habitats in some localized areas would continue to degrade due to grazing effects.

Invasive Species

Birds require habitat containing a variety of plant species, variation in horizontal canopy cover, and complexity in vertical structure. In contrast, invasive exotic infestations are often comprised of one species, mostly uniform in height and structure, and form a canopy coverage that is too dense (American Bird Conservancy 2009). As compared to alternative A, alternatives B, C, and D would result in minor benefits due to increased efforts and partnerships to control invasive species and benefit bird habitat. The use of herbicides and pesticides to control invasive species could have some negative effects on bird populations, but judicious application would limit those effects (Montana Partners in Flight 2000).

Fire

As with grazing, historically wildfire played a significant role in shaping the grassland ecosystem. Suppression of wildfires along with the changes in native ungulate and prairie dog grazing has changed this delicate balance to the detriment of most birds of the Great Plains (Vickery et al. 2008). As described under uplands in chapter 4, constant fire suppression would likely result in negative long-term effects for many grassland birds that use the refuge.

Under alternatives B and D, the use of a patch-burn and prescriptive grazing scheme would benefit the greatest number of grassland birds by providing a

mosaic of diverse habitats. The result would be an increase in diversity in both food and structure (Fuhlen-dorf et al. 2006) as compared to alternative A, which would benefit fewer species than alternatives B and D due to constant fire suppression. Managing for different levels of fire severity would also influence bird abundance and species. There would be fewer benefits for birds under alternative C, because there would be an emphasis on fire suppression to limit economic losses and would be a slower transition to prescriptive grazing. The season of burn is often an important variable for bird mortality during prescribed fires. Burns during nesting season appears to be most detrimental to birds and other small mammals, but this depends on the uniformity and severity of a burn. In forested areas, fire effects depend largely on fire severity (Smith 2000). Mortality of adult songbirds is usually considered a minor effect, but mortality of nestlings and fledglings does occur. Nest destruction and mortality of young have been reported for several ground-nesting species including sharp-tailed grouse, but long-term effects depend partly on their tendency to re-nest. In using prescribed fire on the refuge, careful consideration in the timing of fires and the type of habitat would minimize negative effects to bird species.

Grazing

Annual and prescriptive grazing by domestic livestock would occur under all alternatives and could result in short-term and long-term effects for grassland and other Great Plains birds, depending on timing and location (refer to chapter 3, upland objectives). Although understanding these effects is extremely complex, there are several direct and indirect negative effects associated with grazing (Bock 1993, Shackford 1996). Livestock grazing can result in the trampling of ground nesting bird nests, the removal of necessary cover for birds that require dense mid-to tallgrass heights for nesting and winter habitat, and it contributes to a uniform landscape that supports fewer species of birds. Grazing can negatively affect seed and fruit production as well as insect production, which are important food sources for migratory and resident prairie birds. Interior fencing used in conjunction with livestock grazing contributes to edge effects, negatively affecting some birds. Annual grazing often exacerbates negative effects on birds by eliminating much of the nesting cover available in an area in one grazing season.

The increased emphasis toward prescriptive grazing instead of annual grazing could benefit grassland birds over the long term, provided it was done in concert with an objective of improving habitat for grassland birds. Domestic livestock can be used to mimic native grazers (ungulates and prairie dogs) to provide the variety of habitats and foods needed for

all native grassland bird species. A primary advantage of prescriptive grazing is that when combined with fire, a mosaic of habitats would be created (different heights of grasses and more shrubs and forbs) benefitting more bird species.

Areas that remain under an annual grazing regime would likely negatively affect some bird species to a greater degree in the long term. There would continue to be more uniformity of the grasslands and less diversity in structure and plants. Prescriptive grazing targets in alternatives B and D would achieve the desired mosaic effects quicker than under alternative A, benefitting a diversity of bird species. Heavy grazing by elk in some areas could offset positive benefits for birds under alternative B. Prescriptive grazing targets in alternative C would result in minor benefits to grassland birds.

Public Use and Access

Individual bird species react differently to the presence of people. Recreational activities such as hunting, fishing, boating, hiking, birdwatching, photography, and the use of and creation of roads and camping sites could directly and indirectly affect birds. Some bird species such as the nonnative house sparrow or the native brown-headed cowbird have increased in numbers due to human influences, whereas others such as the piping plover have drastically declined due to their specific needs for undisturbed shoreline habitat. Reactions vary according to breeding status, species size, group size, location within a habitat or current activity (foraging for food, roosting, and nesting) (Hamann et al. 1999).

Under all alternatives, the Service would continue to provide for a variety of wildlife-dependent recreation opportunities. Much of the refuge's visitation occurs in the fall during hunting season, which is past the breeding season for birds. The refuge is open for hunting of upland birds, waterfowl and migratory gamebirds, and subsequently, some individuals would be negatively affected, but monitoring has shown sage-grouse and sharp-tailed populations to be stable. There would likely be some modest increases in upland birds hunters under alternatives B, C, and D, but overall any incremental negative effects on these species would be negligible over the long term.

The Service would improve visitor programs and facilities in alternatives B, C, and D largely through the development of more opportunities for wildlife viewing and other nonconsumptive uses. Although more facilities and programs could lead to increased disturbances for birds, facilities such as viewing blinds can direct and concentrate visitor use and lessen negative effects and serve management goals. With careful planning and placement, a blind can prevent birdwatchers from wandering into sensitive

habitats while at the same time providing an opportunity to experience birds in an ideal setting (Colorado Division of Wildlife 2007). Refugewide, the minor to moderate increases in visitors and facilities (refer to section 5.6, effects on visitor services) would have negligible effects on birds. There would be more temporary disturbances such as increased noise, dust, and activity during the construction of new trails, viewing blinds, or the science and or interpretive center at Sand Creek Field Station. Scheduling construction activities to occur outside of the breeding seasons or migrations would minimize negative effects.

Studies have shown that recreational roads and trails interrupt the continuity of grasslands and forests, often creating an edge effect, which influences breeding communities. Not only can trails affect the abundance and distribution of bird species, nest predation is often greater near them (Miller et al. 1998). Graveling an added 16 miles of road under alternative C (Routes 209 and 838) and 5 miles under alternative D (Route 209) would likely increase traffic along those roads resulting in localized incremental disturbances to birds along those corridors. Closing 106 miles of road in alternative B and 23 miles in alternative D would create larger blocks of relatively undisturbed land, which would benefit birds.

Very little information is known about numbers of boaters on Fort Peck or the Missouri River and or the effect they have on waterfowl or other birds on the refuge. Under any of the alternatives, there would be only incremental increases in boating over 15 years. Similarly, significant numbers of anglers line the shores of Missouri River often during the spring breeding season. Much of this occurs during the paddlefish season in select areas from Rock Creek Boat Ramp west to the Fred Robinson Bridge, attracting large crowds and campers when fish numbers and weather conditions are favorable. In recent years, MFWP has limited the number of paddlefish fishing permits. Although fishing would not change substantially under alternatives B, C, and D, birds would continue to be negatively affected to some degree from these disturbances during the spring (refer to chapter 4 and to fishing in section 5.7 below).

Special Management Areas

Protected areas on the refuge such as the research natural areas and wilderness generally benefit birds by allowing more natural processes to take place with fewer disturbances and edge effects. Alternative B would result in the greatest benefits from wilderness protections, followed by alternatives D, A, and C.

Monitoring

Although more than 250 species of birds have been documented on the refuge, there is little data available on most of the species recorded. Under all alter-

natives, short-term surveys and long-term monitoring of all grassland birds would indirectly benefit birds as establishing the taxonomy is the foundational first step in species conservation. 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. The monitoring program for bird populations would vary by alternative and would be tied to the habitat objectives and focal bird species described in chapter 3.

Survey and monitoring efforts would be limited under alternative A largely because of the lack of staff and resources and other management priorities. It would continue to limit the ability of the Service to understand trends in bird numbers or species while factors such as climate change are changing bird population dynamics. Without this information, the Service could negatively affect birds inadvertently over the long term through its management actions. Under alternatives B, C, and D, a baseline inventory would be completed within about 6 years, and a comprehensive monitoring program would be established as part of the overall habitat management program. Alternative D would have the most aggressive schedule for implementing a monitoring program to tie bird monitoring into the objectives for sentinel plant monitoring and focal bird species monitoring. Alternative C would have a less aggressive schedule and B would be the intermediate alternative.

Conclusion

The Service would increase its monitoring efforts under alternatives B, C, and D, which would be tied to habitat objectives and focal bird species described in chapter 3, benefiting birds over the long term. Annual and prescriptive grazing by domestic livestock would be used in all alternatives and could result in short-term and long-term negative effects. Alternative A would result in minor to moderate, long-term, negative effects, while alternatives B and D would result in minor to moderate long-term benefits from faster transition in implementing prescriptive grazing refuge-wide (4–7 years under alternative B, 6–9 years under alternative D), and alternative C would have minor benefits. Effects on riparian habitat would be minor to moderate incremental benefits for alternative A, moderate long-term benefits for alternative B, variable for alternative C, and moderate to major long-term benefits for alternative D. Areas with annual grazing (under any alternative) would likely continue to negatively affect birds in localized areas, resulting in moderate to major negative effects in localized areas.

Under alternative A, constant fire suppression would have negative long-term effects for many grass-

land birds largely due to the lack of diversity in species. Alternatives B and D would apply a patch-burning and prescriptive grazing regime that would benefit the greatest number of birds, although the timing of fires in conjunction with breeding seasons would need to be considered. Alternative C would be similar to alternative A. Birds would also benefit from increased invasive species management under alternatives B, C, and D.

Wildlife-dependent recreation activities could negatively affect birds in localized areas under all alternatives, but overall, incremental, negative effects would be minimal with careful planning.

Overall, alternative A would result in negligible effects (as negative habitat effects would offset benefits), while alternatives B and D would have moderate to major long-term benefits. Alternative C would have minor long-term benefits. In all alternatives, areas with annual grazing would continue to have moderate to major, localized, negative effects.

Mitigation

The application and timing of prescribed fire would need to be considered in reducing mortality particularly during breeding seasons.

Careful planning in locating and building visitor facilities or road improvements would minimize disturbances particularly during critical breeding periods. In addition, undertaking a study to fully assess the effects of boating and fishing along the Missouri River would enable the Service to find ways to work with partners and reduce disturbances to birds.

EFFECTS on THREATENED and ENDANGERED SPECIES and SPECIES of CONCERN

Threatened or endangered species at the refuge are black-footed ferret, piping plover, least tern, and pallid sturgeon. Species of concern are greater sage-grouse (candidate), Sprague's pipit (candidate), sicklefin chub, sturgeon chub, black-tailed prairie dog, swift fox, and mountain plover. The grizzly bear (threatened), although not currently found on the refuge, is included in the discussion. The endangered whooping crane is a migrant in McCone, Phillips, and Valley Counties.

All Alternatives

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. Therefore, everything proposed as objectives in chapter 3 for all of the alternatives would attempt to have beneficial effects for threatened and endangered species or at worst, be neutral. Similar consideration and expected effects apply to species of concern.

Hunting is currently permitted under all of the alternatives for greater sage-grouse on the refuge in accordance with State regulations. The Service found in March 2010 that greater sage-grouse was “warranted but precluded” for listing under the Endangered Species Act. That determination places it on the candidate list. That status does not offer any protection from take, but does raise the level of concern and public scrutiny, places them in the queue for eventual listing and requires an annual status review.

The refuge is not planning to conduct any specific actions related to pallid sturgeon, sicklefin chubs or sturgeon chubs so no effects on those species are expected to result from the proposed actions under any of the alternatives. Least terns and piping plovers are relatively rare on the refuge. Negligible to minor positive benefits are expected under all of the alternatives while working with USACE on invasive plant control and shoreline habitat management to promote attractiveness and nesting success of these shorebirds.

Should the grizzly bear recolonize on the refuge, the Service would follow the recovery plans for this species. In addition, the Service would develop management plans in cooperation with MFWP, which would be a proactive approach for dealing with the conflicts that would occur.

Alternative A

Black-footed ferrets were “rediscovered” in Wyoming in 1981, and the 1986 the refuge EIS called for maintaining viable black-tailed prairie dog colonies suitable for ferret reintroduction when animals became available. Ferret reintroductions began in

1994 (refer to chapter 4) and about a dozen animals remained at the UL Bend Refuge by the end of 2009. In response to sylvatic plague-caused prairie dog die-offs, the Service and partners have taken measures, including translocation and pulicide (agent to kill fleas) applications, to repopulate colonies and to prevent plague outbreaks in prairie dog populations.

Overall, efforts contributing to the conservation of black-tailed prairie dogs and associated species would continue to benefit these species. The maintenance and expansion of prairie dog colonies have contributed to habitat and wildlife diversity, natural processes and ecological health. Continuation of these efforts under alternative A would result in minor, incremental benefits to prairie dogs, black-footed ferrets, and other associated species over the long term.

Alternative A does not include specific management objectives for other threatened and endangered species and species of concern. While the lack of specific management guidance could be detrimental to these other species, any such effects would be negligible due to the Service’s requirement to manage for special status species on the refuge.

Alternative B

Consistent with the theme of alternative B, resources would be directed toward maintaining and enhancing, where appropriate, population levels of all threatened and endangered species and species of concern to the maximum extent possible and practicable. Such actions would all contribute to achieving biological integrity and managing for biological



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Black-footed ferrets were “rediscovered” in Wyoming in 1981.

diversity. Working collaboratively with the many involved partners is a theme within the specific objectives for each of the special status species listed in chapter 3. If successful, an environmental consequence of that approach would be improvement of habitats and wildlife populations at a scale larger than the refuge.

Several of the objectives in alternative B include various monitoring efforts to assess population status and trends of special status species. None of those activities is anticipated to have any significant environmental consequences or effects on special status species. Several upland birds are identified as focal species including Sprague's pipit and sage-grouse.

Transitioning to prescriptive grazing would occur most rapidly under this alternative and would benefit many species of wildlife. Reductions in livestock grazing could benefit species like sage-grouse, Sprague's pipit, and other focal bird species that are sensitive to heavy livestock grazing applications (MFWP 2005b, FWS 2010e) and provide optimum residual cover for nesting. Similarly, more intensive grazing could be directed to some areas to promote prairie dog expansion and increase habitat for mountain plovers and other prairie-related species of concern.

Managing fire by protecting or preventing sagebrush areas from burning would be a moderate-to-major benefit for sage-grouse. Similarly, fire could be used to remove sagebrush in some areas and promote prairie dog expansion that could also result in benefits for associated species. In general, all of the management actions that promote native vegetation and healthy, functioning riparian systems would benefit native fauna. Actions aimed at reducing invasive species would also benefit native flora, fauna, and naturally functioning systems.

Overall, alternative B is anticipated to result in moderate to major long-term benefits for threatened and endangered species and species of concern on the refuge.

Alternative C

Most of the threatened and endangered species and species of concern management objectives for alternative C are the same as alternative B. Therefore, the effects are anticipated to be the same as those described under alternative B (moderate to major long-term benefits), with the following exceptions.

Efforts to work with USACE to maintain suitable shoreline nesting habitats, if successful, would moderately benefit least tern and piping plover populations over the long term. Likewise, efforts to maintain at least 50 percent of sage-grouse habitat would contribute some habitat to help support sage-grouse population on and surrounding the refuge, but would be less effective than maintaining 100 percent of the habitat as proposed under alternative B.

The emphasis under alternative C to provide more opportunities for public viewing would likely result in more disturbance effects on wildlife from people. As those opportunities are developed, care would be taken to minimize such disturbance. Over the long term, the extent of those effects would likely be negligible to minor.

Transitioning to prescriptive grazing would occur most slowly under this alternative and fewer benefits for species like sage-grouse, Sprague's pipit, and other focal bird species that are negatively affected by heavy livestock grazing would be expected. Similarly, management actions designed to improve habitat conditions are least aggressive and occur over longer timeframes so effects on threatened and endangered species and species of special concern would be least pronounced under this alternative. Fires would be aggressively suppressed under this alternative and that approach would probably benefit sage-grouse in most situations. However, opportunities to use the proper management response to benefit threatened and endangered species and species of concern such as Sprague's pipit, which benefits in the long term from prescribed fire that reduces woody encroachment and invasive species, and other wildlife may be missed.

Alternative D

The threatened and endangered species and species of concern management objectives, as well as their benefits, would be the same as alternative B. Maintenance, restoration and enhancement of special status species is essential to restoration of natural ecological processes, the theme of this alternative.

Habitat management actions such as patch burning in sagebrush habitats could help promote prairie dog expansion that would in turn benefit species associated with prairie dog colonies. In contrast, fires in sagebrush habitats, either prescribed or wildfire, could have major negative effects on sage-grouse. The sagebrush flats in UL Bend National Wildlife Refuge provide critical nesting and wintering habitat for sage-grouse. Wildfire in these areas could dramatically alter habitat, resulting in severe negative effects during brooding seasons (Connelly et al. 2000). Sage-grouse need different habitat throughout the seasons and the actions under alternative D should benefit sage-grouse in the long term. Potential threats to sage-grouse habitat would be mapped and identified, and sage-grouse habitat would be protected, particularly in the sagebrush flats in UL Bend. Sage-grouse habitat would be protected in prescribed fire and wildfire plans, which would minimize negative effects on important sage-grouse areas.

For areas where Sprague's pipit is found, fire can result in short-term adverse effects but, in the

long term, habitat quality should be improved (FWS 2010e). Although short-term grazing could benefit Sprague's pipit, any grazing should take into account vegetation potential in the form of structure (i.e., vertical and horizontal density) as well as plant species composition, which varies within and across geographic locales. Cattle presence could also result in increased abundance of cowbirds (Duffy 2000). With monitoring, the actions under alternative D should benefit Sprague's pipit habitat in the long term.

In general, all of the management actions that promote native vegetation and healthy, functioning riparian systems would benefit native fauna. Actions aimed at reducing invasive species would also benefit native flora, fauna, and naturally functioning systems.

Conclusion

Alternative A does not include specific management objectives for other threatened and endangered species and species of concern. While the lack of specific management guidance could be detrimental to these other species, any such effects would be negligible. Under alternatives B, C, and D, resources would be directed toward maintaining and enhancing, where appropriate, population levels of all threatened and endangered species and species of concern to the maximum extent possible and practicable, resulting in moderate to major benefits over the long term.

Mitigation

Any new visitor facilities would need to be carefully planned out to minimize any potential disturbance to threatened, endangered, or species of concern. Lek viewing blinds would be constructed outside of breeding seasons with careful monitoring of use by visitors during the breeding seasons.

EFFECTS on FURBEARERS and SMALL PREDATORS

Furbearers include swift fox (discussed under species of concern), coyotes, beaver, muskrat river otter and mink, raccoons, badgers, and other small mammals.

Alternative A

There would be no changes from the current status or management practices for furbearer species under this alternative. Effects would be negligible. All furbearing species, excluding coyote, would remain protected from hunting or trapping. Protection from harvest should result in maximum abundance, if not already obtained.

Overall, current management practices would continue to benefit furbearing species by maintaining the amount of current upland habitat, restoring riparian habitat, continuing an active fire management program, and moving toward a prescriptive

livestock-grazing program on some parts of the refuge. Riparian area restoration and protection would result in moderate to major benefits for all furbearer species, especially the beaver and muskrat (refer to riparian habitat above). More benefits would be expected for furbearer species that are currently below acceptable population levels (for example, river otter, beaver, and swift fox) by continuing to protect from harvest and by promoting range expansion. However, furbearer species currently at viable, self-sustaining levels (for example, badger and coyote) may remain relatively unaffected under this alternative.

It is unknown how predatory furbearer species would be affected by changes in grazing or changes in prescribed fire frequency. Certain prey species may benefit from these management objectives, but how they affect the predators is unknown.

Alternative B

In addition to alternative A, other benefits would result from active reintroduction of species not currently found on the refuge or are considered rare (for example, swift fox and river otter). These benefits would be major and long-term for the affected species.

Alternative C

This alternative could promote sustainable harvest of furbearing species, which have been identified as self-sustaining, through hunting or trapping for the sole purpose of maximizing public use opportunities. Harvesting of furbearer species currently protected would vary between minor and major, negative effects on the furbearer populations. Current regulations do not allow any take of furbearer species, except coyote, and thus are currently below or at maximum abundance. Any allowable harvest would lower current abundance and maintain the populations at the minimum, self-sustaining numbers. A comprehensive monitoring program would be in affect to detect moderate, negative effects on any furbearing species to maintain a minimum, self-sustaining population.

It is unknown how predatory furbearer species would be affected by changes in grazing or changes in prescribed fire frequency. Certain prey species could be affected from these management objectives, but how they affect the predators is unknown.

Alternative D

Under this alternative, harvesting of furbearing species would be possible if populations were considered above acceptable levels (based on native habitat and food resources) or able to maintain a self-sustaining population with regulated harvest. This should result in a negligible effect on the selected furbearing species. A comprehensive monitoring program would be in affect to detect minor, negative effects on

any furbearing species to maintain maximum abundance. Current management practices on the refuge allow only the coyote to be harvested and the other species remain protected. Eliminating the taking of coyotes on the refuge by agents within Wildlife Services who are in pursuit of coyotes from off the refuge would have negligible effects on coyotes, other wildlife species, or livestock.

Conclusion

Under alternative A, few changes would occur in the management of furbearers, and effects would be negligible. More benefits for furbearers would occur with the implementation of alternatives B and D, such as the active reintroduction of species not currently found on the refuge or are considered rare (for example, swift fox and river otter). These benefits would be major and long-term for the affected species. Alternative C could promote sustainable harvest of furbearing species that are currently protected, resulting in minor to major, negative effects to the furbearer populations. Harvest of furbearing species under alternative D would be based on acceptable population levels, resulting in negligible effects.

Mitigation

No mitigation would be necessary.

EFFECTS on AMERICAN BISON RESTORATION

Any proposal to move forward with a restoration endeavor for wild bison would be conducted through another public process led by MFWP in which all of the associated issues about such a proposal would be thoroughly examined. Therefore, it is beyond the scope of analysis here to exhaustively address or evaluate all of the issues associated with a restoration proposal for wild bison. The important aspect for the purposes of this CCP is to evaluate the environmental consequences pertinent to the refuge, realizing any restoration effort would be part of a separate and larger planning effort involving multiple partners.

Alternative A

Wild bison restoration was not addressed in the 1986 EIS. Given there are no objectives or strategies for restoration and management of wild bison under this alternative, it is difficult to anticipate what environmental consequences may ensue. If wild bison remain absent, progress in restoring ecological processes would remain incomplete. If restoration of wild bison materialized, ecological systems would move closer to full restoration and their presence would likely result in a host of subsequent effects that are difficult to predict. The range of environmental consequences with and without the pres-

ence of wild bison is more fully explored in the action alternatives.

Alternatives B and D

By itself, development of a collaborative restoration and management plan for wild bison would not have any environmental consequences. However, the contents and direction of that management plan would set the stage for subsequent environmental and social effects should a restoration effort be launched that involved the refuge.

Alternative B emphasizes the abundance of target and focal species, while alternative D emphasizes the diversity of all wildlife species. Wild bison restoration would bring back what was once a dominant herbivore in the refuge landscape. Such a project would be consistent with the wildlife population emphasis of this alternative (a positive move toward restoration of natural ecological processes) and would present the opportunity for enhanced wild-life-dependent public uses.

It is anticipated there would be changes in bovid herbivory patterns, and subsequent changes in plant and community responses, with wild bison allowed to range over relatively large areas compared to current management practices for domestic cattle. It is hard to predict what those changes would be, because they would be influenced by many as of yet undetermined factors, for example, population targets for wild bison, size and location of areas managed for wild bison, fire frequency and distribution, topography, and earlier land use and management practices. However, it is reasonable to assume that the interaction of wild bison with the other factors that affect natural ecological processes would be improved by the presence of the dominant herbivore with which these systems evolved.

Alternative C

The environmental consequences on the refuge from an MFWP effort to restore wild bison would be determined by MFWP management guidelines. Because there is currently no proposal being advanced and those management guidelines have not been drafted, it is difficult to anticipate what the environmental consequences may be, as they would depend on many factors yet to be determined.

Given the public and economic use emphasis of this alternative, there would be an emphasis on promoting compatible public uses of wild bison (such as viewing and hunting) and minimizing influences of wild bison on other economic uses of the refuge (such as livestock grazing).

Although the presence of wild bison would move management toward more naturally functioning ecological processes compared to the absence of wild

bison, such influences would be minimal. Management efforts would focus on promoting public and economic uses with less emphasis on promoting restoration of natural ecological processes.

Conclusion

It would be unlikely that wild bison would be restored under alternative A. Under alternatives B, C, and D, the development of a collaborative restoration and management plan for wild bison would not have any environmental consequences. However, the contents and direction of that management plan would set the stage for subsequent environmental and social effects should a restoration effort be launched. Wild bison restoration would bring back what was once a dominant herbivore in the refuge landscape. Such a project would be consistent with the wildlife population emphasis of alternative B and a positive move toward restoration of natural ecological processes under alternative D. It would present the opportunity for enhanced wildlife-dependent public uses.

Mitigation

Mitigation would not be necessary.

EFFECTS on NORTHERN GRAY WOLF

Should the gray wolf recolonize on the refuge, the Service would develop management plans in cooperation with MFWP, which would be a proactive approach for dealing with the conflicts that would occur.

Alternative A

Gray wolf management was not addressed in the 1986 EIS. Given there are no objectives or strategies for wolf management under this alternative, it is difficult to anticipate what environmental consequences may ensue. Should wolves continue to be absent, progress in restoring ecological processes would remain incomplete. Should wolves become established, ecological systems would move closer to full restoration and their presence would likely result in a host of subsequent effects. Some of these potential effects may include altered big game population dynamics, behaviors and habitat use, changes in habitats, changes in public hunting programs, and livestock depredations. The range of environmental consequences with, and without wolf presence, is more fully explored in the action alternatives.

Alternative B

The Service would follow the Northern Rockies Recovery Plan for the gray wolf. By itself, development of a refuge-specific gray wolf management plan would not have any environmental consequences, but the contents and direction of that management plan would set the stage for subsequent effects

should wolves recolonize the Missouri River Breaks. An important aspect of developing a refuge-specific wolf management plan is that it is scheduled to be completed before anticipated wolf recolonization and would afford the opportunity for ordered and coordinated development with the public and other agencies before a crisis-management situation should a plan not be in place before wolf population establishment. It is likely there would be a high degree of conflict and controversy for how wolves would be managed during the interim while the plan was developed.

Alternative B emphasizes the abundance of target species. The philosophy of the plan under this alternative would be toward promoting wolf abundance (within ecological constraints) and providing for recreational viewing opportunities. Wolf presence would add one more native wildlife species that would add diversity and move ecological processes toward more naturally functioning systems. Wolves would provide predation pressure on ungulates that would likely influence their population dynamics, behavior, and habitat use. Changes in how native ungulates use the landscape would likely result in effects on vegetation and habitat dynamics. Those changes are expected to be complex interrelationships among many factors and cannot be predicted at this time, other than to expect an ecological system that includes wolves is closer to restoration of natural processes than a system where wolves are absent.

There would likely be livestock depredation issues should wolves recolonize the Missouri River Breaks. Management responses to livestock depredations under this alternative would be most protective of wolves and public hunting of wolves on the refuge would not be permitted. As a result, wolf populations would likely be greater than under management that uses approaches that are more aggressive and would probably result in greater influences on native ungulates and related population and habitat responses.

Alternative C

Under alternative C, an ecological system with at least some gray wolves present would be closer to restoring natural processes than a system where they were absent, but the ecological effects and resulting changes in aspects of native ungulate ecology and habitat effects would be less than under alternatives B or D.

Alternative D

Alternative D would have added emphasis on research to document and better understand how wolves influence natural ecological processes.

Conclusion

With no objectives and strategies established for gray wolf management under alternative A, it would be difficult to predict any consequences should they

colonize the refuge. Under alternatives B, C, and D, the development of a refuge-specific wolf management plan would not have any environmental consequences, but the contents and direction of that management plan would set the stage for subsequent effects should wolves recolonize the Missouri River Breaks. Completion of a management plan under alternatives B and D would likely be more effective, because it would be completed before wolf population establishment. The completion of a plan in alternative C after wolves were established would be more contentious and potentially less effective.

Mitigation

Mitigation of negative livestock effects would need to be addressed in any wolf management plan.

EFFECTS on BIG GAME

Pronghorn, mule deer, white-tailed deer, Rocky Mountain elk, Rocky Mountain bighorn sheep, and mountain lion are addressed.



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A mountain lion on the refuge.

All Alternatives

The effects of management objectives for furbearers, threatened and endangered species, species of concern, birds or other wildlife would have minimal, if any, effects on big game populations under any of the alternatives.

The effects the alternatives would have on hunting opportunities and experience do not directly affect big game populations and are addressed under public use. However, under all of the alternatives, hunting and harvest levels would be a major factor affecting populations. Harvest levels can be adjusted more easily than weather or other factors that would also influence population levels. The aim would be to adjust harvest to achieve specified objectives under each of the alternatives.

Invasive Species. Management objectives for shorelines and working with USACE to address habitat needs for threatened and endangered species and management actions to reduce invasive species

will have negligible effects on big game populations. Overall, efforts to reduce invasive species and maintain and restore native plant communities will benefit big game species and other wildlife.

Fire. Overall, wildfire and prescribed fire would have negligible effects on big game animals. Animals do not flee wildfire as is commonly believed. When mortality of large animals does occur, it is usually from smoke inhalation in very large, very fast-moving fires. The refuge has experienced some fast-moving wildfires in the past, which have likely resulted in some animal mortality. However, documentation of mortality is very rare, indicating minimal overall effects.

The biggest effect fire has on wildlife is the change in their habitats. Wildlife habitats, like forests, are not static; they adapt and respond to disturbances as do other natural systems. Fire changes the proportion, arrangement, and characteristic of habitats across the landscape. Immediately after a fire, there can be temporary loss of food and shelter; animal populations may shift from species that prefer cool, moist conditions to ones that prefer warm, dry conditions. Unburned areas and adjacent burned areas result in a mosaic of habitats with a range of vegetative conditions in which wildlife can find food and cover (Lyon and Telfer 2009).

Roads and Access. Existing road access would remain under alternative A and would result in few new effects on big game populations. However, if more hunters continue to access the refuge from the river, which has been a trend in recent years, there could be more wildlife disturbance affecting use and movements by elk in some local areas. It is also well documented that roads and traffic during the hunting season affect big game movements and distribution (especially for elk) with animals avoiding roads. Less easily accessed areas may provide a degree of refugia for big game from hunters and allow more animals, especially males, to survive the hunting season. In addition, decreased road access almost certainly reduces poaching.

Road access objectives in alternatives B, C, and D intend to reduce or improve road access to some degree. Effects on big game would be expected to be commensurate with the degree of road access change. The implementation of game retrieval roads on the north side in alternative D would benefit big game population by reducing disturbance and increasing wildlife security particularly along the ridge tops. The amount of open roads under all of the alternatives provides sufficient vehicular access to the hunting public and essentially the entire refuge is open to hunting. Hunting season structure and length, combined with permit levels for some species, will have the dominant effect on big game populations regardless of road management changes that may occur under each of the alternatives.

Wilderness. Because the biggest difference in proposed wilderness units on the refuge and other areas is roads, any effects the adjustments to proposed wilderness units suggested in each alternative might have on big game populations would parallel effects outlined above for vehicle access via roads.

Grizzly Bear Management. In itself, the drafting of a grizzly bear management plan would have no effect on big game populations, but implementation of management strategies developed in the plan could have major effects on big game populations should grizzly bears colonize the refuge. Grizzly bears would likely replace part of the big game mortality now attributed to hunter harvest, but the degree to which this would occur is unknown and speculative.

Alternative A

There would be no changes from current objectives and management practices for big game under this no-action alternative. The big game density objectives that were established for native ungulates are thought to be well within habitat capacities for long-term population viability and allow for maintenance of or improvement in habitat quality. Continued management for habitat conditions and diversity that support healthy big game populations would also result in habitat conditions favorable for a wide range of other wildlife, especially migratory birds, many Special Status Species, and sharp-tailed grouse. Opportunities remain for expanding bighorn sheep populations into previously occupied habitat. Such expansion would restore a missing wildlife component to those areas and could provide more recreational opportunities. Overall, wildlife management objectives under alternative A would result in minor benefits to big game populations.

Mountain lion presence or management was not considered in the 1986 EIS. With no changes proposed for management under alternative A, there would be negligible effects on mountain lion populations. Their abundance, distribution, population composition, and trends would remain unknown.

Habitat Management. The objectives for uplands, river bottoms, riparian areas and wetlands, shorelines and invasive species under alternative A would result in negligible effects compared to status or trends in big game populations that have always been variable and dependent on local conditions and management circumstances. Although a positive approach, the proposed objectives to increase the quantity and quality of shrubs on about 1 percent of the refuge over 15 years would have negligible effects on wildlife populations. The speed at which transition to prescriptive grazing progressed would determine its utility to achieve specified wildlife and habitat objectives.

Fire. Both prescribed fire and wildfire objectives under alternative A would continue current management strategies and resource protection policies. It is difficult to predict the effect fire alone may have on big game populations without specifics. The effects could be positive or negative depending on the situation, species, locale, previous management, disturbances, or other factors. Fire in some pine–juniper areas could dramatically reduce thermal cover that is essential to mule deer survival during severe winter weather. However, reduction of conifer cover in other areas may improve habitat suitability for bighorn sheep. There would certainly be immediate short-term effects depending on fire intensity and spatial extent in addition to intermediate and more long-term effects that would be complex and variable across the refuge. These same short- to long-term effects would apply to all alternatives.

Alternative B

With this alternative emphasizing big game abundance, management actions would strive to increase big game populations and distribution wherever possible within habitat limits. Such increases would necessitate reductions in livestock 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.

Habitat objectives and monitoring on the refuge would be the primary guide for determining allowable big game population levels. As one tool to increase and sustain big game populations at higher levels, harvest rates would be reduced from current levels for some species. To achieve population composition ratios similar to a lightly hunted population, harvest intensity of males would be reduced from current levels, affording the opportunity for ecological processes to occur in a more natural fashion compared to the current heavy emphasis on harvest of the largest antlered males, especially for mule deer and elk. As shown by habitat monitoring, population levels would be largely controlled through harvest of antlerless animals.

Alternative B objectives for bighorn sheep are consistent with current management. Ram harvest is comparatively conservative and ewe harvest or removal has been limited, as there remains suitable but unoccupied habitat where populations may expand. All elk hunting is currently by permit only and compared to bighorn sheep, harvest intensity is greater for elk. Comparatively, big game harvest pressure is greatest on mule deer as there are no limits on how many people can hunt in all but one small hunting district in McCone County. Portions of the refuge have a shortened season compared to adjacent lands, but there are no limits on mule deer

harvest like there is with permits for elk, pronghorn, and bighorn sheep hunting.

Compared to current conditions, the consequences of adjusting harvest rates under this alternative would be minor for bighorn sheep, moderate for elk, and major for mule deer. These changes would generally result in populations and ecosystem processes more closely approximating naturally functioning systems as the current intense pressures to harvest the largest antlered males would be reduced. Although harvest opportunities for male elk and mule deer would be reduced from current levels, many would welcome such management for quality public land hunting. However, some members of the public and MFWP would find such a management approach unacceptable and would consider the limitations an unnecessary restriction on hunting opportunity.

When big game populations are managed for higher densities and near the carrying capacities of habitats, disease risks generally increase. Although chronic wasting disease has not yet been detected in wild cervids in Montana, the potential exists. Should chronic wasting disease present, high cervid populations would likely increase risk, incidence, prevalence and spread of the disease. Continued efforts to monitor for chronic wasting disease would benefit cervids by providing an opportunity for early detection and necessary mitigation (specified in the refuge's chronic wasting disease management plan), should it occur.

Other diseases such as bovine brucellosis, bovine tuberculosis, and paratuberculosis are not currently known to be present, but should they become an issue, management for high native ungulate densities would be counter to management needs to minimize such diseases. Because of the susceptibility of bighorn sheep to nearly complete die-offs from pneumonia and other diseases, there would be little change from current management practices that aim to keep sheep populations below carrying capacity in an effort to reduce risks to disease and maintain stable populations over the long term.

Success in coordinating big game surveys and research projects with MFWP would result in a better understanding of big game population dynamics, effects of harvest and native ungulate ecology in relation to other biotic and abiotic factors at a scale larger than the refuge. An improved understanding of natural ecological processes involving big game at a landscape scale would provide a better basis for management decisions and adaptive adjustments, and would result in major long-term benefits to big game.

There are no changes proposed for mountain lion management under alternative B, but there could be effects on mountain lion populations resulting from how native ungulates are managed. Management for



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Pronghorn

abundant native ungulate populations would likely result in greater mountain lion abundance with more abundant prey compared to management under the other alternatives. In contrast, if the stated objectives for sentinel plants are not met, native ungulate populations may be reduced to low levels for a long time resulting in corresponding effects on mountain lion populations with limited prey availability. A consequence could be increased lion depredation.

In contrast to alternative A, there would be efforts to document mountain lion abundance, distribution, population composition and trends in an attempt to better understand their ecology and function in a larger landscape.

Overall, successful implementation of wildlife management objectives in alternative B would result in moderate benefits to big game species.

Habitat Management. The objectives for uplands listed under alternative B call for writing plans and developing monitoring approaches and would have no immediate effects on big game. Success in fencing boundaries and reducing “common” pastures would facilitate management actions that could promote habitat quality in support of big game populations. Compared to the other alternatives, the objectives for uplands under alternative B move most quickly to prescriptive grazing and that should reduce conflicts between livestock and native ungulates and be a benefit to big game. However, if the stated objectives for sentinel plants are not met, big game populations may be reduced to low levels for a long time resulting in moderate short-term effects on big game. Monitoring results would provide a feedback loop for evaluation of management actions and



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White-tailed Deer

adopting adaptive management changes for the next iteration of attempts to improve habitat conditions and maintain abundant big game populations.

The objectives for planting food plots attractive to big game in previously cultivated river bottoms would likely benefit big game populations and could reduce conflicts with adjacent landowners by luring animals away from private land. With reduced landowner conflict, managing for greater big game populations levels may be possible.

Efforts to improve the health and function of riparian and wetland areas would benefit big game populations by providing more quality habitat, forage and flowing streams. Removal of reservoirs and restoration of natural hydrological systems would likely have multiple and complex effects on big game and would be variable, depending on the proportion of a watershed involved. Big game species did not evolve with the numerous constructed impoundments present today and their removal would move systems toward more naturally functioning processes. Both native ungulate and livestock distribution and use patterns would change with reservoir removal and it would take time for riparian systems to respond to changes in waterflow patterns. With changes in ungulate foraging patterns over time (for example, more intensive grazing near remaining water sources and reduced grazing where reservoirs had been removed), vegetative communities would shift over time. In the long term, the result would probably be favorable for big game populations, but the extent and magnitude are hard to predict.

Overall, habitat management objectives in alternative B would result in minor to moderate benefits to big game.

Fire. Several objectives for prescribed fire in alternative B set priorities for areas to burn, areas not to burn, and development of plans. Until such plans are carried out, the effects of fire on big game populations would be the continued selection of resources and use of habitat by animals in response to ongoing vegetation succession. Those selection patterns would be the result and expression of a multitude of complex and changing influences that include human disturbance, previous fires, and livestock management practices on and next to the refuge.

Alternative B includes an objective to develop a patch-burning system to treat at last 2,500 acres annually, which would be up to 40,000 acres over 15 years. It would be difficult to demonstrate the effects of such a system on big game populations, because there are numerous other variables involved. Several burns that were spatially distributed annually would be relatively insignificant, given the movements and home range sizes of most big game species. There could be some local effects—positive, neutral, or negative—on individuals, depending on the location and local situation. Considering that the density of mule deer on the refuge averaged about 6 per square mile from 2000–05, if the refuge reached the stated burn targets each year, annually those fires would affect at most 8 square miles on the refuge, and overall the effect on the refuge’s mule deer population would be negligible.

Given the different life histories and ecology of the various big game species, burning would have both positive and negative effects depending on the species involved and specifics of the situation, locale, and site history. For example, applying prescribed fire to sagebrush and juniper could reduce habitat quality for wintering pronghorn and mule deer but could increase forage production for elk and bighorn sheep, depending on local conditions and surrounding land use and management practices. The fire objectives for hazardous fuel reduction would have no effect on big game populations; the areas targeted for treatment are small and have an insignificant influence on big game populations compared to factors such as weather, harvest intensity, and tolerance for depredation of crops or grasslands on neighboring ranchlands.

Wolf and Wild Bison Management. Under alternative B, wolf colonization would represent a step forward in ecosystem restoration and stewardship (Licht et al. 2010). Among the alternatives, wolves would likely have the most effect on big game, especially elk, mule deer and white-tailed deer under alternative B. Depending on established population level objectives, wolf predation would likely replace part of the big game mortality now attributed to hunter harvest.

Should efforts to reintroduce wild bison materialize, adjustments in management and population

objectives for other big game species may or may not be necessary. A detailed evaluation of how wild bison restoration may affect other resources is beyond the scope of this planning effort, but would be completed during a MFWP planning effort and framework development for the refuge.

Alternative C

In contrast to alternative B, management of big game populations would be geared toward maximizing sustainable harvest levels. As a result, populations would have younger age structures and sex ratios skewed toward females compared to management under alternatives B or D. A high priority would be given to adjacent landowner concerns about big game abundance, game damage outside the refuge and would likely result in management for big game densities below ecological carrying capacity. Adjustments of livestock grazing may be considered if the result could be greater opportunity for increasing the number of big game animals that could be harvested annually. As with all the alternatives, habitat monitoring would help guide appropriate population target levels. Wildlife management objectives under alternative C would result in moderate to major negative effects on big game species and natural ecological processes as management would intentionally skew populations toward younger and female-dominated populations to maximize harvests.

The effects of management under alternative C on mountain lion populations would likely be minimal as prey base management would not be much different from management under alternative A. Evaluation of establishing a hunting season for mountain lions is called for under this alternative. A prerequisite for creating a new hunting season would be collection of sufficient data to understand mountain lion abundance, distribution, population composition and trends that also provided a basis for responsible harvest management that assured the long-term sustainability of mountain lion populations. That monitoring data would provide a better understanding of mountain lion ecology than with no monitoring under alternative A. Should a mountain lion season become established, mountain lions would likely be managed for lower population levels than under any of the other alternatives in an attempt to minimize any livestock depredation issues.

Habitat Management. Similar to alternative B, the upland and river bottom objectives of writing plans and developing monitoring strategies would have no immediate effects on big game. The speed at which boundary fence is constructed to facilitate management treatments and transitioning to prescriptive grazing is slowest under alternative C; therefore, any positive results for big game populations would also be expected to be delayed. It is doubtful any mean-

ingful relationships could be established between big game population responses to achievement of the specified upland forb and shrub objectives. Restoration of native vegetation to river bottoms would be beneficial to big game.

Riparian area and wetland management objectives under alternative C, which generally seek to restore degraded riparian areas and systems, would be generally favorable to big game populations. However, with the emphasis of managing riparian resources toward maximizing livestock grazing and meeting NRCS range conditions, more uniform distribution of grazing would be expected. With changes in water distribution and availability, livestock and big game distribution and foraging patterns would also be expected to interact and to change. With such changes (for example, more uniform forage utilization), vegetative communities would likely shift, but the extent and magnitude are hard to predict without specifics.

Development of more water impoundments would hinder restoration of riparian areas and expand the distribution of livestock, resulting in negative effects on big game populations, depending on livestock stocking rates. The maintenance or creation of new reservoirs by itself would likely result in a negligible effect on big game populations in the absence of livestock grazing.

Habitat management objectives in alternative C would have negligible overall effects on big game populations.

Fire. With the prescribed fire objectives in alternative C being much less aggressive and taking place over a longer timeframe than fire objectives in alternative B, there would be minimal effects on big game populations for the same reasons discussed under alternative B above.

Wolf and Wild Bison Management. The effects of wolf colonization and management under MFWP's wolf management plan on big game populations would be similar under alternative C. Wolves would be managed to minimize conflicts with livestock and for recreational viewing.

The concept of wild bison restoration in Montana is in its infancy, and MFWP has only recently begun preliminary scoping discussions and has not started a planning process. For these reasons, it is difficult to predict how wild bison restoration, if pursued, would affect big game populations on the refuge under a MFWP management plan as called for under alternative C.

Alternative D

Many of the environmental consequences of big game management under alternative D would be similar to those described under alternative C, but to a lesser degree. It would seek a more balanced approach

that still achieves natural ecological function, natural density, and sex and age composition makeup of big game populations. This approach provides for reasonable recreation and harvest opportunities and fulfills the quality wildlife-dependent recreational use emphasis directives of the Improvement Act.

The main big game objective under alternative D calls for cooperatively developing population and habitat monitoring strategies with MFWP and establishing desired population and abundance levels. Successful accomplishment of the big game objectives under alternative D could result in big game populations meeting the Service's goal of increasing biological diversity and integrity, but numbers of ungulates would likely need to be reduced in some areas. Ideally, distribution and density targets would be tailored to ecological units and their ability to support native ungulates.

Additionally, alternative D would provide quality wildlife-dependent public uses and experiences. Management under alternative D would provide more recreational opportunity than under alternatives A and B, but less than alternative C.

The effects of limited mountain lion hunting would be similar to alternative C. If wildlife and sentinel plant monitoring shows stable and robust populations, a limited mountain lion hunt would have negligible effects on the population.

Habitat Management. The upland, river bottom, and riparian area and wetland objectives for alternative D would strive to manage toward functional vegetative communities with the full complement of native plant species and processes. Once achieved, such habitat conditions could be expected to support abundant big game populations, perhaps not unlike those described by early explorers, and a complex system of co-evolved flora and fauna. Such habitat conditions would result in moderate to major long-term benefits for big game populations, but could result in moderate, short-term, negative effects for several years with reduced livestock and big game populations to reduce total ungulate herbivory until stated objectives for sentinel plants are achieved.

Fire. Although Frost (2008) used fire scar chronologies, vegetation, soil, and topography among other methods to reconstruct the approximate fire frequency on the refuge, the response of plants and ungulates in the diverse habitat types of the refuge is not fully understood. Furthermore, there are multiple and competing perspectives on what the historical fire regimes were. Only well-executed monitoring of plant and animal responses to fires would lead to an assessment and better understanding of the effects of management actions such as patch burns and restoration of pyric herbivory systems, which could alter forage selectivity and abandonment by animals or change the ecological resilience.

The effects of fire management objectives on big game and other wildlife would vary by location, timing, fire behavior, and other factors and result in a negligible, short-term, negative effect in some areas and potential minor to moderate long-term benefits.

The objectives for prescribed fire and wildfire in alternative D are similar to alternative B, although there would be a greater emphasis on patch burning in alternative D. As discussed under alternative B above, there would be few if any effects on big game populations directly attributable to fire.

Wolf and Wild Bison Management. The objectives for wolf management and wild bison restoration potential under alternative D is the same as alternative B; therefore, the effects on big game populations would be the same as described under alternative B.

Conclusion

Alternative A would continue current management with minor benefits. Alternative B would result in populations and ecosystem processes more closely approximating natural functioning systems, with moderate overall benefits for big game. Alternative C would result in moderate to major negative effects on big game populations as natural ecological processes are intentionally skewed to maximize harvests. Alternative D would result in moderate to major benefits to big game, using a balanced approach to management.

With few changes in habitat management under alternative A, there would be negligible effects on existing big game populations that have always been variable and dependent on local conditions. Over the long term, habitat management objectives would result in minor to moderate benefits to big game under alternative B because of reducing livestock conflicts. Alternative C would have negligible effects. Similar to alternative B, alternative D would result in minor to moderate benefits to big game populations with a greater emphasis on prescriptive grazing. However, alternatives B and D could also result in moderate negative effects if big game populations are reduced to achieve sentinel plant objectives.

Drafting of a wolf management plan or evaluating the potential would have negligible effects on big game populations. Should wolves colonize the refuge or wild bison be reintroduced, in the long term, there could be negative effects on big game, and adjustment in management and populations could be necessary. Effects on mountain lion populations would vary by alternative, depending on big game and prey population levels and hunting opportunities; the overall effects would be negligible.

Overall, in the long term, alternative A would have minor benefits on big game populations, while alternative B would have minor to moderate benefits, and alternative D would have moderate benefits (health),

although numbers could be reduced to improve diversity across the refuge. Alternative C would result in moderate negative effects on big game populations.

Mitigation

Generally, mitigation would not be required under this alternative. However, under alternative B, because big game populations would be managed for higher densities, the potential for diseases being introduced into the herds' increase. If this occurred, depending on the disease and its prevalence, mitigation measures could be necessary.

EFFECTS on OTHER WILDLIFE

Other wildlife includes amphibians, reptiles, fish, and small mammals such as bats and other small rodents.

Habitat Management

Species that depend on uplands for parts of their life cycle would generally benefit from efforts under all alternatives to maintain and improve upland habitats including prescriptive livestock grazing, prescribed fire, and invasive species management. While prescribed fire, prescriptive livestock grazing, or other management techniques may result in short-term, negative effects on individual animals or localized areas (due to trampling or the elimination of vegetative cover), the long-term benefits of these measures to amphibian and reptile populations would outweigh the negative effects. Overall, these benefits would be moderate to major under alternative D, followed by alternatives B (moderate) and C (minor). Alternative A would result in minor, incremental, negative effects on upland habitats and their value for amphibians and reptiles.

In a similar fashion, efforts to protect and restore riparian habitat areas (including enclosure fence construction and other livestock management efforts) would greatly benefit amphibian, reptile, and fish species, most of which depend on riparian habitats for survival (Pilliod and Wind 2008). Under alternative A, these benefits would be minor though some localized areas would continue to decline, resulting in moderate, long-term, negative effects on riparian area-dependent species. Benefits to these species and their habitat would be moderate under alternatives B and D, and would vary under alternative C depending on the management emphasis in certain locations.

Invasive Species

Pesticides used to control invasive plants cause negative effects to amphibians and reptiles (Maxell

and Hokit 1999). Under all alternatives, the invasive species program would be carried out through an approved stepdown plan. All personnel who use chemicals would be trained in the proper application of where, when, and how to apply them, which would minimize negative effects to amphibians and reptiles.

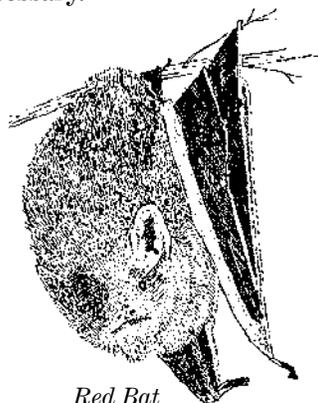
Water Impoundments

While water impoundments have contributed to the degradation of native riparian habitats, existing impoundments provide open-water habitat for many reptiles and amphibians and some fish species that is otherwise scarce on the refuge. Indirect effects of new development of water impoundments may result in the creation or loss of key breeding, foraging and overwintering habitats for amphibians and reptiles (Maxell and Hokit 1999) and fish. Recreational use of water impoundments brings people and pets into direct contact with native wildlife, which can have negative effects. Additionally, predators and game fish use these areas and can have a negative effect on amphibians and reptiles (Maxell and Hokit 1999). Increased use by waterfowl can lead to increased predation on amphibians and reptiles and is associated with decreased water quality, and in some cases, decreased habitat for amphibians and reptiles.

Alternative A would not change management of water impoundments, and therefore would not affect amphibian, reptile, and fish species that depend on them. Efforts under alternative C to evaluate existing impoundments for rehabilitation, removal, or new pond development would likely result in negligible to minor benefits to species that use those areas. The removal of many water impoundments in alternatives B and D would result in moderate short-term localized negative effects on some amphibian, reptile, and fish populations. However, this open-water habitat need would likely be served over the long term by the restoration of native riparian systems, resulting in moderate long-term benefits to species that use lentic wetlands.

Roads and Access

Indirect effects from roads on riparian areas include negative effects on wildlife that use riparian areas. Large numbers of reptiles, amphibians, birds, and small mammals are killed on roads. Some reptiles and amphibians undergo mass migrations to and from breeding habitats and may be killed while crossing roads. Northern leopard frogs exposed to loud noises (120 decibels) become immobilized, possibly leading to increased mortality while crossing roads. Vehicle noise may prevent amphibians from hearing and moving toward breeding areas leading to negative effects. Contaminated runoff from roads and increased sedimentation from road construction could enter riparian areas, negatively affecting



Red Bat
© Cindie Brunner

amphibians and fish. The density of roads is negatively associated with the probability that amphibians would occupy a pond (Maxell and Hokit 1999).

Pesticides used to control invasive plants cause negative effects on amphibians and reptiles (Maxell and Hokit 1999).

Alternative A

There would be no changes from the current status or management practices for other wildlife species under this alternative. All small mammal species would be protected from harvesting, resulting in maximum abundance if not already obtained.

Small mammals would benefit from the maintenance of upland habitat; restoration of riparian habitat; a continued, active, fire management program; and progressive movement toward a prescriptive livestock-grazing program. For small mammal species that are currently below maximum population levels, there could be major positive benefits because of not hunting and by promoting range expansion. However, choosing this alternative would have a negligible effect on remaining populations that are currently at viable, self-sustaining levels.

The use of prescribed fire would have mixed results on small mammal communities. Short-term, negative effects would result from fire due to reduction of residual cover as well as a temporary reduction in forage availability. Species that require larger patches of residual cover would be negatively affected; however, the effect would be short-term as fire-return intervals mimic historical levels. Overall, an increase in prescriptive fire in areas that were historically suppressed would result in a long-term, positive effect for small mammal communities.

This alternative would also result in positive effects to raptors and other predatory species that rely on small mammals for survival.

Alternatives B and D

Specific objectives and strategies targeted toward reptiles, amphibians, and fish would contribute to the long-term benefits for these species. The completion of inventory plans or baseline surveys for high priority areas would benefit these species by improving the ability of the Service to monitor and evaluate the success of habitat objectives.

In addition to the effects of alternative A, management actions in alternatives B and D would continue to have long-term, negligible to minor benefits to the small mammal community. Active removal of continued, season-long grazing would increase many small mammal species found in upland and riparian habitats. Season-long grazing has shown to decrease small mammal diversity and relative abundance by limiting residual cover and forage availability for granivorous species (Chapman and Ribic 2002). Prescriptive

grazing techniques could have short-term, moderate, negative effects on small mammal communities. However, small mammal communities would be expected to recover after short-term grazing prescriptions.

Continued research and monitoring would provide additional data on nongame species with limited distributions or specific habitat needs (for example, bat rookery or roosting sites). Once identified, adaptive management practices could provide more protection for high-priority species and habitat needs.

Alternative C

As in alternatives B and D, alternative C has specific objectives and strategies for amphibians, reptiles, and fish. Alternative C would further emphasize the restoration of native reptile, amphibian, and fish that provide recreational and wildlife-viewing opportunities, which would benefit the populations that are being restored.

Small mammal communities would be negatively affected under this alternative. Continued fire suppression in native prairie habitats would negatively affect small mammal communities by allowing the invasion of exotic species, increasing the encroachment of woody plants, and increasing heavy accumulations of litter (Cid et al. 1991, Larson et al. 2001, Howe 1994, Samson and Knopf 1994). Although some small mammal species that require large amounts of residual cover or greater habitat structure (woody vegetation) would be positively affected (for example, western harvest mouse), the small mammal community composition would be expected to diminish over time by the reduction of native plant species.

Similar to alternative B, prescriptive grazing techniques should have short-term, moderate, negative effects on small mammal communities. However, small mammal communities would be expected to recover after short-term grazing prescriptions. Under this alternative, a management objective of more grasses and less forbs and shrubs, would negatively affect small mammal communities by eliminating the amount forage available for certain species. Particularly, species that forage on forbs and shrubs would be negatively affected and a reduction in range would be expected.

Overall effects of alternative C would be negligible to minor over the long term.

Conclusion

Baseline information on amphibian, reptile, and fish diversity and abundance is limited. Effects to amphibians, reptiles, and fish would be based mostly on changes to the habitat on which they depend including uplands, riparian areas, and water impoundments. Amphibians and reptiles occupy a range of habitat types on the refuge, and serve as key indicators for the environmental health of the ecosystem.

Nineteen species of amphibians and reptiles have been identified on the refuge, while numerous fish species have been identified in both large rivers and small streams during various sampling surveys.

There would be no changes from the current status or management practices for small mammal species under alternative A. Alternatives B and D would continue to have long-term, negligible to minor benefits to the small mammal community. While prescriptive grazing techniques could have short-term, moderate, negative effects, small mammal communities would be expected to recover after short-term grazing prescriptions. Some small mammal communities would be negatively affected under alternative C from continued fire suppression in native prairie habitats by allowing the invasion of exotic species, increasing the encroachment of woody plants, and increasing heavy accumulations of litter.

Efforts under all alternatives to maintain and improve upland habitats—including transitioning to using prescriptive grazing instead of annual grazing, applying prescribed fire, and managing invasive species—would generally benefit species that depend on uplands for parts of their life cycle. The short-term negative effects of habitat management actions would be outweighed by the long-term benefits. Overall, these benefits would be moderate to major under alternative D, followed by alternatives B (moderate) and C (minor). Alternative A would result in minor, incremental, negative effects on upland habitats and their value for amphibians and reptiles.

Alternative A would not change management of water impoundments, and therefore would not affect amphibian, reptile, and fish species that depend on them. Efforts under alternative C to evaluate existing impoundments for rehabilitation, removal, or new pond development would likely result in negligible to minor benefits to species that use those areas. The removal of many water impoundments in alternatives B and D would result in moderate, short-term, localized, negative effects on some amphibian, reptile, and fish populations, followed by long-term benefits.

The use of pesticides to control invasive weeds could harm amphibians and reptiles, but the effects could be minimized through proper training in the application of chemicals. Under any alternative some reptiles and amphibians are likely to be negatively affected from the large network of roads on the refuge. Road closures in alternatives B and D could benefit amphibians and reptiles in localized areas.

Mitigation

For management of upland habitats, in essence, the objectives and strategies lay out a path for mitigating uplands that are in decline or have not seen sig-

nificant improvement since implementation of the 1986 record of decision. This includes (1) establishing a more effective monitoring program to look at plant species that are declining, (2) reducing fencing in some areas, (3) fencing the boundary or keeping livestock away from riparian area corridors, (4) implementing a continual transition toward prescriptive grazing, (5) managing wild ungulates, (6) carefully applying prescribed fire through approved fire management plans and burn permits, and (7) increasing the emphasis on controlling invasive species (horse users are required to use weed-free hay, and there has been significant effort to increase public education about the transport of invasive species).

Similarly, for riparian area restoration including stock pond removal, mitigation has been built into the objectives and strategies. This includes tactics such as (1) not removing ponds that contain species of concern, (2) fencing, (3) keeping livestock out of riparian areas, (4) establishing a plan for restoration and monitoring the results, (5) incorporating applicable regulatory compliance such as wetland permitting, and (6) frequent supervision of projects to avoid adverse effects such as trampling. Refer to chapter 3, section 3.8, “Habitat—Riparian Area and Wetland.”

Whenever possible, the Service would avoid spraying pesticides in sensitive riparian habitats. However, invasive species such as saltcedar are found along the riparian habitat, and the harm by the lack of treatment could have a greater long-term, negative effect on amphibians and reptiles. Developing and implementing a stepdown plan for invasive species management, together with the rigorous training of personnel in the use of any chemicals could limit negative effects on amphibians, reptiles, and native fish species (refer to chapter 3). The implementation of an inventory and monitoring program on the refuge would be a first step in identifying the most sensitive areas, particularly for species of concern such as the northern leopard frog. Alternatives to spraying could be necessary in these areas.

CUMULATIVE IMPACTS on BIOLOGICAL RESOURCES

None of the proposed alternatives would result in cumulative effects on habitat, threatened and endangered species, species of concern, wolf management, furbearers, small mammals, fish, reptiles, and amphibians.

While direct and indirect effects of the Enhancement Act of 2000 (conveyance of cabin sites) are outside the scope of this analysis, cumulative effects are discussed. Implementation of the Enhancement Act of 2000 would potentially result in the addition of between 10,000 and 40,000 acres of upland and ripar-

ian habitat to the refuge. Under any refuge management alternative, the addition of these lands to the refuge, which would include large tracts of unbroken native prairie sagebrush steppe habitat, and riparian areas, would result in minor cumulative benefits to upland and riparian habitat, and the wildlife species that depend on those areas, by removing inholdings, reducing existing habitat fragmentation, and improving potential management (FWS 2005).

Implementation of the Fort Peck Dam/Fort Peck Lake Master Plan may result in cumulative benefits on several biological resources on the refuge. Efforts to improve and maintain tern and plover habitat on the lakeshore would result in minor cumulative benefits to those species when combined with the benefits of the refuge management objectives that are common to all alternatives. Reestablishing cottonwood bottomland in the Nelson Dredge area, may result in cumulative benefits to river bottom restoration efforts throughout the Fort Peck and refuge region by providing another opportunity to learn from successful or unsuccessful practices. The overall cumulative benefit to bottomlands on the refuge would be negligible to minor.

BLM, MFWP, other Federal and State agencies, and others are working in concert to conserve habitat for greater sage-grouse. Landscape-level conservation efforts to protect important habitat would result in cumulative benefits for this species' within and around the refuge in all alternatives. Under alternatives B and D, in particular, the transition toward prescriptive grazing would occur more quickly. However, without more specifics from adjacent BLM areas, which are currently revising or developing their resource management plans, any cumulative impacts for greater sage-grouse from the refuge management alternatives are not known.

MFWP has developed management plans for various big game species that include population objectives for the refuge. Most of the refuge management objectives for big game are consistent with MFWP's objectives, with the exception of mule deer management and herd composition targets in alternatives B and D. While this difference in management plan objectives and philosophy exists, it would be speculative to suggest that such a conflict in management plans would result in cumulative effects on mule deer or any other big game species. Under all alternatives, the Service would continue to work with MFWP to manage big game populations on the refuge.

The American Prairie Reserve has created an 123,000-acre reserve on public and private lands next to the refuge. The Nature Conservancy manages the 63,000-acre Matador Ranch near the northwest edge of the refuge. The continued management of American Prairie Reserve and The Nature Con-

servancy lands for conservation purposes, by either providing habitat or by buffering habitat and populations on the refuge, would provide general cumulative benefits to big game species, grassland birds, and listed species and species of concern including black-footed ferret and sage-grouse. These cumulative benefits would be minor to moderate under any alternative, depending on the species, its habitat needs, and metapopulation dynamics. The restoration of bison on American Prairie Reserve lands could provide moderate cumulative benefits to restoration planning or implementation for wild bison on the refuge by providing a local example of bison management with more opportunities for cooperation. These moderate cumulative benefits would be limited to alternatives B, C, and D, contingent on the pursuit of restoration plans for wild bison on the refuge.

The efforts by the Ranchers Stewardship Alliance to promote ecological, social, and economic conditions that will sustain the biodiversity and integrity of America's northern, mixed-grass prairie will result in general cumulative benefits for grassland-dependent species.

Efforts by the World Wildlife Fund and the National Wildlife Federation to reduce grazing conflict with ground-nesting birds by buying and retiring refuge grazing rights would result in cumulative benefits to those species and other grassland-dependent species (including sage-grouse and black-footed ferret). Under alternatives A and C, the cumulative benefits of these efforts would offset the long-term effects of annual grazing. Under alternatives B and D, the cumulative benefits would complement refuge management efforts to expand prescriptive grazing, though the specific effects would vary by location.

The continued closing of access roads into the refuge by adjacent private landowners has been an ongoing issue. If this practice continues as recent evidence suggests, it could lead to more increases in elk populations. Although there could be cumulative effects in all alternatives, the greatest effect would be under alternative B where the emphasis is on maximizing populations. This would benefit elk populations because of reducing disturbance and increasing security, particularly when combined with the Service's plans to close 106 miles of road. It could also lead to negative effects on vegetation from too many elk in some areas because of the lack of adequate harvest.

The construction of the proposed Keystone XL Pipeline Project would result in localized negative effects on biological resources within the pipeline corridor. None of the refuge management alternatives, when combined with the effects of the pipeline, are anticipated to result in cumulative effects to biological resources.

5.6 ENVIRONMENTAL CONSEQUENCES for VISITOR SERVICES

Visitors to the refuge have the potential to be affected by opportunities, their experiences, and the setting where the use occurs (Manfredo 2002). Service policy emphasizes the need to provide for quality opportunities when providing for wildlife-dependent recreational activities. Wildlife-dependent recreation programs are evaluated based on the goal of providing for quality programs with the following elements: (1) safety and compliance with applicable laws; (2) minimized conflicts with wildlife and habitat goals and public uses; (3) accessibility for all; (4) resource stewardship, and (5) reliable and reasonable opportunities to experience wildlife (FWS 2006c). This section addresses the priority public uses and the activities and facilities that support those uses and how visitors would be affected by the actions in chapter 3. Table 28 compares visitation, miles of road, and level of facility development between the alternatives.

EFFECTS on HUNTING

This section discusses the effect of habitat management, number of hunters, reintroductions, predator management, hunting opportunities, access, and commercial outfitting would have on the hunting program. Information about effects resulting from harvest objectives is discussed for big game under wildlife in section 5.6 above.

Alternative A

Over the long term, there would be little change from current hunting opportunities on the refuge. Big game, upland birds, waterfowl, and migratory gamebirds would be open to hunting, and there would be limited coyote hunting opportunities. If the bighorn sheep population continued to expand, it would benefit hunters seeking this experience. Most hunting seasons for species open on the refuge would coincide with season and harvest quotas established by the State, although in some instances, the refuge would promulgate special regulations to provide for more restrictive harvest of a specific game species when necessitated by a refuge-specific goal or objective for that species.

Table 28. Comparison of access, visitation, and facilities between the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Visitation aspect</i>	<i>Alternative A</i>	<i>Alternative B</i>	<i>Alternative C</i>	<i>Alternative D</i>
Miles of open refuge roads	670	564	670	649
Miles of all-weather access on refuge roads	60	60	76	65
Miles of additional seasonal closures	0	0	0	15
Fishing visits	60,000*	60,000	60,000	60,000
Hunting visits	103,900	100,000	118,500	108,000
Participation visits in nonconsumptive activities (wildlife observation, photography, interpretation)	40,000	44,000	48,000– 68,000	46,000– 50,000
All nonconsumptive visits (includes office and other visits)	87,100	93,000	117,585	95,800
Increase in environmental education programs	Limited (with a few informal programs)	5% increase (with formal programs, 5+/- yearly)	10% increase (with formal programs, 8+/- yearly)	10% increase (with formal programs, 8+/- yearly)
Number of visitor facilities	Limited (tour route, visitor center, hunting blind, signage)	5–10% more than A	10–15% more than A	10% more than A
Total visitation	250,000	253,000	296,085	263,810

*These are the fishing visits attributed to the refuge. USACE estimates nearly 160,000 fishing visits annually.

Over the long term, hunting would remain near current levels of about 103,900 hunters annually (refer to table 28). Current resource management programs on the refuge would result in a positive trend in habitat for game species of wildlife, which in turn would likely result in increasing opportunities for hunting and hunter success over time, but it would have a negligible effect on the numbers of hunters on the refuge. Nationwide, the trend in hunting has been decreasing (FWS 2008e). Although hunting on the refuge would likely remain stable, it would not likely grow without a significant effort to increase hunter numbers.

Access would remain as it is today (refer to table 28 and access below), with a mix of hunting areas open to motorized vehicle access and areas where roadless hunting opportunities exist with little or no influence by mechanized equipment. Some hunters believe little or no direct road access into some areas of the refuge limits their ability to harvest big game, especially cow elk. Others suggest minimal road access is a treasured value to get away from the “road hunters,” seek solitude and enjoy a quality experience not available elsewhere.

The annual number of permits for commercial hunting (outfitters) would be limited to eleven. Some individuals could feel commercial outfitters would negatively affect their opportunities or experience, particularly where they compete for the same space and resource, but overall it would have a negligible effect on most hunters. As outfitters retire, the refuge would continue the practice of holding those permits and not issuing new permits until a new visitor services plan is completed.

Alternative B

Alternative B would affect hunting in several ways. The resource management programs on the refuge would shift to a blending of both natural processes such as fire and grazing (by wild and domestic) ungulates and artificial processes such as planting food and cover crops and construction of water development projects to benefit fish and wildlife. Game wildlife species would be managed according to mutually agreed to population objectives with the State, taking into consideration tolerance of adjacent landowners and land managers as well as ensuring no negative effects to refuge habitats or other nongame wildlife species. Populations would be managed at levels considered natural in terms of densities and natural age classifications. As a result, there could be some unique opportunities for hunting bull elk or mule deer in the 8-year class, which would benefit some hunters.

The numbers of hunters would remain near existing levels. With an emphasis in maximizing wildlife numbers, it might be necessary to limit harvest rates, at least temporarily; therefore, the number of hunt-

ers would be expected to decline slightly to 100,000, but the effect would be negligible overall. Alternative B would seek to maximize targeted species such as sharp-tailed grouse or greater sage-grouse. With an increased emphasis on youth hunting, it is estimated that the refuge could increase the number of upland bird hunters by 2,000 annually from 10,000 to 12,000. Opportunities for big game hunters would stay the same or decrease slightly to 85,000 as compared to 90,000 visits in alternative A in the short term as intensive habitat restoration occurred or as roads were closed.

This alternative also encompasses several wildlife reintroductions including Rocky Mountain bighorn sheep where the habitat would support it and there is a social acceptance for such reintroductions. Sheep hunting is an important and highly sought-after opportunity on the refuge and would benefit hunters seeking this opportunity.

This alternative would lead the refuge to consider more hunting opportunities for mobility-impaired hunters as well as for young hunters that may or may not exist on other areas. This would result in a positive benefit in the overall hunting experience for some users and increase the diversity of the current hunter user group.

With road closures and access agreements with neighboring entities, access would be managed to benefit and increase wildlife populations and in some instances be managed to promote harvest opportunities. The refuge would promote nonmotorized access to some parts of the refuge but also provide for more motorized access in other areas where currently there are strategies that are more restrictive. This could mean allowing game retrieval with motorized vehicles on seasonally closed roads. This would be considered an improvement by those interested in broader use of motorized vehicles but also a negative change by those advocates of roadless hunting opportunities as many seasonally closed roads essentially bisect a larger block of roadless refuge hunting areas.

Specific consideration is given in this alternative to the monitoring and analysis of ATVs and motorized watercraft as they relate to both wildlife use and visitor experience. This could potentially result in regulating these motorized uses in a manner to ensure that they are not negatively affecting wildlife or visitors if it is found that they are doing so. This alternative would also lead the refuge to improve areas for visitor use and access such as improving camping areas, boat ramps, and all-weather roads that lead to these types of facilities. This would be a long-term benefit to visitors that desire these facilities. However, it could have a negative effect on wildlife populations, distribution and hunter success in areas that are near to these areas due to increased visitation to specific sites. This alternative also notes that following a

review of proposed wilderness units it could recommend increasing proposed wilderness acres by 25,037 acres (refer to wilderness below). This may result in improved game populations of specific species and a corresponding increase in opportunity for this type of hunting experience and improved hunter success.

Under this alternative outfitting and guiding for hunting would be evaluated to ensure there are no conflicts with other hunters on the refuge. Outfitters would still be required to submit annual report with the number of clients, number of days hunted and game species sought and harvested. The number of outfitting permits for hunting would be adjusted during the life of the CCP to meet wildlife and habitat objectives. The refuge would work to reduce conflicts between guides, clients, and the public.

Overall, the implementation of alternative B would result in negligible to minor benefits to hunting opportunities and experiences.

Alternative C

This alternative would maximize wildlife-dependent public uses and economic uses while protecting wildlife populations and habitat to the extent possible, striking a balance between livestock grazing and wildlife utilization of habitat. There would be a considerable emphasis placed on the refuge's hunting program with maximization of opportunity and harvest attempted while at the same time providing for diverse opportunities and healthy wildlife populations and habitats. These efforts would benefit hunting opportunities on the refuge. Some of the artificial processes discussed under alternative B would also be included in this alternative such as food plots and water developments.

Compared to alternative A, the number of hunters would be a minor increase of 14,600 (14 percent) hunters to about 118,500 hunters over the long term. It is estimated that the numbers of big game hunters could increase through concerted efforts at promoting hunting on the refuge and would be expected to rise from 90,000 to 100,000 over the long term. Upland game hunters would also increase from 10,000 to 15,000 hunters. There would be a slight increase in waterfowl hunters from 3,000 to 3,500.

The wildlife reintroductions also discussed in alternative B would be included in this alternative. As it relates to hunting, bighorn sheep reintroductions are most notable with the positive benefits to hunters. This alternative also addresses the potential inclusion of mountain lion hunting with the associated benefits and negative effects also noted in alternative B.

Increases in hunting opportunities noted in alternative B as it relates to mobility-impaired hunters and young hunters are included in this alternative to even a greater degree. In addition, some "niche hunting" opportunities would also be considered

such as traditional or primitive weapon hunts or specific predator hunts.

With a greater emphasis placed on maximizing hunter opportunity and visitation, public use facilities and access would be managed accordingly. This would mean improved access to boat ramps and improving camping facilities, more restrooms and parking facilities. There would be some emphasis placed on non-motorized access hunting but also provisions to allow motorized access on seasonally closed roads for game retrieval. There would also be consideration for designation of bicycle use in areas currently not open to such use. There would also be consideration given to designated horse camping with some facilities development to accommodate increasing interest in this type of hunting visitor. The overall benefits of these improvements are for the visiting public and would be positive for those interested in this type of experience. There could be negative effects to wildlife habitat and wildlife distribution in specific sites where increased visitor impacts would occur.

This alternative encourages the refuge to develop and expand commercial activities that would be consistent with the wildlife purpose. In this alternative, more outfitter permits would be issued as long as they are consistent with refuge policy and procedures for issuing permits, along with anticipated time and space restraints, would reduce conflicts with the public and between guides. More outfitting and guide permits would be issued for pack and retrieval services to facilitate the harvest of big game species in roadless areas. This would result in minor economic gain for outfitters and guides and could result in a small increase in the number of visitors to the refuge. The extent of these negative effects is unknown due to incomplete data on the interest by the public for retrieval services in proposed wilderness units and guided wildlife-viewing activities.

Overall, alternative C would result in minor to moderate benefits to hunting opportunities and experiences.

Alternative D

This alternative is based on an ecological processes emphasis where various approaches would be used to restore the natural function of plant communities and wildlife interactions with habitat, the role of fire, water and other influences (refer to objectives and strategies in chapter 3). Wildlife populations and the subsequent opportunities provided to the public through a hunting program would be driven primarily by how these activities would fit into the role of the broader ecological processes. This could mean short-term loss of opportunity if it is beneficial to the overall system to maintain or reduce specific game populations. It could result in a long-term benefit to hunting programs if, when restoration is achieved, the system supports larger and more diverse game populations.

Over the long term, there would be a modest increase of about 4,100, to about 108,000, in the number of hunters as compared to alternative A due to the focus on providing quality experiences, more opportunities to hunt bighorn sheep, more young people hunting, and more mobility-impaired hunters. Overall, this would be negligible increase. The number of big game hunters would be expected to increase to about 95,000 as compared to 90,000 in alternative A in the long term as habitat quality improves and with efforts to increase focus on providing quality hunting experiences. The number of upland bird hunters would remain about the same as alternative A at about 10,000 hunters annually. The number of waterfowl hunters would increase slightly from 2,900 to 3,000.

As compared to alternative A, this alternative would consider additional reintroductions of wildlife including Rocky Mountain bighorn sheep. This alternative would base the implementation of these reintroductions on the appropriateness of how they would benefit the landscape from an ecological function perspective. The short- and long-term benefits of this initiative were described for the other alternatives. In the long term, this would benefit hunters seeking this opportunity.

A mountain lion hunting season would be considered in this alternative. This would be viewed as a positive action by those holding an interest in this type of hunting opportunity on the refuge, as well as the State of Montana's desire to see the refuge participate in this type of hunting, which is currently managed by them on existing hunting units immediately outside the refuge. Those opposed to seeing the refuge open to top predator hunting would view this hunting opportunity negatively.

Alternative D considers the opening of various furbearer seasons not currently permitted on the refuge. This would include species such as fox, raccoon, and badger. This hunting opportunity would only be considered in a more limited basis and would be allowed only when the natural role of predators in the system would not be altered through a hunting strategy. This could result in a short-term reduction in this type of hunting opportunity, but potentially a long-term gain as more diverse predator component may become part of a restored system and associated hunting opportunities could be considered if sustainable viable predator populations existed on the refuge.

The overall hunting program on the refuge would be based on hunting quality rather than hunting quantity. Diverse age and sex ratios for game species would be managed for where possible. This could be benefit to those hunters that desire the opportunity to experience game in relatively good abundance and the opportunity to see older age class animals where the opportunity for this is limited in other areas open to public hunting.

This approach could also limit participation and reduce hunter numbers at times when it may be necessary to reduce or limit harvest, which could be viewed as a negative aspect to this type of hunting program.

Access under this alternative would be managed according to what best provides for improving wildlife habitat and overall functioning of the refuge as an ecological system. The road system would be dynamic and managed with seasonal and permanent closures as well as open roads that contribute positively to improving function and health from an ecological perspective. Where possible, roads would be managed to improve harvest when necessary. This approach would have the positive and negative effects as outlined for the other alternatives as it relates to hunter access, participation, and success. The effects of ATVs and motorized watercraft would be the same as alternative B.

Proposed wilderness units would be expanded by about 19,942 acres. As discussed under alternatives B and C, there would be negative and positive effects on the refuge's overall hunting program including from the viewpoint of hunters.

Outfitting and guiding under this alternative would be managed similarly to alternative B.

Overall, alternative D would result in minor to moderate benefits to hunting opportunities and experiences, depending on the type of experience that individual hunters prefer.

Conclusion

The actions in the alternatives would have negligible to minor benefits on hunting opportunities across the refuge for big game, upland birds, waterfowl, and migratory gamebirds. The reasons for these benefits vary by alternative, and are largely dependent on the preferences and values of individual hunters.

In the long term, there would be negligible to minor differences in the number of hunters using the refuge annually with a slight decrease of about 3,900 hunters in alternative B as compared to alternative A, a minor increase of about 14,600 hunters in alternative C and a slight increase of about 4,100 hunters in alternative D. Hunters would continue to enjoy a wide variety of access for hunting in all alternatives, although there would be some distinct differences in the amount of road access and proposed wilderness acreage, which would positively benefit or negatively affect hunters depending on their point of view.

Mitigation

No mitigation measures would be necessary under any alternative.

EFFECTS on FISHING

Because fishing is a popular activity that occurs on the refuge, fishing pressure, access to fishing areas, and opportunities are evaluated.

All Alternatives

Under all alternatives, the State of Montana (MFWP) would continue to have primary responsibility for all fisheries management within the refuge, which is consistent with Service policy on fishing (FWS 2008e). This includes regulating harvest, egg collecting efforts, and stocking activities. Similarly, USACE manages the permitting requirements for any commercial fishing activities (including recreational tournaments). The Service would have little control over harvest opportunities for individual anglers. Patterns of fishing pressure have historically followed reservoir levels, with periods of high water levels tending to result in increased fishing pressure and vice versa. This pattern would remain in place under all alternatives. As a result, the numbers of fishing visits attributed to the refuge would likely remain the same under all alternatives (about 60,000 annually; USACE attributes nearly 160,000 fishing visits to lake and recreation areas).

The Service would work with USACE to extend boat ramps to the water's edge as the lake recedes and identify roads that provide direct access to the lake including ATV access (refer to access below), which would provide long-term benefits for anglers desiring better access to the lake.

Alternatives A, B, and D

Alternatives A, B, and D would not result in noticeable changes to fishing pressure or opportunities on the waters within the refuge. Existing use patterns would likely continue due to the isolated nature of the reservoir.

Alternative C

Alternative C would likely result in expanded fishing opportunities, because the Service would be placing a higher priority on improving existing lake and river access sites and possibly creating more access sites. However, water level management would not change, so the high and low use patterns would persist, and the overall number of fishing visits would remain at current levels. New or expanded boat access would require considerable road improvements (refer to access in chapter 3). USACE would need to be a partner in any new boat ramp development. Improvements in access would provide moderate benefits for anglers in the long term.

Conclusion

Under alternatives A, B, and D, there would be few noticeable changes in fishing pressure or opportunities on the waters of the refuge, resulting in negligible effects. In alternative C, the Service would expand opportunities by improving boat access including better boat ramp development, but overall, there would not be significant changes in the number of fishermen regardless of the alternative due to

existing use patterns and isolated nature of the reservoir. Alternative C would have negligible benefits.

Mitigation

No mitigation measures would be necessary under any alternative.

EFFECTS on WILDLIFE OBSERVATION and PHOTOGRAPHY

This section addresses effects on users and the quality of the wildlife observation and photography program including opportunities and facilities. Like other forms of wildlife-dependent recreation, Service policy (FWS 2008e) encourages refuges to provide quality opportunities for observing and photographing wildlife.

All Alternatives

The refuge would provide the public with many opportunities to observe and photograph wildlife. Commercial photographers would be required to have a special use permit, which would enable the refuge to control the number of permits issued and minimize negative effects on wildlife or other users. For example, the Service would not authorize off-road travel or access into the elk-viewing area. Given the few permits that would be issued for commercial photographers, there would be negligible conflicts with other user groups or refuge resources. Because the Service would be able to use any images or footage produced by a commercial photographer in brochures and other information, the public would benefit from the quality imagery.

Alternative A

The current trend of increases in wildlife observation and photography visits would likely continue despite few changes in facilities or programs (refer to chapters 3 and 4) but, in the long term, with only negligible improvements in the overall program or facilities and the remoteness of the refuge, visitation would remain stagnant. Ongoing habitat improvements and land acquisition would improve the quality of opportunities for these uses in some areas providing some minor benefits. However, this alternative would not meet the demand for facilities related to observation and photography (trails, tour routes, overlooks, blinds) as gauged by inquiries, past visitation trends, and growing tourism visits to the refuge area.

During peak seasons, visitors would be concentrated in some popular areas like the Elk Viewing Area. Dust, crowds, and inadequate parking facilities (refer to interpretation in chapter 4) would negatively affect some users. There would not be a staff person dedicated to the visitor service's program to develop a comprehensive visitor program that could address conflicts and improve the overall program. Although



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Refuge staff help visitors identify wildlife species.

the refuge would remain a great place to view wildlife, over the long term, the Service would not meet its goal of providing a quality wildlife observation and photography program for a wider audience.

Alternative B

An increased emphasis on habitat improvements and land acquisition would improve the quality of wildlife observation and photography in some areas. The Service would hire one outdoor recreation planner and a visitor service plan would be developed within 5 years of plan implementation. Having a staff member assigned to the visitor service's program would result in improved programming and facility development that could address some conflicts in popular areas. The modest increases in viewing facilities and programs (5 percent over alternative A) would improve the quality of the overall program in the long term, and visitation would be anticipated to grow by about 5–10 percent above alternative A. Improvements in the overall program could be somewhat offset as most of the staff would be directed to more important fish and wildlife-related work. Overall, it would only partially enable the Service to provide a quality wildlife observation and photography program on the refuge.

The reintroduction of bighorn sheep on the south side of the river could provide more wildlife-viewing opportunities for some visitors. Because this CCP and EIS is addressing the potential for wolves colonizing in the Missouri River Breaks at some point and the interest by many in wild bison restoration, if wolves colonized the refuge or wild bison were reestablished in cooperation with MFWP (refer to the sections about wolf and wild bison restoration under wildlife in chapter 3) under alternatives B and D, more wildlife-viewing opportunities could be provided.

Alternative C

With an emphasis on maximizing public use opportunities, wildlife observation and photography visits would increase by 20–50 percent due to habitat improvements, accelerated land acquisition, and a 10-percent increase in related facilities such as trails, tour routes, overlooks, and blinds. Two added staff would focus on providing public use programs and facility development, which could enhance the quality and quantity of observation and photography opportunities by a moderate amount. Increased facilities and visitation would result in some minor disturbances to wildlife, although this would result in negligible effects on wildlife-viewing opportunities given the size of the refuge. The development of a visitor services plan and travel management plan would minimize intrusion into important wildlife locations and habitat through better planning and facility programming. Any increased use in popular areas like the elk-viewing area without any improvements to offset conflicts would negatively affect some users. This alternative would likely result in long-term positive public and political support, which could positively affect projects and funding for improving the quality of fish and wildlife habitat.

Similar to alternative B, reintroduction of bighorn sheep on the south side of the river would provide more wildlife-viewing opportunities. Because this CCP and EIS is addressing the potential of wolves colonizing in Missouri River Breaks at some point and the interest by many in wild bison restoration, it is likely, if wolves immigrated to the refuge or wild bison were reestablished in cooperation with MFWP and others visitation would increase (refer to the sections on wolf and wild bison restoration under wildlife in chapter 3).

Alternative D

With an emphasis on integrating the wildlife management and public use focus, under this alternative, wildlife observation and photography visits are estimated to increase by a minor to moderate amount of 15–25 percent more in the long term. Similar to alternative C, two added staff would be focused on providing a comprehensive program that incorporated better planning and facility development. Similar to alternative B, when combined with an emphasis on improving habitat conditions and land acquisition, quality opportunities to see and photograph wildlife would increase by a moderate amount. As with alternatives A and B, any increased use in popular areas without any improvements to offset existing conflicts would negatively affect some users.

Conclusion

Under existing conditions, visitation levels would remain flat in alternative A. Although the refuge

would provide many opportunities to view and photograph wildlife, without a dedicated staff person to oversee the public use program or any additional facilities to attract visitors seeking nonconsumptive activities, there would be little growth in visitation. Alternative B would add an outdoor recreation planner, and combined with habitat improvements and modest increases in facilities and programs, the number of visitors coming to the refuge would increase by negligible to minor amount (5–10 percent). Alternatives C and D would add two outdoor recreation planners although the programming would look considerably different. Alternative C would seek to increase a wide range of opportunities that would also provide economic benefit for the adjacent communities. Visitation would increase moderately by 20–50 percent over existing levels with improved facilities and programs. Alternative D would also seek to improve facilities and programs but there would be a higher emphasis placed on quality over quantity and habitat management. Visitation would increase by a minor to moderate of 15–25 percent amount. Any increased use in popular areas without addressing issues such as parking, dust, and crowding would negatively affect some users.

Mitigation

No mitigation measures would be necessary under any alternative.

EFFECTS on ENVIRONMENTAL EDUCATION

National wildlife refuges that are open to the public should strive to provide some level of environmental education. Environmental education programs should be based on guidelines specified in the Service's Environmental Education Policy (FWS 2006d). The guidelines stress that environmental education programs should connect people's lives to the natural world around them, advance environmental and scientific literacy through an interdisciplinary approach to learning, strengthen the Refuge System by fostering public knowledge about environmental conservation, allow for participants to experience wildlife, wildlife habitat, and cultural resources, and instill a sense of stewardship for conservation. This section primarily addresses opportunities for environmental education programs between the alternatives.

Alternative A

The Service would provide environmental education programs on an opportunistic basis but in large part the Service would miss opportunities to educate the public about the values of the refuge and the Refuge System. The Service would not meet the guidance for environmental education in Service policy (FWS 2006d) because there would be little or no contact

with refuge staff to answer questions and foster public knowledge or interest in the Service's messages.

Alternative B

The addition of an outdoor recreation planner would enable the refuge to develop a visitor services plan that incorporated a modest increase (5 percent) in environmental education programming, compared to existing conditions. Specific curriculum-based programming would allow staff to train teachers to deliver programs independently and more teacher workshops would further expand educational capabilities. In the short term, there would be few changes in environmental education opportunities. However, once the staff position was hired and the stepdown plan implemented, there would be minor benefits for visitors over the long term, with the ultimate objective of garnishing greater support for future refuge and Refuge System programs.

Alternative C

Two outdoor recreation planners, as well as increased use of volunteers and partnerships, would enable the refuge to increase environmental education programs by about 10–15 percent as compared to alternative A. In the long term, creating refuge-specific curricula could moderately enhance awareness of the refuge's wildlife and habitat resources. Providing teacher workshops would allow staff to train teachers to deliver programs independently, further expanding educational capabilities. The addition of a education and interpretive center at Sand Creek Field Station would enable the Service to advance its goals for environmental education for both children and adults. This alternative could have long-term benefits in terms of public and political support that could positively affect projects and funding.

Alternative D

Similar to alternative C, there would be an addition of two outdoor recreation planners to the staff. There would be a minor increase of 10 percent in environmental education programming as compared to alternative A. The emphasis would be on providing quality programming over quantity that met the guidelines specified in Service policy. Specific curriculum-based programming would allow staff to train teachers to deliver programs independently and more teacher workshops would further expand educational capabilities. Students would gain an improved understanding of refuge's natural history, wildlife and ecology as well as the mission and importance of the Refuge System. Similar to alternative C, the addition of a science and interpretive center at Sand Creek Field Station would enable the Service to advance the Service's goals for environmental education for both children and adults, although the messages and programming would differ to some

degree. In the long term, it would provide a moderate benefit in terms of generating greater support for future refuge and Refuge System programs.

Conclusion

Under existing conditions, very limited environmental education would be offered at the refuge. Under alternative B, the Service would hire one staff person and begin to offer some additional programming and teacher-led workshops, resulting in negligible benefits. Two staff positions would be filled in alternatives C and D, which would enable the Service to provide more programming. In addition, an interpretive center at Sand Creek Field Station or combination interpretive and science center would enable the Service to advance its goals for environmental education, resulting in minor benefits.

Mitigation

No mitigation measures would be necessary under any alternative.

EFFECTS on INTERPRETATION

The guiding principles for the Refuge System's interpretive programs involve developing opportunities, facilities and programs where visitors can develop an understanding and appreciation for America's natural and cultural resources through safe, informative, enjoyable, and accessible activities that ultimately lead to a sense of stewardship about the refuge's resources (FWS 2006g).

All Alternatives

Under all alternatives, visitors would continue to enjoy the refuge's interpretive facilities from the auto tour route, elk-viewing area, an accessible hunting blind, the Fort Peck Interpretive Center, and other contact stations (refer to interpretation in chapter 4), Interpretive signs, exhibits, materials, brochures, and informational kiosks would continue to provide visitors an opportunity to enjoy and learn about the refuge.



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Alternatives A and B

As compared to alternative A, under alternative B, there would be modest improvements in the number and quality of interpretive facilities and programs. In addition to hiring an outdoor recreation planner, there would be a 5-percent increase in the number of facilities and programs, but overall this would result in negligible benefits furthering the Refuge Systems principles for interpretation.

Alternatives C and D

Alternative C would have the greatest improvements in interpretive facilities (5–15 percent) and alternative D would be intermediate at about 10 percent. A small visitor center located at Sand Creek Field Station under alternative C and a combination science and interpretive center under alternative D would enable the refuge to provide more quality information where the most popular activities occur like elk viewing during the fall. Under alternatives C and D, the hiring of two outdoor recreation planners would enable the refuge to improve programming, facilities, signage, and exhibits as compared to alternative A by a moderate amount.

Conclusion

Similar to wildlife observation, photography and environmental education, under existing conditions, there would be limited interpretive facilities and programs available under alternative A. By hiring one staff person in alternative B and two persons in alternatives C and D, the Service could increase programs and develop more facilities (10 percent more in alternative D and 15 percent more in alternative C). A small interpretive center in alternatives C and D would enable the refuge to provide quality interpretive programs across the refuge.

Mitigation

No mitigation measures would be necessary under any alternative.

EFFECTS on OUTREACH

Effective outreach depends on open and continuing communication and collaboration between the refuge and its many publics. It involves determining and understanding the issues, identifying audiences, listening to interested groups and the public, creating messages, selecting the most effective delivery techniques, and evaluating effectiveness (FWS 2006d).

Under alternative A, the Service would occasionally take part in State and local events, make presentations, recruit some volunteers to support staff efforts, seek grants in partnership with others, and use the internet to keep the public informed about the refuge's programs and activities.

Under alternative B, the Service would increase its outreach efforts resulting in a negligible, 5-percent targeted increase in requests for information about the refuge. Additionally, there would be a modest increase in efforts to give presentations or host open houses annually. Alternative C would result in the greatest improvement in outreach efforts resulting in a 15-percent, or minor, targeted increase in requests for information by the public. Alternative D would be intermediate with a 10-percent, or minor, targeted increase.

As compared to alternative A, alternatives B, C, and D, the Service would develop a Friends group although the timing would vary in the implementation of the group.

Mitigation

No mitigation measures would be necessary under any alternative.

EFFECTS on ACCESS

This section addresses how access to the refuge is affected under each alternative. Refer to the rationales for access in chapter 3 for an explanation of how and why access would change.

All Alternatives

Visitors to the refuge would continue to have many opportunities for accessing the refuge ranging from the wide network of roads, river access, and designated landing areas on Fort Peck Reservoir for seaplanes. All pilots would be required to adhere to USACE's seaplane landing plan (USACE 1995), which designates landing areas. Licensed motor vehicles would be allowed on refuge roads (refer to access under section 4.5 in chapter 4), along with other types of users like boaters, bicyclists, snowmobilers, cross-country skiers, and others. There would continue to be an extensive network of roads although there would be some minor differences between the alternatives (refer to table 28 above; also see figures 7–10 alternative maps in chapter 3).

The Wilderness Society (2009) modeled the accessibility of the refuge by foot from a road for each alternative, assigning values for the time it takes to travel across different vegetation classes while accounting for the steepness of the slope. As shown in figures 48 and 49, within an hour of walking from a road, regardless of the alternative selected, between 90 and 100 percent of the refuge would be accessible for average hikers. Even with reductions in the

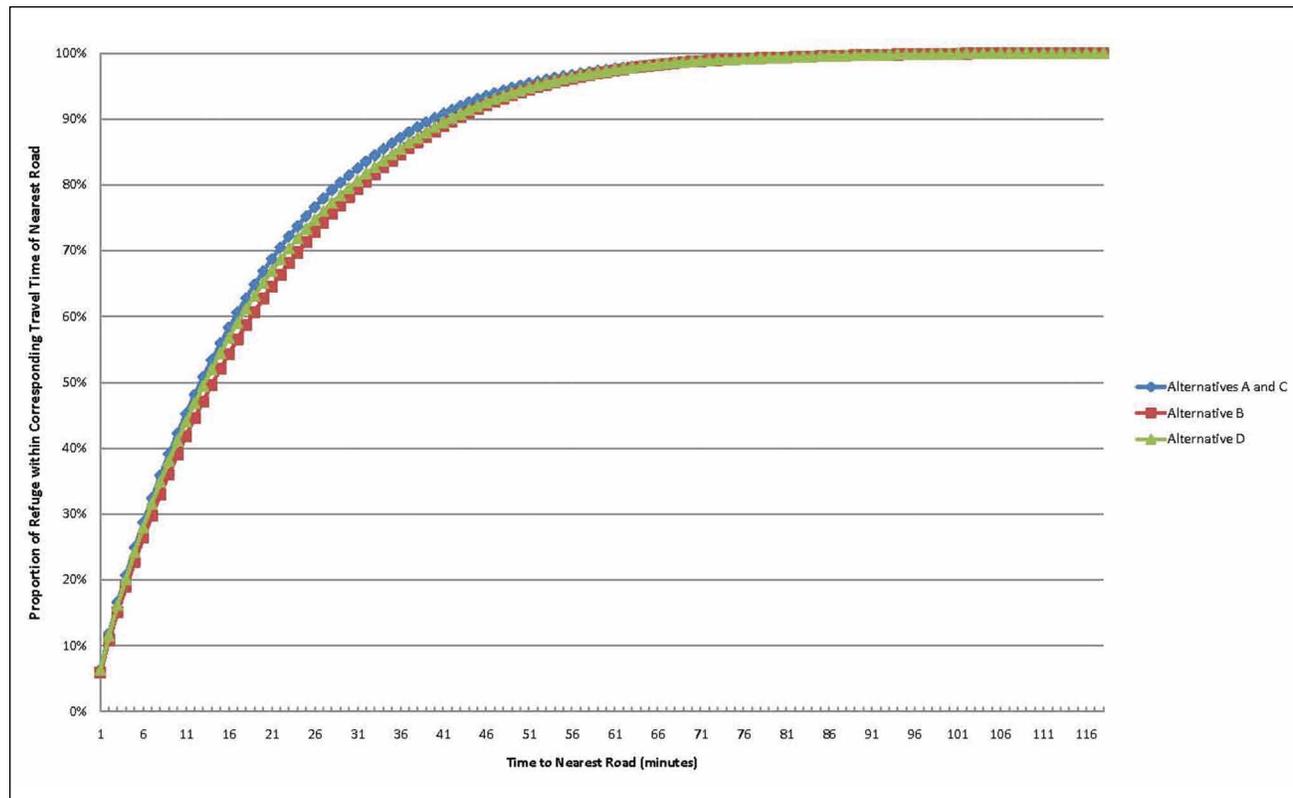


Figure 48. Graph of the proportion of the Charles M. Russell and UL Bend Refuges within the corresponding travel time of the nearest road, by CCP alternative. *Source: The Wilderness Society (2009).*

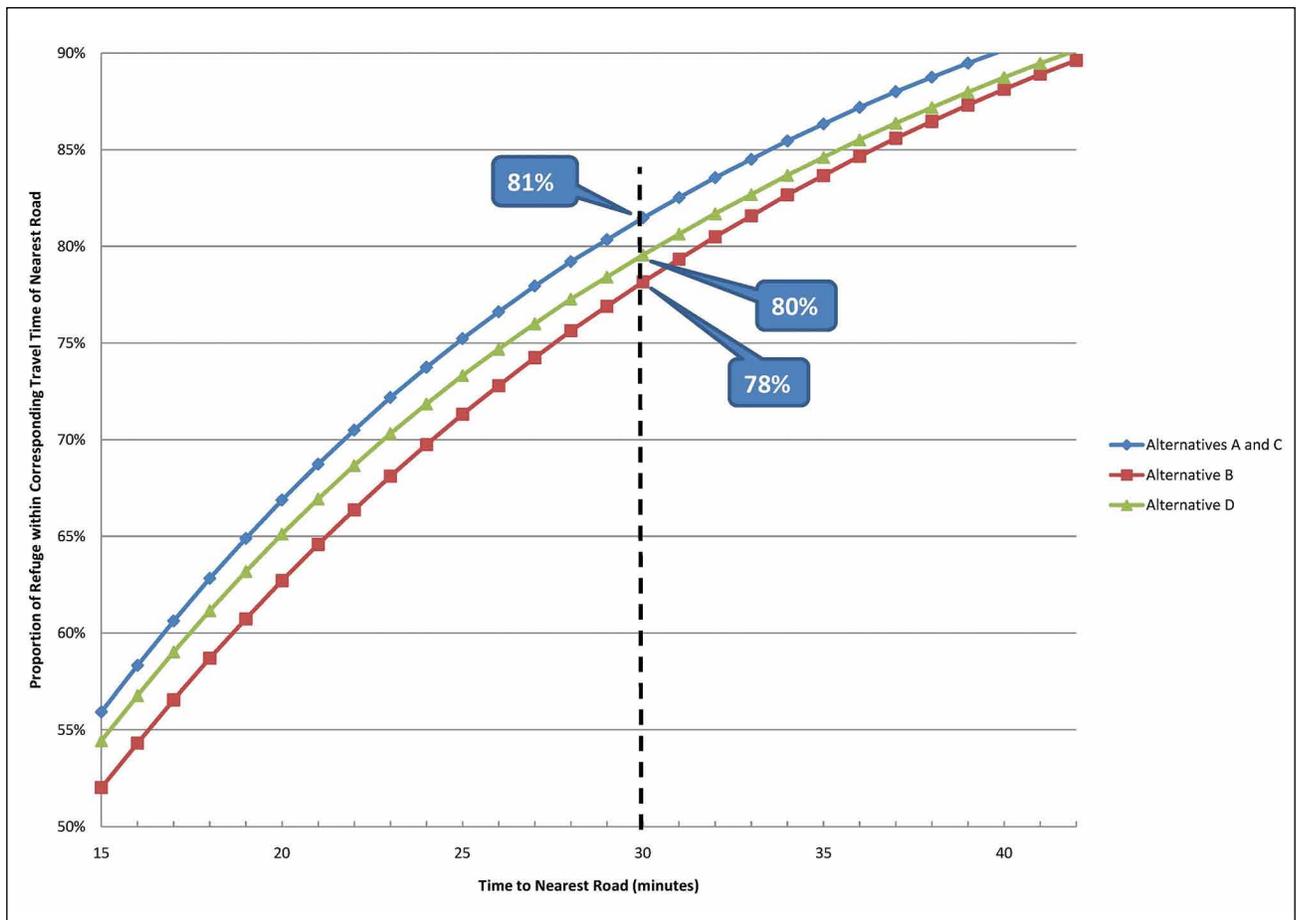


Figure 49. Graph of the proportion of the Charles M. Russell and UL Bend Refuges to the nearest road at 30 minutes.
Source: The Wilderness Society (2009).

miles of road under alternative B (106 miles) and D (21 miles plus 15 miles of seasonal closures), it would result in negligible to minor differences in the amount time it would take to access most of the refuge within 30 minutes of a road. Figures 48 and 49 show various travel times across the refuge.

The Service has little information on the number of boat users across the refuge, but none of the alternatives would negatively affect boat users. Bicyclists could continue to access the refuge from any numbered open road or seasonally closed road.

All alternatives would continue to allow for access to State lands within the refuge and to existing private lands. Some roads could be designated as administrative access only. If refuge roads were closed at boundary locations, the Service would make every effort to make sure the closure occurred within the boundary and any parking areas that needed to be developed occurred within the boundary and not on State or private land.

Alternative A

Under alternative A the current road system on the refuge would remain in place (about 670 miles of road). Current refuge data shows about 62 percent

of the refuge is within 1 mile of an open road, and 82 percent is within 1 mile of motorized access. Minor modifications to the current road system would take place over the life of the plan. Where a private landowner has closed access to the refuge, the Service would work with the counties and others to provide access to the refuge. This would be an ongoing challenge because private lands within and immediately adjacent to the refuge restrict access to public land. In addition, safety concerns and maintenance could require that some roads be rerouted or closed to provide for public safety. Under this alternative, the negative effects on vehicular access would be negligible. Figure 50 displays areas of the refuge accessible by foot within certain amounts of time; almost all of the refuge is accessible by foot within 90 minutes, and most of the refuge is accessible by foot within 30 minutes. This assumes that access occurs from within the refuge and not from outside the refuge where an extensive road network provides access to many boundary areas.

Alternative B

Under alternative B approximately 106 miles of road would be closed to improve habitat for wildlife and

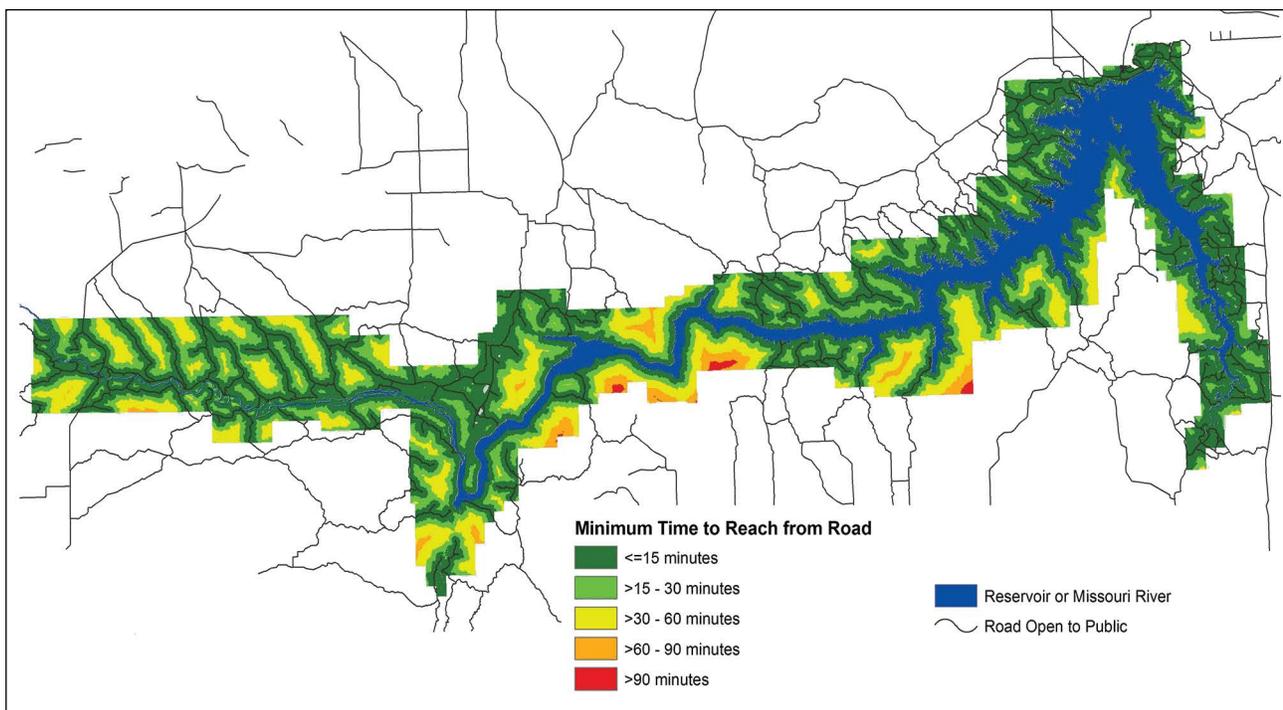


Figure 50. Map of accessibility by foot to the Charles M. Russell and UL Bend Refuges under CCP alternative A.

Source: *The Wilderness Society (2009)*.

or better define true public access. In some situations, roads would be closed that are inaccessible to the public because of private landownership within or outside the refuge. Although a primary reason for road closures would be for wildlife benefit, roads also would be closed to stop exclusive use in areas where access to the refuge has been closed by private landowners. This alternative would close roads that are not available to the entire public and would stop exclusive use of some roads on the refuge. Road closures in this alternative would have a moderate positive benefit for wildlife populations (more security), especially big game. It would result in minor negative effects on road access with 8 percent fewer roads as compared with alternative A.

Alternative C

The refuge road system under alternative C would be very similar to the current road system that exists under alternative A. Several roads (Routes 209 and 108) would be improved (all-weather access), which would provide minor benefits for accessibility in those areas.

Alternative D

About 21 miles of road would be permanently closed. Additionally, 2.4 miles along road 315 (southwest side) would be seasonally closed. About 13 miles along roads 440, 331, 332, and 333 (northeast side) would be seasonally closed during hunting season and designated as game retrieval roads. Access would only be allowed during midday for the purposes of retrieving

game. Route 209 would be improved to all-weather access. In addition, those roads that currently do not provide vehicle access to the public would be closed to stop exclusive use. Effects on access would be negligible (about 5 percent).

Conclusion

Visitors to the refuge would continue to access the refuge through a variety of means and opportunities. Alternatives A and C would have the most miles of road open for travel at 670 miles. Alternative B would result in 106 miles of closed road and alternative D would close about 21 miles of road and 15 miles of additional seasonal closures. Under all alternatives, nearly 80 percent of the refuge would be accessible within 30 minutes of walking time and 90 percent or more would be accessible within an hour of walking. Alternative C would have the most all-weather access with 76 miles of road, and alternative D would have about 65 miles as compared to alternatives A and B with about 60 miles. The overall effect on refuge access would be minor negative effects from alternative B, minor benefits from alternative C negligible effects from alternative D.

Mitigation

No mitigation would be required.

EFFECTS on RECREATION SITES

None of the Service's actions would affect USACE's management of its developed recreation areas. The

Service would continue to manage the primitive recreation sites (refer to chapter 4) under all alternatives.

EFFECTS on COMMERCIAL RECREATION

This section evaluates the effects of wildlife-outfitting and guiding and commercial fishing.

Alternative A

Wildlife outfitting and guiding activities would continue at the current permitted level of 11 outfitters operating on the refuge. Outfitters would still be required to submit annual report with the number of clients, number of days hunted and game species sought and harvested. As outfitters retire, the refuge would continue the practice of holding those permits and not issuing new permits until a new visitor services plan is completed. There would continue to be some conflict with the public in some areas as guides and clients compete for the same space and resource. Commercial fishing and fishing tournaments are managed by MFWP and USACE on Fort Peck Lake. Because USACE has primary jurisdiction on recreational activities on Fort Peck Lake, the Service would continue to support MFWP and USACE in managing those activities.

Alternatives B and D

Under alternatives B and D outfitting and guiding for hunting would be evaluated to ensure there are no conflicts with other hunters on the refuge. Outfitters would still be required to submit annual report. The number of outfitting permits for hunting would be adjusted during the life of the CCP to meet wildlife and habitat objectives. The Service would evaluate permitting outfitting and guide services for wildlife viewing, resulting in minor economic gain for outfitters and guides and a small increase in the number of visitors to the refuge. The extent of these effects is unknown due to incomplete data on the interest by the public for guided wildlife-viewing activities. Conflicts between guides, clients, and the public would be minimized. For commercial fishing and commercial-fishing tournaments, the refuge would work with MFWP and USACE to ensure these activities are consistent with Service policy.

Alternative C

Same as alternatives B and D except more permits would be issued as long as they are that consistent with refuge policy and procedures for issuing permits, along with anticipated time and space restraints, would reduce conflicts with the public and between guides. More outfitting and guide permits would be issued for pack and retrieval services to facilitate the harvest of cow elk in proposed wilderness units and to promote wildlife viewing, resulting in minor economic gain for outfitters and guides and a small increase in refuge visitors.

Conclusion

Under existing conditions, outfitting permits would remain at about 11 outfitters operating on the refuge. Alternatives B and D would evaluate the program to ensure there were no substantial conflicts with other hunters. The number of hunters could be adjusted to meet wildlife and habitat objectives if necessary. Under alternative C, more permits could be issued provided they were consistent with refuge policies and procedures and there were no substantial conflicts with other hunters. There could be more permits issued for pack and retrieval services to facilitate harvest in wilderness or to promote wildlife viewing.

Mitigation

No mitigation measures would be necessary under any alternative.

CUMULATIVE IMPACTS on VISITOR SERVICES

The Fort Peck Dam/Fort Peck Lake Master Plan describes proposed upgrades and expansions of recreational facilities at existing sites. Proposed upgrades include expanded camping facilities, improved sewage treatment, improved boat ramps, improved day use facilities, and increased interpretive facilities. Implementation of the proposed master plan would directly benefit recreational uses on Fort Peck Lake and at existing facilities. Because many of these areas are used by refuge visitors, implementation of the master plan would also result in minor to moderate cumulative benefits to recreational access and experiences and commercial uses on the refuge (under any refuge management alternative).

The direct and indirect effects of the Enhancement Act of 2000 (conveyance of cabin sites) are outside the scope of this analysis. Implementation of the Enhancement Act of 2000 would not result in any cumulative effects on refuge recreation areas.

As part of the Upper Missouri River Breaks National Monument Resource Management Plan, BLM will limit special use permits commercial recreational use on the Missouri River and related lands (BLM 2008c). This may adversely affect some users in the short term, but would likely result in long-term benefits due to a predictable and equitable permit system that maintains the quality of the resource. Under any refuge management alternative, this may result in minor to moderate short-term cumulative impacts and long-term cumulative benefits on commercial river access on the refuge.

Implementation of the Upper Missouri River Breaks National Monument Resource Management Plan includes management actions to improve rec-

reational access and experiences along the Missouri River (BLM 2008c). Under any refuge management alternative, these actions may result in minor cumulative benefits to recreational river access opportunities on the refuge.

5.7 ENVIRONMENTAL CONSEQUENCES for SPECIAL AREAS

This section addresses the effects on land areas with special land designations including wilderness. Refer to specific topics under visual resources and soundscapes for more information.

EFFECTS on SPECIAL MANAGEMENT AREAS

None of the alternatives would change the special management areas including the Upper Missouri Breaks Wild and Scenic River, research natural areas, national natural landmarks, and the Lewis and Clark Historic Trail (refer to section 4.4 in chapter 4).

EFFECTS on WILDERNESS

This section evaluates the effects of changes in wilderness protection across the four alternatives. The acreage of proposed wilderness protection on the refuge and the opportunities to experience wilderness as defined in the Service's wilderness stewardship policy (FWS 2008c) are evaluated. For complete information about the Service's review on wilderness

and for a breakout of each wilderness unit, refer to appendix E and the alternative maps (figures 7–10) in chapter 3. The specific effects from habitat management or other activities in wilderness are addressed under the specific resource topic being affected such as visual resources, vegetation, wildlife, access, and others and is not addressed here.

Several studies have been completed showing the potential irreversible effects of recreation on valuable wilderness. A publication put out by the Wilderness Society and USDA Forest Service, "Keeping It Wild: A Citizen Guide to Wilderness Management" (1992), is a summary from the Wilderness Act and subsequent legislation. It notes that wilderness should provide for human use while preserving the wilderness character, providing outstanding opportunities for solitude or a primitive and unconfined recreational experience. In addition, recreation should favor wilderness-dependent activities when managing wilderness use. Other non-wilderness-dependent recreation activities taking place in wilderness can be enjoyed elsewhere.

In this analysis, the refuge is examining whether new wilderness study areas should be recommended and the units where other wildlife-dependent recreational activities can be accommodated. In some of the existing proposed areas, the Service has a legal responsibility to allow access to State and private inholdings. While the habitat within those areas is still valuable for wildlife, nonetheless, under existing conditions, it has been fragmented.

Table 29 summarizes the amount of wilderness that would be protected under each alternative. The narratives that follow describe the effects of the various levels of protection.

Table 29. Wilderness protection under the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

	<i>Alternative A</i>	<i>Alternative B</i>	<i>Alternative C</i>	<i>Alternative D</i>
Acres in UL Bend Wilderness ¹	20,819	20,819	20,819	20,819
Acres of current proposed wilderness ²	155,288	155,288	155,288	155,288
Increase in acres	0	+25,869	0	+19,942
Acres of total wilderness protection (designated and proposed)	176,107	201,976	176,107	196,049
% Change in wilderness protection	0	+17	0	+13
% of Refuge with wilderness protection ³	16	18	16	18

¹ Based on the legal acreage.

² The actual proposed wilderness acreage sent forth to Congress was 155,288 acres, but with advances in technology, current GIS acreages may differ slightly.

³ Based on the 1.1 million-acre refuge boundary.



USFWS

UL Bend Wilderness protects habitat for the greater sage-grouse, a species of concern on the refuge.

All Alternatives

There would be no effects to the 20,819 acres in the UL Bend Wilderness, which would continue to protect important habitat and wildlife values including the black-footed ferret (endangered) and other species of concern such as the greater sage-grouse. It would offer outstanding opportunities for solitude and primitive and unconfined recreation. No motorized vehicles would be allowed.

Game carts would not be allowed in UL Bend Wilderness, but they would be allowed in all proposed wilderness units. In proposed wilderness units where livestock grazing still occurred, some wilderness users could be negatively affected by the visual impact of livestock grazing (refer to visual resources in section 5.4 above and see figure 16 in chapter 4).

The transition to prescriptive grazing would continue, but there would be differences between alternatives on how quickly this would occur.

Alternative A

Under alternative A, the acreage of proposed wilderness would remain at 155,288 acres as proposed in 1974 (Note: Current GIS calculations estimate the acreage as 158,619 acres, which is within the accepted 2-percent differential margin). Within the refuge boundary, about 16 percent of the refuge would be protected as wilderness. Overall, maintaining the current size and location for proposed wilderness units would have negligible effects on wildlife-

dependent recreation opportunities or other wilderness values. Recreationists looking for solitude and primitive recreation would be able to find multiple opportunities across the refuge as well as for those who want better access with their recreational experience (refer to access in section 5.7 above). A higher level of land protection would continue for all 15 proposed wilderness units protecting the characteristics that make them primitive and allowing natural processes to work freely, sustaining the ecological processes that create the interconnected web of life in wilderness. (The Wilderness Society 1992).

The transition away from annual grazing and toward prescriptive grazing would occur as grazing units became available, primarily through ranch sales. Degradation of the scenic and ecological wilderness values—due to the presence of livestock and subsequent trampling, soil compaction, lower water quality, decreased environmental health, or other negative effects—would continue in some units, particularly in areas with higher livestock stocking rates or where there was heavy grazing by wild ungulates.

Alternative B

Under alternative B, there would be a net gain of 25,869 acres of protected wilderness land. This would result in a 17-percent increase in wilderness lands across the refuge (refer to table 29). Eighteen percent of the refuge would be protected as wilderness as compared to 16 percent in alternative A. By add-

ing acreage to several of the current proposed wilderness units, the refuge would increase protection of natural ecosystems and allow natural processes to work freely. Road closures surrounding wilderness would total about 13 miles. Most of the closures are short spur roads. The reduction in disturbance to wildlife within those areas would have a minor benefit, allowing wildlife to forage and migrate between forage sites with less possibility of disturbances and hindrance due to roads. In a few localized areas, the closures could make it more difficult to manage big game through hunting, but given the overall accessibility of the refuge, the negative effect would be negligible (figures 48, 49, and 50). Although some species tolerate road systems, there are other species, particularly large carnivores, that are usually absent in landscapes with high road densities (Noss 1991).

The transition to prescriptive grazing would occur over most of the refuge within 4–7 years, which would benefit the scenic and ecological wilderness values in the long term. The rate at which this occurred would depend on how quickly prescriptive grazing was carried out in the proposed wilderness units. Overall, the proposed wilderness changes in alternative B would have minor benefits on wilderness and values on the refuge.

Alternative C

Wilderness protection under alternative C would be the same as under alternative A. Near wilderness, some formerly seasonally closed could be opened, allowing for more access to the refuge. However, no new roads would be proposed. While the additional access would have a minor negative effect on wildlife and habitat, it would allow for increased use of the refuge and provide for more recreation such as hunting and game retrieval.

Graveling the Knox Ridge Road could detract from the wild and scenic river values of the Missouri River because more traffic would be visible from some areas along the river. There would be more dust and noise associated with increased vehicle use as compared with current conditions (not graveled and not passable when wet). The degree of increased negative effect would vary with the expectation of the river user, the condition of the road (graveling the road would not equate to all-season), and the amount of increased traffic. Not all parts of the road are visible from the river. With projected increases in refuge visitation of 20–50 percent, there could be minor negative effects associated with graveling the road.

Overall, the proposed wilderness changes in alternative C would have minor negative effects on wilderness values on the refuge. As with alternative A, there would continue to be degradation of the scenic

and ecological wilderness values in those proposed wilderness units where annual grazing still occurred.

Alternative D

Under alternative D, there would be an increase of 19,942 acres or a 13 percent increase of wilderness protection. Eighteen percent of the refuge would be protected as wilderness. This would result in minor benefits for wilderness protection. There would be very few miles of road closures associated with the additional proposed wilderness acres. These road closures would allow wildlife to migrate between forage sites with fewer disturbances.

Similar to alternative C, graveling the Knox Ridge Road could detract from the wild and scenic river values of the Missouri river because more vehicles would be visible from the river in some locations. There would also be more dust and noise associated with the increased vehicle use as compared to existing conditions. With projected increases in refuge visitation of 15–25 percent, there could be minor negative effects associated with graveling the road.

The transition to prescriptive grazing would occur over most of the refuge within 6–9 years, which would benefit the scenic and ecological wilderness values in the long term. Similar to alternative B, the rate at which this occurred would depend on how quickly prescriptive grazing was carried out in the proposed wilderness units. Overall, the proposed wilderness changes in alternative B would have minor benefits on wilderness and values on the refuge.

Conclusion

Under all alternatives, 20,819 acres of designated wilderness in UL Bend Wilderness would remain protected as identified in the Wilderness Act of 1964. No motorized vehicles would be allowed. Increases in proposed wilderness would provide more protection of those natural ecosystems and allow natural processes to work freely.

Under alternatives A and C, the proposed wilderness acreage would remain at 155,288 acres as proposed in 1974. Within the refuge boundary, about 16 percent of the refuge would be protected as wilderness. In alternative B, there would be a net gain of 25,869 acres of proposed wilderness, resulting in a 17-percent change refugewide. Alternative D would have a net gain of 19,942 acres (13 percent). The effects on total designated and proposed wilderness acres, and the values that they provide, would be minor benefits in alternative B and D.

Graveling the Knox Ridge Road under alternatives C and D could detract from the wild and scenic river values of the Missouri River. With minor to moderate increases in refuge visitation, there could be minor negative effects associated with graveling the road.

Mitigation

No mitigation measures would be necessary under any alternative.

CUMULATIVE IMPACTS on SPECIAL AREAS

BLM has three wilderness study areas that are contiguous with existing designated wilderness on the refuge. The existing configuration and management of these areas to preserve wilderness values provides moderate cumulative benefits to the management and integrity of wilderness on the refuge by expanding the total size of wilderness areas. These moderate cumulative benefits would be the same under all alternatives.

Alternative B would result in 13 miles of road closures within or adjacent to wilderness. Overall, the cumulative impact on access would be negligible (most of the road closures are in units that are prescriptively grazed). Alternative D has one small road closure associated with proposed wilderness additions (road 311); the cumulative impact on access would be negligible.

None of the alternatives would result in cumulative impacts on other special land designations.

5.8 ENVIRONMENTAL CONSEQUENCES for CULTURAL and HISTORICAL RESOURCES

Many of the refuge's prehistoric and historic resources have not been surveyed. Formal investigations have been sporadic and there is still a lot the Service does not know about these resources (refer to section 4.6 in "Chapter 4—Affected Environment").

EFFECTS COMMON to ALL ALTERNATIVES

Activities outlined in each alternative have the potential to negatively affect cultural resources, either by direct disturbance during construction of habitat projects and facilities related to public use or administration and operations, or indirectly by exposing cultural and historic artifacts during management actions such as habitat restoration or prescribed burning. The presence of cultural resources including historic properties would not prevent a Federal undertaking or project, but any undertaking would be subject to Section 106 of the National Historic Preservation Act, or other laws protecting cultural resources (refer to "Appendix D—Key Legislation and Policy"). Many negative effects to cultural resources would be identified, and options for minimizing negative effects would be discussed before any

implementation of the project. Refuge staff would provide the zone archaeologist (region 6) a description and location of all projects, activities, routine maintenance, and operations that could negatively affect ground and structures, details on requests for allowable uses, and the options being considered. The zone archaeologist would analyze these undertakings for their potential to affect historic properties and enter into consultation with the State Historic Preservation Officer and other parties as appropriate. As necessary, the refuge would notify the public and local government officials. The Service would protect all known gravesites. Any collection of plant or other materials for tribal ceremonial purposes would be conducted under a special use permit.

EFFECTS of ALTERNATIVES B, C, and D

As compared to alternative A, under alternatives B, C, and D, the Service would increase protection and preservation of cultural resources found on the refuge primarily through better planning and more survey work. Development of a stepdown plan early in the implementation of the CCP would benefit cultural resources, particularly if it were integrated early with habitat management plans. More survey work would enable the refuge to identify areas with a high or moderate likelihood of historic properties, and actions could be taken to limit negative effects on cultural resources.

Visitors who are interested in the refuge's historical past would benefit from an increased emphasis on interpretation of the refuge's cultural resources and the efforts to preserve its rich past.

CONCLUSION

The Service would continue to follow all cultural resources laws for any project work on the refuge. Under alternatives B, C, and D, the Service would increase protection efforts largely through better planning, survey work, and law enforcements. Tribes would be allowed to collect and use plants and other resources for ceremonial purposes under a special use permits. These efforts would result in negligible to minor benefits to cultural resources.

MITIGATION

For cultural resources, any mitigation measures would be addressed with the State Historic Preservation Officer.

CUMULATIVE IMPACTS on CULTURAL and HISTORICAL RESOURCES

None of the alternatives would result in cumulative impacts on cultural and historical resources.

5.9 ENVIRONMENTAL CONSEQUENCES for PALEONTOLOGICAL RESOURCES

The primary effects would be on Hell Creek and Bug Creek.



USFWS

EFFECTS COMMON to ALL ALTERNATIVES

Paleontological resources would be protected on the refuge in accordance with the Paleontological Resources Protection Act of 2009. However, the digging of fossils, even when done under a special use permit would result in direct, negative, and long-term effects from the excavation of these resources from their original context. In keeping with the provisions of the Protection Act, the excavation of these important fossils by credible research facilities would contribute to the knowledge and interpretation of the fossil history of the area. The refuge would continue to issue permits to the Museum of the Rockies or others to collect paleontological resources. Recreational digging would be prohibited. The national natural landmarks at Hell Creek and Bug Creek would be conserved.

EFFECTS of ALTERNATIVES B, C, and D

As required by the Protection Act, the Service would work with Montana State University to develop a stepdown plan to protect paleontological resources and facilitate uniform permitting for research for credible research. Increased law enforcement, educational, and interpretive exhibits would ensure protection of these resources while providing opportunities for the public to enjoy and learn about these resources. These measures would result in minor benefits to paleontological resources.

CONCLUSION

Under all of the action alternatives, the continued adherence to the Paleontological Resources Protection Act of 2009, along with the completion of a stepdown plan and increased management, interpretation, and law enforcement would result in minor benefits to paleontological resources on the refuge over the long term.

MITIGATION

No mitigation measures would be necessary under any alternative.

CUMULATIVE IMPACTS on PALEONTOLOGICAL RESOURCES

None of the alternatives would result in cumulative impacts on paleontological resources.

5.10 ENVIRONMENTAL CONSEQUENCES for the SOCIOECONOMIC ENVIRONMENT

The Service contracted with USGS through the Policy and Science Assistance Branch of the Biological Resources Division, Fort Collins Science Center for the economic impact analysis for this CCP and EIS. It is important to note that the economic value of a refuge encompasses more than just the effects of the regional economy. Refuges also provide substantial nonmarket values (values for items not exchanged in established markets) such as maintaining endangered species, preserving wetlands, educating future generations, and adding stability to the ecosystem (Carver and Caudill 2007). However, quantifying these types of nonmarket values is beyond the scope of this study.

The methods used to conduct a regional economic impact analysis are described below. An analysis of the management objectives and strategies found in chapter 3 that could affect stakeholders and residents 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 program

METHOD for the REGIONAL ECONOMIC IMPACT ANALYSIS

Economic input–output models are commonly used to determine how economic sectors will and will not be affected by demographic, economic, and policy changes. The economic impacts of the management alternatives for the refuge were estimated using IMPLAN (Impact Analysis for Planning), a regional input–output modeling system developed by USDA Forest Service. IMPLAN is a computerized database and modeling system that provides a regional input–output analysis of economic activity in terms of 10 industrial groups involving more than 400 economic sectors (Olson and Lindall 2000). The IMPLAN model draws on data collected by the Minnesota IMPLAN Group from multiple Federal and State sources including the Bureau of Economic Analysis, Bureau of Labor Statistics, and the U.S.

Census Bureau (Olson and Lindall 2000). This study used the 2007 IMPLAN (version 2) county-level data profiles for McCone, Garfield, Fergus, Phillips, Petroleum, and Valley Counties. IMPLAN county-level employment data estimates were found to be comparable to the U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System data for the year 2007.

Because of the way industries interact in an economy, a change in the activity of one industry affects activity levels in several other industries. For example, if more visitors come to an area, local businesses will purchase extra labor and supplies to meet the increase in demand for additional services. The income and employment resulting from visitor purchases from local businesses represent the direct effects of visitor spending within the economy. Direct effects measure the net amount of spending that stays in the local economy after the first round of spending; the amount that does not stay in the local economy is termed a leakage (Carver and Caudill 2007). To increase supplies to local businesses, input suppliers must also increase their purchases of inputs from other industries. The income and employment resulting from these secondary purchases by input suppliers are the indirect effects of visitor spending within the economy. Employees of the directly affected businesses and input suppliers use their incomes to purchase goods and services. The resulting increased economic activity from new employee income is the induced effect of visitor spending. The indirect and induced effects are known as the secondary effects of visitor spending. “Multipliers” (or “response coefficients”) capture the size of the secondary effects, usually as a ratio of total effects to direct effects (Stynes 1998). The sums of the direct and secondary effects describe the total economic impact of visitor spending in the local economy.

For each alternative, regional economic effects from the IMPLAN model are reported for the following categories:

- Local output represents the change in local sales or revenue.
- Employment represents the change in number of jobs generated in the region from a change in regional output. IMPLAN estimates for employment include both full- and part-time workers, which are measured in total jobs.
- Labor income is from employee wages and salaries, including income of sole proprietors and payroll benefits.

The CCP provides long-range guidance and management direction to achieve refuge purposes over a 15-year timeframe. The economic impacts reported in this report are on an annual basis in 2007 dollars. Large management changes often take several years

to achieve. The estimates reported for alternatives B, C, and D represent the final economic effects after all changes in management have been carried out.

ECONOMIC IMPACTS of ALTERNATIVE A

The economic impacts from revenue-sharing payments, refuge administration, public use activities, and other refuge management activities associated with livestock grazing are analyzed.

Revenue Sharing

Forty percent of the acreage within the refuge boundary is under the primary jurisdiction of the Service. Most of the acreage (51 percent) falls under the primary jurisdiction of USACE, with the Service having secondary jurisdiction in those areas. The Montana DNRC and private landowners own the remaining acreages. Under provisions of the Refuge Revenue Sharing Act, local counties receive an annual payment for lands that have been purchased by full fee-simple acquisition by the Service. Table 30 shows the Service fee acquisition acreage in each surrounding county.

Table 30. Full fee-simple acquisition acreage and refuge revenue-sharing payments for the Charles M. Russell and UL Bend Refuges (fiscal year 2008).

<i>County</i>	<i>Full fee-simple acquisition (acres)</i>	<i>Refuge revenue-sharing payment (\$)</i>
Fergus	2,512	2,626
Garfield	5,952	6,819
McCone	2,784	1,325
Petroleum	2,981	2,360
Phillips	12,715	17,347
Valley	6,455	4,652
Totals	24,935	25,684

Refuge revenue-sharing payments are based on the greater of 75 cents per acre or 0.75 percent of the fair market value of lands acquired by the Service. The exact amount of the annual payment depends on congressional appropriations, which in recent years have tended to be less than the amount to fully fund the authorized level of payments. In 2008, the six-county area surrounding the refuge received refuge

revenue-sharing payments totaling \$25,684 (refer to table 30). Table 31 shows the resulting economic impacts of refuge revenue-sharing payments under alternative A. Accounting for both the direct and secondary effects, refuge revenue-sharing payments for alternative A generate total annual economic impacts of \$32.6 thousand in local output, \$7 thousand in labor income, and less than one-third of a job in the local impact area.

Refuge Administration

The spending by refuge employees and work-related purchases are identified.

Employees' Personal Purchases. Refuge employees live in and spend their salaries on daily living expenses in communities near the refuge thereby generating impacts within the local economy. Household consumption expenditures consist of payments by individuals (households) to industries for goods and services used for personal consumption. The IMPLAN modeling system contains household consumption spending profiles that account for average household spending patterns by income level. These profiles also capture average annual savings and allow for leakage of household spending to outside the region. The current approved refuge staff consists of 28 permanent and 21 seasonal employees for alternative A, as shown in table 6 in chapter 3.

Based on fiscal year 2008 salary charts, it was estimated that annual salaries for alternative A would total over \$2.3 million. Table 32 shows the economic impacts associated with spending of salaries in local area by refuge employees under alternative A. For alternative A, salary spending by refuge personnel would directly account for \$1.5 million in local output, 11 jobs, and \$277.2 thousand in labor income in the local economy. The secondary or multiplier effects would generate an additional \$375.2 thousand in local output, four jobs, and \$98.9 thousand in labor income. Accounting for both the direct and secondary effects, salary spending by refuge personnel for alternative A would generate total economic impacts of \$1.9 million in local output, 15 jobs, and \$376.1 thousand in labor income.

Work-Related Purchases. A wide variety of supplies and services are purchased for refuge operations and maintenance activities. Refuge purchases made in

Table 31. Annual economic impacts from refuge revenue-sharing payments by the Charles M. Russell and UL Bend Refuges for CCP alternative A (2007\$).

<i>Type of impact</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Direct effects	25.5	5.0	0
Secondary effects	7.1	2.0	0
Total economic impact	32.6	7.0	0

Table 32. Annual local economic impacts of salary spending by employees at the Charles M. Russell and UL Bend Refuges for CCP alternative A (2007\$).

<i>Type of impact</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Direct effects	1,502.1	277.2	11
Secondary effects	375.2	98.9	4
Total economic impact	1,877.3	376.1	15

the six-county area, contribute to the local economic impacts associated with the refuge. According to refuge records, approximately 40 percent of the annual nonsalary budget expenditures are spent on goods and services purchased in the six-county area. Major local expenditures include supplies and services related to building maintenance and construction; auto repairs, parts, and fuel; and utilities. Average annual nonsalary expenditures for alternative A are anticipated to be \$1.45 million. Table 33 shows the economic impacts associated with work-related expenditures in the six-county area. For alternative A, work-related expenditures would directly account for almost \$597 thousand in local output, two jobs, and \$59 thousand in labor income in the local economy. Accounting for both the direct and secondary effects, work-related purchases for alternative A would generate total economic impacts of \$670.8 thousand in local output, three jobs, and \$79.8 thousand in labor income.

Public Use and Access

The impact from expenditures by refuge visitors is evaluated.

Refuge Visitors' Expenditures in the Local Economy. Spending associated with recreational visits to national wildlife refuges generates significant economic activity. The Service report "Banking on Nature: The Economic Benefits of National Wildlife Refuges Visitation to Local Communities" estimated the impact of national wildlife refuges on their local economies (Carver and Caudill 2007). According to the report, more than 34.8 million visits were made to national wildlife refuges in fiscal year 2006, which generated \$1.7 billion of sales in regional economies. Accounting for both the direct and secondary effects, spending by national wildlife visitors generated nearly 27,000 jobs, and over \$542.8 million in employment

income (Carver and Caudill 2007). Approximately 82 percent of total expenditures were from nonconsumptive activities, 12 percent from fishing, and 6 percent from hunting (Carver and Caudill 2007).

The refuge offers a wide variety of year-round accessible recreational opportunities including big game hunting, upland game hunting, fishing, migratory gamebird and waterfowl hunting, and nonconsumptive wildlife-viewing, education, and photography opportunities. Information on State and regional trends and associated economic impacts of these recreational activities were presented in the previous section. This section focuses on the local economic impacts associated with refuge visitation. Annual refuge visitation estimates are based on several refuge statistic sources including visitors entering the visitor center or other offices, traffic counters, hunting permits, and general observation by refuge personnel. Annual refuge visitation estimates are on a per visit basis. Table 34 summarizes estimated refuge visitation by type of visitor activity for alternative A.

To determine the local economic impacts of visitor spending, only spending by persons living outside the local six-county area are included in the analysis. The rationale for excluding local visitor spending is twofold. First, money flowing into the local area from visitors living outside the local area (hereafter referred to as nonlocal visitors) is considered new money injected into the local economy. Second, if residents of the local six-county area visit the refuge more or less due to the management changes, they will correspondingly change their spending of their money elsewhere in the six-county area, resulting in no net change to the local economy. These are standard assumptions made in most regional economic analyses at the local level. Refuge visitation statistics and hunting permits were used to determine the percentage of nonlocal refuge

Table 33. Local economic impacts of work-related purchases by the Charles M. Russell and UL Bend Refuges for CCP alternative A (2007\$).

<i>Type of impact</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Direct effects	596.8	58.8	2
Secondary effects	74.0	21.0	1
Total economic impact	670.8	79.8	3

Table 34. Estimated annual visitation of the Charles M. Russell and UL Bend Refuges for CCP alternative A.

<i>Visitor activity</i>	<i>Number of visits</i>	<i>Percentage of nonlocal visits</i>	<i>Number of nonlocal visits</i>	<i>Number of hours spent at the refuge per visit</i>	<i>Number of non-local visitor days²</i>
Consumptive use					
Fishing	60,000 ¹	50	30,000	8	30,000
Big game hunting ³	90,000	70	63,000	8	63,000
Waterfowl and migratory bird hunting ³	2,900	70	2,030	8	2,030
Upland game hunting ³	10,000	75	7,500	8	7,500
Nonconsumptive use					
Nature trails, other wildlife observation, and office visits	87,100	70	60,970	4	30,485
Total	250,000	—	163,500	—	133,015

¹ These are the fishing visits attributed to the refuge. USACE estimates nearly 160,000 fishing visits annually.

² One visitor day = 8 hours.

³ Refer to section 5.6 for discussion of visitor use numbers.

visitors. Table 35 shows the estimated percentage of nonlocal refuge visits for alternative A.

A visitor usually buys a wide range of goods and services while visiting an area. Major expenditure categories include lodging, restaurants, supplies, groceries, and recreational equipment rental. This analysis used the average daily visitor spending pro-

files from the “Banking on Nature” report (Carver and Caudill 2007), which were derived from the 2006 “National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.” The survey reports trip-related spending of State residents and nonresidents for several different wildlife-associated recreational activities. For each recreation activity, spending is

Table 35. Annual economic impacts of spending by nonlocal visitors to the Charles M. Russell and UL Bend Refuges for CCP alternative A (2007\$).

<i>Impact aspect</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Direct effects			
Fishing	2,367.7	646.4	30
Hunting	8,913.9	2,606.0	123
Wildlife viewing	3,337.6	975.4	51
Subtotal	14,619.2	4,227.8	204
Secondary effects			
Fishing	917.6	244.5	9
Hunting	3,519.7	946.6	36
Wildlife viewing	1,438.0	379.2	15
Subtotal	5,875.3	1,570.3	60
Total effects			
Fishing	3,285.3	890.9	39
Hunting	12,433.6	3,552.6	159
Wildlife viewing	4,775.6	1,354.6	66
Total economic impact	20,494.5	5,798.1	264

reported in the categories of lodging, food and drink, transportation, and other expenses. Carver and Caudill (2007) calculated the average per-person per-day expenditures by recreation activity for each region of the Service. Residents were defined as living within 30 miles of the refuge and nonresidents as living outside the 30-mile radius (Carver and Caudill 2007). For this analysis, nonlocal visitors match the nonresident spending profile definition. Therefore, the spending profile for nonresidents for the Service's region 6 (where the refuge is located) was used. Nonresident average daily spending profiles for big game hunting (\$190.38 per day), small game hunting (\$156.87 per day), migratory bird hunting (\$67.62 per day), and freshwater fishing (\$112.02 per day) were used to estimate nonlocal visitor spending for refuge hunting and fishing-related activities. The average daily nonresident spending profile for non-consumptive wildlife recreation (observing, feeding, or photographing fish and wildlife) was used for nonconsumptive wildlife-viewing activities (\$140.46 per day).

The visitor spending profiles are estimated on an average per day (8 hours) basis. Because some visitors only spend short amounts of time on the refuge, counting each refuge visit as a full visitor day would overestimate the economic impact of refuge visitation. To properly account for spending, the annual number of nonlocal refuge visits was converted to visitor days. Refuge personnel estimate that nonlocal hunters and anglers spend a full visitor day (8 hours) on the refuge. Nonlocal visitors that view wildlife on nature trails or take part in other wildlife observation activities typically spend 4 hours (0.5 visitor day) on the refuge. Table 34 shows the number of nonlocal visitor days by recreation activity for alternative A.

Total spending by nonlocal refuge visitors was determined by multiplying the average nonlocal visitor daily spending by the number of nonlocal visitor days. Table 35 summarizes the total economic impacts associated with current nonlocal fishing, hunting (all types), and nonconsumptive (wildlife viewing) visitation for alternative A. Nonlocal refuge visitors would spend over \$20.9 million in six-county area annually. This spending would directly account for \$14.6 million in local output, 204 jobs, and \$4.2 million in labor

income in the local economy. The secondary or multiplier effects would generate an additional \$5.9 million in local output, 60 jobs, and \$1.6 million in labor income. Accounting for both the direct and secondary effects, spending by nonlocal visitors for alternative A would generate total economic impacts of \$20.5 million in local output, 264 jobs and \$5.8 million in labor income.

Livestock Grazing

Service records show there were 42 cattle permits on the refuge in 2008 (refer to table 36). During 2008, approximately 24,000 AUMs were permitted; however, only 18,872 AUMs were actually used. Garfield County had the largest number of permits and AUMs (38.1 percent and 36.2 percent respectively). Both McCone and Phillips Counties had 19 percent of the permits, but Phillips accounted for 25.7 percent of total refuge AUMs while McCone only accounted for 14.4 percent. Valley County had 11.9 percent of total permits, and accounted 19.2 percent of total refuge AUMs. Both Fergus and Petroleum received less than 10 percent of total permits (9.5 percent and 2.4 percent respectively), while accounting for only 1.9 percent and 2.5 percent of total refuge AUMs.

Table 36. Grazing permits and AUMs for the Charles M. Russell and UL Bend Refuges (2008).

<i>County</i>	<i>Number of permits</i>	<i>Number of AUMs</i>
Fergus	4	359
Garfield	16	6,839
Petroleum	1	468
Phillips	8	4,849
McCone	8	2,726
Valley	5	3,631
Total	42	18,872

While total AUMs supplied by the refuge have decreased from 2001 to 2008, revenues received from refuge grazing permits have risen due to increases in refuge grazing fees from \$9.50 per AUM in 2001 to \$17.20 per AUM in 2008.

Table 37 summarizes the estimated economic impact of one AUM of refuge grazing to the six-

Table 37. Economic impact of grazing on the Charles M. Russell and UL Bend Refuges (2007\$).

<i>Impact aspect</i>	<i>Value per AUM</i>	<i>Total for AUMs permitted (24,000) at the refuge</i>	<i>Total for AUMs of actual use (18,872) at the refuge</i>
Value of production	\$41.09	\$986,160	\$775,450
Total economic impact (output)	\$79.52	\$1,908,480	\$1,500,620
Total labor earnings	\$18.17	\$436,080	\$342,993
Total employment	0.000741 job	18 jobs	14 jobs
Average earnings per job	\$24,532.00	\$24,532	\$24,532

Source: David Taylor (professor, University of Wyoming, personal communication; 2009).

county area economy if the refuge grazing is considered in isolation. This analysis, conducted by Dr. David Taylor (agricultural economist at the University of Wyoming), was estimated from a modified 2007 IMPLAN model of the six-county area. These estimates are based on the 1999–2008 average value of production for cow and calf operations in the northern Great Plains region of the United States (Economic Research Service 2009), which includes the refuge area, and a 2006 University of Idaho cow and calf budget (a specific budget for the six-county area was not available, the Idaho budget was determined to be the best match). On a per AUM basis, the average value of production was \$41.09. Due to economic linkages between ranching and the rest of the six-county area economy, the total output from the production associated with one AUM of grazing was estimated to be \$79.52. This represents the total economic activity that occurs within the region from production from one AUM of livestock grazing. Because of this economic activity, it is estimated that \$18.17 of labor income are generated throughout the local economy and 0.000741 jobs are supported per AUM of livestock grazing. The 0.000741 jobs represent about one job for every 1,350 AUMs of livestock grazing. Average earnings per job for this employment are \$24,532 per year.

For alternative A, the current level of permitted refuge grazing (24,000 AUMs) would generate \$986.2 thousand of production in six-county area annually. This production would account for \$1.9 million in total economic output, \$436 thousand in labor earnings, and 18 jobs in the local economy (refer to table 37). The current level of AUMs actually used on the refuge (18,872 AUMs) would generate \$775.5 thousand of production in six-county area annually. This pro-

duction would account for \$1.5 million in total economic output, \$343 thousand in labor earnings, and 14 jobs in the local economy (refer to table 37).

Summary of Economic Impacts for Alternative A

Table 38 summarizes the direct and total economic impacts of refuge management activities for alternative A in the six-county area. Under alternative A, refuge management activities directly related to all refuge operations generate an estimated \$16.7 million in local output, 217 jobs and \$4.6 million in labor income in the local economy. Including direct, indirect, and induced effects, all refuge activities would generate total economic impacts of \$23.1 million in local output, 282 jobs, and \$6.3 million in labor income. In addition, grazing on refuge lands generates \$1.5 million in total output, 14 jobs, and \$343 thousand in labor income in the six-county area economy. The economic impacts associated with grazing were not included in the summary of refuge management activities for alternative A (refer to table 38). Grazing would be on a prescriptive basis for all other alternatives where the specific number of AUMs are unknown; therefore, grazing impacts were not analyzed.

In 2007, total labor income was estimated at \$466.4 million and total employment was estimated at 17,945 jobs for the six-county area (Minnesota IMPLAN Group 2007). Excluding grazing operations, total economic impacts associated with refuge operations under alternative A represents 1.3 percent of total income and 1.6 percent of total employment in the overall six-county area economy. Total economic effects of refuge operations play a larger role in the communities near the refuge such as

Table 38. Summary of economic impacts of all management activities at the Charles M. Russell and UL Bend Refuges for CCP alternative A (2007\$).

<i>Impact aspect</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Refuge revenue sharing			
Direct effects	25.5	5.0	0
Total effects	32.6	7.0	0
Refuge administration			
Direct effects	2,098.9	336.0	13
Total effects	2,548.1	455.9	18
Public use			
Direct effects	14,619.2	4,227.8	204
Total effects	20,748.6	5,798.1	260
Aggregate impacts			
Direct effects	16,743.6	4,568.8	217
Total effects	23,075.2	6,261.0	282

Note: Economic impacts associated with grazing are not included.

Lewistown, Glasgow, Fort Peck, Jordan, and Malta where most of the refuge's public use-related economic activity occurs.

ECONOMIC IMPACTS of ALTERNATIVE B

The economic impacts under alternative B from revenue sharing, refuge administration, public use activities, and other management activities are analyzed.

Revenue Sharing

The effects would be the same as for alternative A.

Refuge Administration

The impact from staff purchases and work-related purchases are evaluated.

Employees' Personal Purchases. Proposed staff for alternative B includes all approved staff positions (refer to table 6 in chapter 3) plus five added positions. The new positions are an outdoor recreation planner, law enforcement officer, refuge operations specialist, range technician, and a technician. Table 39 shows the economic impacts associated with spending of salaries in the six-county area by refuge employees under alternative B. For alternative B, salary spending by refuge personnel would directly account for \$1.7 million in local output, 13 jobs, and \$306.7 thousand in labor income in the local economy. The secondary or multiplier effects would generate an additional \$415.1 thousand in local output, four jobs, and \$109.8 thousand in labor income. Accounting for both the direct and secondary effects, salary spending by refuge personnel for alternative B would generate total economic impacts of \$2.1 million in local output, 17 jobs, and \$416.5 thousand in labor income. Due to the increased personnel levels for alternative B, the associated economic effects of

staff salary spending would generate \$199.6 thousand more in local output, two more jobs, and \$40.4 thousand more in labor income than alternative A.

Work-Related Purchases. Nonsalary expenditures for alternative B are anticipated to increase in proportion with the salary increase for the new staff positions for a total annual nonsalary budget of \$1.61 million (an 11-percent increase compared to alternative A). Table 40 shows the economic impacts associated with work-related expenditures in the six-county area for alternative B. These estimates assume 40 percent of the nonsalary budget would be spent on goods and services purchased in the six-county area (same as current and alternative A). Work-related expenditures under alternative B would directly account for \$660.3 thousand in local output, two jobs, and \$65.1 thousand in labor income in the local economy. Accounting for both the direct and secondary effects, work-related purchases for alternative B would generate a total economic impact of \$742.2 thousand in local output, three jobs, and \$88.4 thousand in labor income. Due to the increased nonsalary expenditures for alternative B, the associated economic effects of work-related purchases would generate \$71.3 thousand more in local output and \$8.6 thousand more in labor income than alternative A.

Public Use and Access

Visitor expenditures are evaluated.

Refuge Visitors' Expenditures in the Local Economy. Changes in refuge management activities can affect recreational opportunities offered and visitation levels. Table 41 shows the estimated visitation levels associated with each visitor activity for alternative B. Under alternative B, annual visitation is antici-

Table 39. Annual local economic impacts of salary spending by employees at the Charles M. Russell and UL Bend Refuges for CCP alternative B (2007\$).

<i>Type of impact</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Direct effects	1,661.8	306.7	13
Secondary effects	415.1	109.8	4
Total economic impact	2,076.9	416.5	17

Table 40. Local economic impacts of work-related purchases by the Charles M. Russell and UL Bend Refuges for CCP alternative B (2007\$).

<i>Type of impact</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Direct effects	660.3	65.1	2
Secondary effects	81.9	23.3	1
Total economic impact	742.2	88.4	3

Table 41. Estimated annual visitation of the Charles M. Russell and UL Bend Refuges for CCP alternative B.

<i>Visitor activity</i>	<i>Number of visits</i>	<i>Percentage of nonlocal visits</i>	<i>Number of nonlocal visits</i>	<i>Number of hours spent at the refuge per visit</i>	<i>Number of non-local visitor days²</i>
Consumptive use					
Fishing	60,000 ¹	50	30,000	8	30,000
Big game hunting ³	85,000	70	59,500	8	59,500
Waterfowl and migratory bird hunting ³	3,000	70	2,100	8	2,100
Upland game hunting ³	12,000	75	9,000	8	9,000
Nonconsumptive use					
Nature trails, other wildlife observation, and office visits	93,000	70	65,100	4	32,550
Total	253,000	—	165,700	—	133,150

¹ These are the fishing visits attributed to the refuge. USACE estimates nearly 160,000 fishing visits annually.

² One visitor day = 8 hours.

³ Refer to section 5.6 for discussion of visitor use numbers.

pated to increase for waterfowl hunting (3 percent), upland game hunting (20 percent), and nonconsumptive use activities (7 percent) compared to alternative A (refer to table 35 under alternative A above). No change is anticipated for fishing activities while big game hunting is anticipated to decrease by 6 percent compared to alternative A.

Table 42 summarizes the total economic impacts associated with current nonlocal fishing, hunting (all types), and nonconsumptive visitation for alternative B. Nonlocal refuge visitors would spend over \$20.8 million in the six-county area annually. This spending would directly account for \$14.6 million in local output, 203 jobs, and \$4.2 million in labor

Table 42. Annual economic impacts of spending by nonlocal visitors to the Charles M. Russell and UL Bend Refuges for CCP alternative B (2007\$).

<i>Impact aspect</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Direct effects			
Fishing	2,367.7	646.4	30
Hunting	8,641.8	2,529.0	119
Wildlife viewing	3,563.7	1,041.5	54
Subtotal	14,573.2	4,216.9	203
Secondary effects			
Fishing	917.6	244.5	9
Hunting	3,413.4	919.3	35
Wildlife viewing	1,535.4	404.9	16
Subtotal	5,866.4	1,568.7	60
Total effects			
Fishing	3,285.3	890.9	39
Hunting	12,055.2	3,448.3	154
Wildlife viewing	5,099.1	1,446.4	70
Total economic impact	20,439.6	5,785.6	263

income in the local economy. The secondary or multiplier effects would generate an additional \$5.9 million in local output, 60 jobs, and \$1.6 million in labor income. Accounting for both the direct and secondary effects, spending by nonlocal visitors for alternative B would generate total economic impacts of \$20.4 million in local output, 263 jobs, and \$5.8 million in labor income. Even though visitation increased slightly (135 total nonlocal visitor days) compared to alternative A, the increase in waterfowl hunting (70 visitor days with an average spending of \$67.62 per day), upland game hunting (1,500 visitor days with an average spending of \$156.87 per day), and non-consumptive use activities (2,065 visitor days with an average spending of \$140.46 per day) does not offset the decrease in big game hunters (3,500 visitor days with an average spending of \$190.39 per day). Therefore, for alternative B, the associated economic effects of refuge visitation would be less than alternative A by \$54.9 thousand in local output, one job, and \$12.5 thousand in labor income.

Livestock Grazing

For alternative B, refuge management would progressively move toward a prescriptive grazing regime, and it would be carried out on 50–75 percent of the refuge within 4–7 years. As a result, the level of grazing could be reduced or increased for short periods.

As shown in table 23 in chapter 4, the refuge supplies less than 1 percent of total AUMs in the six-county area. Therefore, changes to refuge grazing levels would not be significant for the six-county economy but could impact individual ranches with refuge grazing permits. The refuge grazing impacts in table 37 under alternative A assume that the only

affect on the ranching operation from refuge grazing is the direct production associated with the refuge AUMs. Although most ranches are typically only partially dependent on Federal land grazing for forage, this forage source can be a critical part of their livestock operation due to the rigidity of seasonal forage availability (Taylor et al. 2008). Therefore, potential reductions in income and net ranch returns can be greater than just the direct economic loss from reductions in Federal grazing AUMs (Rowe and Bartlett 2001, Taylor et al. 2008, Van Tassell and Richardson 1998). The level of an increased impact above the direct production associated with refuge AUMs would depend on several factors including the individual ranch's level of dependency on refuge grazing, the magnitude of the proposed change in grazing, the financial solvency of the ranch, and the availability of alternative sources of forage (Taylor et al. 2008).

Summary of Economic Impacts for Alternative B

Table 43 summarizes the direct and total economic impacts of refuge management activities for alternative B in the six-county area. Excluding grazing operations, refuge management activities directly related to refuge operations would generate an estimated \$16.9 million in local output, 218 jobs and \$4.6 million in labor income in the local economy under alternative B. Including direct, indirect, and induced effects, all refuge activities would generate total economic impacts of \$23.3 million in local output, 283 jobs and \$6.3 million in labor income. Excluding grazing operations, total economic impacts associated with refuge operations under alternative B represents 1.4 percent of total income and 1.6 percent of total employment in the overall six-county area

Table 43. Summary of economic impacts of all management activities at the Charles M. Russell and UL Bend Refuges for CCP alternative B (2007\$).

<i>Impact aspect</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Refuge revenue sharing			
Direct effects	25.5	5.0	0
Total effects	32.6	7.0	0
Refuge administration			
Direct effects	2,322.1	371.8	15
Total effects	2,819.1	504.9	20
Public use			
Direct effects	14,573.2	4,216.9	203
Total effects	20,439.6	5,785.6	263
Aggregate impacts			
Direct effects	16,920.8	4,593.7	218
Total effects	23,291.3	6,297.5	283

Note: Economic impacts associated with grazing are not included.

economy. Total economic effects of refuge operations play a larger role in the communities near the refuge such as Lewistown, Glasgow, Fort Peck, Jordan, and Malta where most of the refuge's public use-related economic activity occurs.

Table 44 summarizes the change in economic effects associated with refuge operations under alternative B as compared to alternative A. Due to increases in refuge administration and decreases in big game hunting, alternative B would generate \$216.0 thousand more in local output, \$36.4 thousand more in labor income and one more job as compared to alternative A.

ECONOMIC IMPACTS of ALTERNATIVE C

The economic impacts under alternative C as a result of revenue sharing, refuge administration, public use activities, and other management activities are evaluated.

Revenue Sharing

The effects would be the same as for alternative A.

Refuge Administration

The purchases by staff in the communities or other work-related purchases are evaluated.

Employees' Personal Purchases. Proposed staff for alternative C includes all current staff positions (refer to table 6 in chapter 3) plus seven added positions: two outdoor recreation planners; two maintenance workers; one law enforcement officer; one station manager (UL Bend National Wildlife Refuge); and one range technician. Table 45 shows the economic impacts associated with spending of salaries in the six-county area by refuge employees under alternative C. For alternative C, salary spending by refuge personnel would directly account for \$1.7 million in local output, 13 jobs, and \$321.5 thousand in labor income in the local economy. The secondary or multiplier effects would generate an additional \$435.1 thousand in local output, four jobs, and \$114.7 thousand in labor income. Accounting for both the direct and secondary effects, salary spending by refuge personnel for alternative C would generate total economic impacts of \$2.2 million in local output, 17 jobs, and \$436.2 thousand in labor income. Due to the increased personnel levels for alternative C, the associated economic effects of staff salary spending would generate \$300 thousand more in local output, two more jobs, and \$60.1 thousand more in labor income than alternative A.

Table 44. Change in economic impacts for the Charles M. Russell and UL Bend Refuges under CCP alternative B compared with CCP alternative A (2007\$).

<i>Impact aspect</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Refuge revenue sharing			
Direct effects	0	0	0
Total effects	0	0	0
Refuge administration			
Direct effects	+223.2	+35.8	+2
Total effects	+270.9	+48.9	+2
Public use			
Direct effects	-46.0	-10.9	-1
Total effects	-309.0	-12.5	+3
Aggregate impacts			
Direct effects	+177.2	+24.9	+1
Total effects	+216.0	+36.4	+1

Table 45. Annual local economic impacts of salary spending by employees at the Charles M. Russell and UL Bend Refuges for CCP alternative C (2007\$).

<i>Type of impact</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Direct effects	1,742.0	321.5	13
Secondary effects	435.1	114.7	4
Total economic impact	2,177.1	436.2	17

Work-Related Purchases. Nonsalary expenditures for alternative C are anticipated to increase in proportion with the salary increase for the new staff positions for a total annual nonsalary budget of \$1.68 million (16-percent increase compared to alternative A). Table 46 shows the economic impacts associated with work-related expenditures in the six-county area for alternative C. These estimates assume 40 percent of the nonsalary budget would be spent on goods and services purchased in the six-county area (same as current and alternative A). Work-related expenditures under alternative C would directly account for \$692.2 thousand in local output, two jobs, and \$68.2 thousand in labor income in the local economy. Accounting for both the direct and secondary effects, work-related purchases for alternative B would generate a total economic impact of \$778.0 thousand in local output, three jobs and \$92.6 thousand in labor income. Due to the increased nonsalary expenditures for alternative B, the associated economic effects of

work-related purchases would generate \$107.2 thousand more in local output and \$12.8 thousand more in labor income than alternative A.

Public Use and Access

The impact from visitor expenditures is evaluated.

Refuge Visitors' Expenditures in the Local Economy.

In table 47, the estimated visitation levels associated with each visitor activity are shown for alternative C. Under alternative C, visitation increases are anticipated for all activities except fishing as compared to alternative A (refer to table 34).

Table 48 summarizes the total economic impacts associated with current nonlocal fishing, hunting (all types), and nonconsumptive visitation for alternative C. Nonlocal refuge visitors would spend almost \$23.4 million in the six-county area annually. This spending would directly account for \$17.1 million in local output, 240 jobs, and \$5 million in labor income

Table 46. Local economic impacts of work-related purchases by the Charles M. Russell and UL Bend Refuges for CCP alternative C (2007\$).

<i>Type of impact</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Direct effects	692.2	68.2	2
Secondary effects	85.8	24.4	1
Total economic impact	778.0	92.6	3

Table 47. Estimated annual visitation of the Charles M. Russell and UL Bend Refuges for CCP alternative C.

<i>Visitor activity</i>	<i>Number of visits</i>	<i>Percentage of nonlocal visits</i>	<i>Number of nonlocal visits</i>	<i>Number of hours spent at the refuge per visit</i>	<i>Number of non-local visitor days²</i>
Consumptive use					
Fishing	60,000 ¹	50	30,000	8	30,000
Big game hunting ³	100,000	70	70,000	8	70,000
Waterfowl and migratory bird hunting ³	3,500	70	2,450	8	2,450
Upland game hunting ³	15,000	75	11,250	8	11,250
Nonconsumptive use					
Nature trails, other wildlife observation, and office visits	117,585	70	82,310	4	41,155
Total	296,085	—	196,010	—	154,855

¹ These are the fishing visits attributed to the refuge. USACE estimates nearly 160,000 fishing visits annually.

² One visitor day = 8 hours.

³ Refer to section 5.6 for discussion of visitor use numbers.

Table 48. Annual economic impacts of spending by nonlocal visitors to the Charles M. Russell and UL Bend Refuges for CCP alternative C (2007\$).

<i>Impact aspect</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Direct effects			
Fishing	2,367.7	646.4	30
Hunting	10,240.0	2,990.2	141
Wildlife viewing	4,505.8	1,316.8	69
Subtotal	17,113.5	4,953.4	240
Secondary effects			
Fishing	917.6	244.5	9
Hunting	4,045.0	1,087.5	41
Wildlife viewing	1,941.3	511.9	20
Subtotal	6,903.9	1,843.9	70
Total effects			
Fishing	3,285.3	890.9	39
Hunting	14,285.0	4,077.7	182
Wildlife viewing	6,447.1	1,828.7	89
Total economic impact	24,017.4	6,797.3	310

in the local economy. The secondary or multiplier effects would generate an additional \$6.9 million in local output, 70 jobs, and \$1.8 million in labor income. Accounting for both the direct and secondary effects, spending by nonlocal visitors for alternative C would generate total economic impacts of \$24 million in local output, 310 jobs and \$6.8 million in labor income. Due to the increased visitation levels (except for fishing) under alternative C, the associated economic effects of visitor spending would generate \$3.5 million more in local output, 46 more jobs, and \$999.2 thousand more in labor income than alternative A.

Livestock Grazing

For alternative C, refuge management would gradually move toward a prescriptive grazing regime on those units that are fenced or are currently not assigned a permit holder. As with alternative B, prescriptive grazing would be initiated to meet specific wildlife and habitat objectives. As a result, the level of grazing would remain consistent from year-to-year with some fluctuations due to units being prescriptive grazed to meet goals and objectives.

As shown in table 23 in chapter 4, the refuge supplies less than 1 percent of total AUMs in the six-county area. Therefore, changes to refuge grazing levels would not be significant for the six-county economy but could impact individual ranches with refuge grazing permits. The refuge grazing impacts in table 37 under alternative A assume that the only affect on the ranching operation from refuge grazing is the direct production associated with the refuge AUMs. Although most ranches are typically only partially

dependent on Federal land grazing for forage, this forage source can be a critical part of their livestock operation due to the rigidity of seasonal forage availability (Taylor et al. 2008). Therefore, potential reductions in income and net ranch returns can be greater than just the direct economic loss from reductions in Federal grazing AUMs (Van Tassell and Richardson 1998, Rowe and Bartlett 2001, Taylor et al. 2008). The level of an increased impact above the direct production associated with refuge AUMs would depend on several factors including the individual ranch's level of dependency on refuge grazing, the magnitude of the proposed change in grazing, the financial solvency of the ranch, and the availability of alternative sources of forage (Taylor et al. 2008).

Summary of Economic Impacts for Alternative C

Table 49 summarizes the direct and total economic impacts of all refuge management activities for alternative C in the six-county area. Under alternative C, refuge management activities directly related to all refuge operations generate an estimated \$19.6 million in local output, 255 jobs, and \$5.4 million in labor income in the local economy. Including direct, indirect, and induced effects, all refuge activities would generate total economic impacts of \$27 million in local output, 330 jobs, and \$7.3 million in labor income. Excluding grazing operations, total economic impacts associated with refuge operations under alternative C would represent 1.6 percent of total income and 1.8 percent of total employment in the overall six-county area economy. Total economic effects of refuge oper-

Table 49. Summary of economic impacts of all management activities at the Charles M. Russell and UL Bend Refuges for CCP alternative C (2007\$).

<i>Impact aspect</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Refuge revenue sharing			
Direct effects	25.5	5.0	0
Total effects	32.6	7.0	0
Refuge administration			
Direct effects	2,434.2	389.7	15
Total effects	2,955.1	528.8	20
Public use			
Direct effects	17,113.5	4,953.4	240
Total effects	24,017.4	6,797.3	310
Aggregate impacts			
Direct effects	19,573.2	5,348.1	255
Total effects	27,005.1	7,333.1	330

Note: Economic impacts associated with grazing are not included.

ations play a larger role in the communities near the refuge such as Lewistown, Glasgow, Fort Peck, Jordan, and Malta where most of the refuge's public use-related economic activity occurs.

Table 50 summarizes the change in economic effects associated with refuge operations under alternative C as compared to alternative A. Due to increases in refuge administration and visitation, alternative C would generate \$3.9 million more in local output, 48 additional jobs, and \$1 million more in labor income as compared to alternative A.

ECONOMIC IMPACTS of ALTERNATIVE D

The economic impacts under alternative D from revenue sharing, refuge administration, public use activities, and other management activities are evaluated.

Revenue Sharing

The effects would be the same as for alternative A.

Refuge Administration

The purchases by staff in the communities or other work-related purchases are evaluated.

Employees' Personal Purchases. Proposed staff for alternative D includes all current staff positions (refer to table 6 in chapter 3) plus seven added positions: two outdoor recreation planners; one maintenance worker; one law enforcement officer; one station manager (UL Bend National Wildlife Refuge); one range technician; and one technician. Table 51 shows the economic impacts associated with spending of salaries in the six-county area by refuge employees under alternative D. For alternative D,

Table 50. Change in economic impacts for the Charles M. Russell and UL Bend Refuges under CCP alternative C compared with CCP alternative A (2007\$).

<i>Impact aspect</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Refuge revenue sharing			
Direct effects	0	0	0
Total effects	0	0	0
Refuge administration			
Direct effects	+335.3	+53.7	+2
Total effects	+407.0	+72.8	+2
Public use			
Direct effects	+2,494.3	+725.6	+36
Total effects	+3,268.8	+999.2	+50
Aggregate impacts			
Direct effects	+2,829.6	+779.3	+38
Total effects	+3,929.9	+1,072.0	+48

Table 51. Annual local economic impacts of salary spending by employees at the Charles M. Russell and UL Bend Refuges for CCP alternative D (2007\$).

<i>Type of impact</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Direct effects	1,739.2	321.0	13
Secondary effects	434.4	114.5	4
Total economic impact	2,173.6	435.5	17

salary spending by refuge personnel would directly account for \$1.7 million in local output, 13 jobs, and \$321 thousand in labor income in the local economy. The secondary or multiplier effects would generate an additional \$434.4 thousand in local output, four jobs, and \$114.5 thousand in labor income. Accounting for both the direct and secondary effects, salary spending by refuge personnel for alternative C would generate total economic impacts of \$2.2 million in local output, 17 jobs, and \$435.5 thousand in labor income. Due to the increased personnel levels for alternative D, the associated economic effects of staff salary spending would generate \$296 thousand more in local output, two more jobs, and \$59 thousand more in labor income than alternative A.

Work-Related Purchases. Nonsalary expenditures for alternative D are anticipated to increase in proportion with the salary increase for the new staff positions, a 16-percent increase (same as alternative C) compared to alternative A. Therefore, the impacts

would be the same as for alternative C, as shown in table 46 above.

Public Use and Access

The impact from visitor expenditures is evaluated.

Refuge Visitors' Expenditures in the Local Economy. In table 52, the estimated visitation levels associated with each visitor activity are shown for alternative D. Under alternative D, slight increases in visitation are anticipated for all activities except fishing and upland game hunting as compared to alternative A (refer to table 32 above).

Table 53 summarizes the total economic impacts associated with current nonlocal fishing, hunting (all types), and nonconsumptive visitation for alternative D. Nonlocal refuge visitors would spend almost \$21.8 million in the six-county area annually. This spending would directly account for \$15.8 million in local output, 221 jobs, and \$4.6 million in labor income in the local economy. The secondary or mul-

Table 52. Estimated annual visitation of the Charles M. Russell and UL Bend Refuges for CCP alternative D.

<i>Visitor activity</i>	<i>Number of visits</i>	<i>Percentage of nonlocal visits</i>	<i>Number of nonlocal visits</i>	<i>Number of hours spent at the refuge per visit</i>	<i>Number of non-local visitor days²</i>
Consumptive use					
Fishing	60,000 ¹	50	30,000	8	30,000
Big game hunting ³	95,000	70	66,500	8	66,500
Waterfowl and migratory bird hunting ³	3,000	70	2,100	8	2,100
Upland game hunting ³	10,000	75	7,500	8	7,500
Nonconsumptive use					
Nature trails, other wildlife observation, and office visits	95,810	70	67,067	4	33,534
Total	263,810	—	173,167	—	139,634

¹ These are the fishing visits attributed to the refuge. USACE estimates nearly 160,000 fishing visits annually.

² One visitor day = 8 hours.

³ Refer to section 5.6 for discussion of visitor use numbers.

Table 53. Annual economic impacts of spending by nonlocal visitors to the Charles M. Russell and UL Bend Refuges for CCP alternative D (2007\$).

<i>Impact aspect</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Direct effects			
Fishing	2,367.7	646.4	30
Hunting	9,803.9	2,872.0	135
Wildlife viewing	3,671.4	1,073.0	56
Subtotal	15,843.0	4,591.4	221
Secondary effects			
Fishing	917.6	244.5	9
Hunting	3,870.5	1,042.6	40
Wildlife viewing	1,581.8	417.1	16
Subtotal	6,369.9	1,704.2	65
Total effects			
Fishing	3,285.3	890.9	40
Hunting	13,674.4	3,914.6	175
Wildlife viewing	5,253.2	1,490.1	72
Total economic impact	22,212.9	6,295.6	287

multiplier effects would generate an additional \$6.4 million in local output, 65 jobs, and \$1.7 million in labor income. Accounting for both the direct and secondary effects, spending by nonlocal visitors for alternative D would generate total economic impacts of \$22.2 million in local output, 287 jobs, and \$6.3 million in labor income. Due to the increased visitation levels (except for fishing and upland game hunting) under alternative D, the associated economic effects of visitor spending would generate \$1.7 million more in local output, 23 more jobs, and \$497.5 thousand more in labor income than alternative A.

Livestock Grazing

For alternative D, refuge management would move toward a prescriptive grazing regime to promote ecological resilience, promote biological diversity, integrity, and heterogeneity across the landscape. Prescriptive grazing would be carried out across 50–75 percent of the refuge within 6–9 years. As a result, the level of grazing could probably be reduced from the current level but could possibly increase for short periods.

As shown in table 23 in chapter 4, the refuge supplies less than 1 percent of total AUMs in the six-county area. Therefore, changes to refuge grazing levels would not be significant for the six-county economy but could affect individual ranches with refuge grazing permits. The refuge grazing impacts in table 37 under alternative A assume that the only affect on the ranching operation from refuge grazing is the direct production associated with the refuge AUMs. Although most ranches are typically only

partially dependent on Federal land grazing for forage, this forage source can be a critical part of their livestock operation due to the rigidity of seasonal forage availability (Taylor et al. 2008). Therefore, potential reductions in income and net ranch returns can be greater than just the direct economic loss from reductions in Federal grazing AUMs (Van Tassel and Richardson 1998, Rowe and Bartlett 2001, Taylor et al. 2008). The level of an increased impact above the direct production associated with refuge AUMs would depend on several factors including the individual ranch's level of dependency on refuge grazing, the magnitude of the proposed change in grazing, the financial solvency of the ranch, and the availability of alternative sources of forage (Taylor et al. 2008).

Summary of Economic Impacts for Alternative D

Table 54 summarizes the direct and total economic impacts of all refuge management activities for alternative D in the six-county area. Excluding grazing, refuge management activities directly related to all refuge operations generate an estimated \$18.3 million in local output, 236 jobs and \$5 million in labor income in the local economy under alternative D. Including direct, indirect, and induced effects, all refuge activities would generate total economic impacts of \$25.2 million in local output, 307 jobs and \$6.8 million in labor income. Excluding grazing operations, total economic impacts associated with refuge operations under alternative D would represent 1.5 percent of total income and 1.7 percent of total employment in the overall six-county area economy.

Table 54. Summary of economic impacts of all management activities at the Charles M. Russell and UL Bend Refuges for CCP alternative D (2007\$).

<i>Impact aspect</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Refuge revenue sharing			
Direct effects	25.5	5.0	0
Total effects	32.6	7.0	0
Refuge administration			
Direct effects	2,431.4	389.2	15
Total effects	2,951.6	528.1	20
Public use			
Direct effects	15,843.0	4,591.4	221
Total effects	22,212.9	6,295.6	287
Aggregate impacts			
Direct effects	18,299.9	4,985.6	236
Total effects	25,197.1	6,830.7	307

Total economic effects of refuge operations play a larger role in the communities near the refuge such as Lewistown, Glasgow, and Malta where most of the refuge's public use-related economic activity occurs.

Table 55 summarizes the change in economic effects associated with refuge operations under alternative D as compared to alternative A. Due to increases in visitation and refuge administration, alternative D would generate \$1.6 million more in local output, 19 additional jobs, and \$569.6 thousand more in labor income as compared to alternative A.

IMPACTS on PRIVATE LANDS and LIVESTOCK PERMITTEES

In addition to economic impacts described above, the effects on livestock grazers from changes in annual

grazing to prescriptive grazing including fencing changes, stock pond renovations, and changes in wilderness on current livestock permittees were evaluated. For more information on current livestock grazing, refer to chapter 4 and figure 16.

All Alternatives

Under all alternatives, the Service would extend agreements that are in place for fire suppression on adjacent lands (Montana Cooperative Fire Management Response Agreement 2011–2015). Over time, the use of prescribed fire in alternatives B and D and to a lesser extent in C would reduce heavy fuel, thus reducing the risk for severe wildfires spreading across private lands, but implementation of alternative would not eliminate the risk for wildfire altogether.

Table 55. Change in economic impacts for the Charles M. Russell and UL Bend Refuges under CCP alternative D compared with CCP alternative A (2007\$).

<i>Impact aspect</i>	<i>Local output (\$ thousands)</i>	<i>Labor income (\$ thousands)</i>	<i>Employment (number of full- and part-time jobs)</i>
Refuge revenue sharing			
Direct effects	0	0	0
Total effects	0	0	0
Refuge administration			
Direct effects	+332.5	+53.2	+2
Total effects	+403.5	+72.1	+2
Public use			
Direct effects	+1,223.8	+363.6	+17
Total effects	+1,464.3	+497.5	+27
Aggregate impacts			
Direct effects	+1,556.3	+416.8	+19
Total effects	+2,121.9	+569.6	+25

As the Service continues the transition and implementation of prescriptive grazing across the refuge, there would be increased transportation costs for permittees as they would not necessarily be able to turn out their cattle at the beginning of the season as they have done in the past. For some permittees, this could be a moderate to major impact depending on the distance traveled, the number of times per season livestock needed to be moved, and even market prices for beef. For those operators who are used to moving livestock to alternative sources of forage, increased transportation costs would not be as significant.

Alternatives A and C

The alternatives would have varying impacts on current livestock permittees as shown in table 56. Under existing conditions, a minimum of 34 percent of the refuge would be grazed prescriptively, and any change from annual grazing would only occur when grazing units became available through the sale to a third party, or when habitat evaluations are completed and prescriptive grazing is required to meet habitat objectives. Since 1990, the Service has moved from no prescriptive grazing to 34 percent. Because the Service must move to a prescriptive-based pro-

gram to meet legal and policy requirements, under alternative A, based on the past 20 years, it would likely approach 50 percent within 15 years. Under alternative A, the total available acreage for annual grazing would never exceed 409,849 acres and it would continue to decrease. The acres with no grazing allotments (77,475) would remain the same as the Service would be unlikely to graze those allotments. Under alternative C, the Service would implement prescriptive grazing on up to 50 percent of the total available grazing lands (some of the acreage with no grazing allotments could be prescriptively grazed in the future depending on habitat needs) within 15 years. The refuge would continue the practice of holding grazing permits as ranches sell their lands to outside parties. Any move to prescriptive grazing would occur mostly on units that would become vacant in the future so the negative effects on current permit holders would be minor. Fence removal and stock pond renovations would occur on those units that are managed under prescriptive grazing plan. New boundary fence construction would have negligible to minor impacts on a few permittees that would have pastures that are in common with refuge lands.

Table 56. Acres of grazing lands available under the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

EXISTING CONDITIONS 2010							
Total acres of refuge grazing lands = 740,030 ¹							
Acres with no grazing allotments = 77,475 (10%)							
Acres available for grazing = 662,555 (90%)							
<i>Alternative A</i>		<i>Alternative B</i>		<i>Alternative C</i>		<i>Alternative D</i>	
Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total
Area under annual grazing							
409,849– 331,278	55–45	331,278– 165,639	45–22	409,849– 331,278	55–45	331,128– 165,639	45–22
Area under prescriptive grazing ²							
252,706– 370,015	34–50	331,278– 555,023	50–75	252,706– 370,015	Up to 50	331,278– 555,023	50–75
Area with no grazing allotments							
77,475	10	Variable		Variable		Variable	
Implementation timeframe							
Over 15 years		Within 4–7 years		Over 15 years		Within 6–9 years	

¹ Refer to figure 16 in chapter 4. This acreage accounts for all of the Service’s lands available for grazing including those with no current grazing allotment, lands grazed under annual grazing, and lands currently grazed under prescriptive grazing. It does not include private or State inholdings within the refuge boundary.

² This acreage would depend on amount of acreage with no grazing allotment. If all of the yellow lands remained with no grazing allotment, 662,555 acres would be available for grazing either prescriptively or under annual grazing; if all of the yellow lands were available for grazing in the future, the highest amount available for prescriptive grazing would be 740,030 acres. The total available for annual grazing would not exceed 409,849 acres (existing conditions) and would continue to decrease as prescriptive grazing is carried out.

Alternatives B and D

Under alternatives B and D there would be moderate to major impacts on some livestock permittees as the Service moved to a greater emphasis on prescriptive grazing over annual grazing (refer to table 56). Under alternative B, the Service would move to prescriptive grazing over 50–75 percent of the refuge in 4–7 years, whereas the timeframe under alternative D would occur over 6–9 years. Over 15 years, 331,278 to 555,023 acres would be prescriptively grazed under alternatives B and D for an increase of 16–41 percent as compared to existing conditions (252,706 acres). Compared to existing conditions where only 662,555 acres of the 740,030 acres are being grazed either by annual or prescriptive grazing under alternatives B and D, the acres with no current Federal grazing allotments could be prescriptively grazed in the future. Steer operations typically have more flexibility and could adapt easier to a prescriptive program. When developing habitat management plans with a prescriptive grazing component, the Service would work with the existing permittees so they could arrange their operations for future grazing needs on the refuge, which could reduce negative effects on the permittees.

Additionally, there would be moderate direct impacts on permittees when the Service removed 25–50 percent of the interior fences; however, there would be a minor economic benefit when the Service issued contracts for this work. There could be moderate to major impacts on permittees when the Service renovated stock ponds to restore natural hydrological conditions of riparian areas downslope. There would be minor to moderate negative effects due to the closing of 106 miles of road and increasing wilderness acreage in six units by 25,869 acres under alternative B. Under alternative D, the closing of about 21 miles of road and increase in wilderness acreage by 19,942 acres would result in negligible-to-minor impacts on livestock owners.

IMPACTS on STATE GRAZING LANDS

Under all alternatives, the Service would extend agreements that are already in place for aggressive fire suppression activities on DNRC lands. Over time, the use of prescribed fire in alternatives B and D and to lesser extent in C would reduce heavy fuel, thus reducing the risk for severe wildfires spreading across State lands, but implementation of any alternative would not eliminate the risk for wildfire all together. Implementation of a prescriptive grazing program across 50–75 percent of the refuge in alternatives B and D and up to 50 percent in alternative C could negatively impact DNRC in meeting their statutory obligations of generating revenue for local schools. The degree to which this would occur is not

known, but under all alternatives, the Service would work with DNRC to develop special use permits that would allow permittees to continue to graze habitat units. If permittees no longer desired to keep their grazing permits, the Service would work with DNRC to assume permits, providing money exists.

EFFECTS on ENVIRONMENTAL JUSTICE

Within the spirit and intent of Executive Order 12898, Federal actions to address environmental justice in minority populations and low-income populations, no actions being considered in this final CCP and EIS would disproportionately place any adverse environmental, economic, social, or health effects on minority or low-income populations as compared to the public.

Under all alternatives the Service would not charge for public use activities, and a variety of opportunities and activities would be offered. Native American tribes would like to see increased opportunities for tribal hunting; however, licensing and harvest levels are regulated by the State, and this would not change under any alternative. Tribal members who are interested in collecting small quantities of plants or other natural resources would need to contact the refuge manager and obtain a special use permit before collecting materials for ceremonial purposes.

Future road closures would not disproportionately displace any minority or low-income populations. Changes in habitat management practices including moving away from annual grazing, removing fences, or eliminating stock ponds could impact some individuals who have low incomes, particularly those who rely solely on farming or ranching and are solely dependent on forage within the refuge (refer to chapter 4, section “4.8 Socioeconomics”). The degree to which any low-income rancher who is an existing permittee would be affected by changes in the grazing program would depend on several factors including the dependency on refuge grazing, the financial solvency of the ranch, and the availability of alternative sources of forage (Taylor et al. 2008).

The Service is committed to ensuring that all members of the public have equal access to America’s fish and wildlife resources, as well as equal access to information that would enable them to meaningfully take part in activities and policy shaping.

CONCLUSION

Under alternative A, refuge management activities directly related to all refuge operations generate an estimated \$16.7 million in local output, 217 jobs and \$4.6 million in labor income in the local economy. Including direct, indirect, and induced effects, all refuge activities would generate total economic impacts of \$23.1 million in local output, 282 jobs, and \$6.3 million in labor income. Excluding grazing operations,

total economic impacts associated with refuge operations under alternative A represents 1.4 percent of total income and 1.6 percent of total employment in the overall six-county area economy.

The refuge currently supplies less than 1 percent of total AUMs in the six-county region (about 22,581 AUMs in 2008; see table 23 in chapter 4). While moving toward a greater emphasis on prescriptive grazing could negatively impact individual ranchers holding refuge grazing permits, the overall effects to the counties would be negligible to minor. The specific number of AUMs grazed on the refuge would be difficult to predict with any certainty in light of the uncertainties of ranches changing ownership, potential for droughts, grazing fees, and habitat conditions.

Under alternative B, excluding grazing operations, the refuge would generate an estimated \$16.9 million in local output, 218 jobs, and \$4.6 million in labor income in the local economy, with total economic impacts of \$23.3 million in local output, 283 jobs, and \$6.3 million in labor income. Excluding grazing operations, total economic impacts associated with refuge operations under alternative B represents 1.4 percent of total income and 1.6 percent of total employment in the overall six-county area economy. Due to increases in refuge administration and decreases in big game hunting, alternative B would generate \$216.0 thousand more in local output, 36.4 thousand more in labor income and one more job as compared to alternative A. The overall economic effect of alternative B would be negligible, compared to existing conditions.

Under alternative C, the refuge would generate an estimated \$19.6 million in local output, 255 jobs and \$5.4 million in labor income in the local economy, with total economic impacts of \$27 million in local output, 330 jobs, and \$7.3 million in labor income. Excluding grazing operations, total economic impacts would represent 1.6 percent of total income and 1.8 percent of total employment in the overall six-county area economy. Due to increases in refuge administration and visitation, alternative C would generate \$3.9 million more in local output, 48 additional jobs, and \$1 million more in labor income as compared to alternative A. The overall economic effect of alternative C would be negligible to minor benefits, compared to existing conditions.

Under alternative D, the refuge would generate an estimated \$18.3 million in local output, 236 jobs, and \$5 million in labor income in the local economy, with total economic impacts of \$25.2 million in local output, 307 jobs, and \$6.8 million in labor income. Excluding grazing operations, total economic impacts would represent 1.4 percent of total income and 1.4 percent of total employment in the overall six-county area economy. Due to increases in visitation and refuge administration, alternative D would generate \$2.1 million more in local output, 25 additional jobs, and \$569.6 thousand more in labor

income as compared to alternative A. The overall economic effect of alternative D would be minor benefits, compared to existing conditions.

The alternatives would have varying degrees of effects on livestock permittees as changes in annual and prescriptive grazing, fencing changes, stock pond renovations, and wilderness units occurred. Under existing conditions, about 34 percent of the refuge would be prescriptively grazed and this would not change unless units became available through the sale to a third party, or when habitat conditions dictated a change. Alternative C would apply prescriptive grazing on 50 percent of the refuge in 15 years, but the refuge would continue the practice of holding grazing permits as ranches sold their lands to outside parties. Fence removal or stock pond renovations would only occur on lands that were converted to prescriptive grazing. Overall, there would only be negligible to minor negative effects in alternatives A and C.

Alternatives B and D would have greater impacts on livestock permittees and, for some, these could be moderate to major as the Service applied prescriptive grazing on up to 75 percent of the refuge. The schedule would be more aggressive under alternative B than under D. There would be moderate negative effects on permittees when the Service removed 25–50 percent of the interior fences or renovated stock ponds, although the actual removal of any fencing would bring about a short-term economic benefit as a result of contracting out the work. Alternative B would have the greatest impact on permittees with the closing of 106 miles of road, and an increase in wilderness protection by 25,676 acres, limiting access in some areas. Road closures in alternative D would be minor (21 miles). Working with permittees during the development of HMPs would enable ranchers to make arrangements for future grazing needs.

Implementation of any alternative would not affect existing agreements with DNRC for fire suppression activities nor would it affect access. The greater use of prescribed fire in alternatives B and D and to a lesser extent in alternative C would reduce some of the risk for severe wildfire spreading across State lands. Implementation of a prescriptive grazing program across much of the refuge in alternatives B, D, and to a lesser extent in C could negatively affect DNRC if refuge grazing lands became less attractive to permittees. This could be offset by working with DNRC to assume permits if money permitted.

MITIGATION

Working closely with ranch permittees and DNRC during the development of HMPs would enable them to plan in advance for changes in their operations.

CUMULATIVE IMPACTS on the SOCIOECONOMIC ENVIRONMENT

As described in chapter 4, landownership patterns near the refuge are continuing to see a transition toward nontraditional ownership and management (such as the American Prairie Reserve's 123,000-acre preserve and The Nature Conservancy's 63,000-acre Matador Ranch), along with the purchase of private ranches by absentee owners. The 2009 purchase and retirement of two grazing allotments on the refuge by the National Wildlife Federation (totaling about 45,000 acres) are consistent with this trend. While the reduction or elimination of grazing on private conservation lands is generally believed to have a negative economic impact on local communities, some individual ranchers have benefited financially by the opportunity to sell their land or grazing interests to outside entities. The economic impacts of absentee ranch owners are less apparent.

While current economic and demographic trends in the six-county region surrounding the refuge are likely to have negative effects on local communities, none of the refuge management alternatives would contribute to those impacts. Instead, all of the alternatives would likely result in negligible to minor cumulative benefits to local communities by increasing income, jobs, and (under action alternatives B–D) more opportunities for recreation and tourism.

Changes in livestock grazing management and stocking rates in alternatives B and D would likely further reduce the availability of grazing land in the region. However, considering that the refuge currently supplies less than 1 percent of all AUMs in the region, the regional cumulative effect of refuge management actions, when combined with the economic effects of other land management changes, would be negligible.

The real or perceived effect of land use and management changes on the social and traditional values of nearby communities is an important consideration. As described in chapter 4, many residents in the area have had family ties to the land and the agricultural economy for several generations. These residents strive to maintain those economic and social traditions and feel threatened by changes in land use (particularly livestock grazing) both on and off the refuge. Others may see economic opportunities from conservation-oriented property sales or increased recreational activity. It is difficult to quantify these types of impacts, or to identify the differences between perceived or actual impacts. If changes in landownership patterns and management in the region has a negative effect on social and traditional values, the changes in livestock grazing management under alternatives B and D would result in minor cumulative effects. Alternatives A and C

would result in negligible cumulative benefits by maintaining existing management approaches.

5.11 IRREVERSIBLE and IRRETRIEVABLE RESOURCE COMMITMENTS

The National Environmental Policy Act requires a discussion of any irreversible or irretrievable commitment of resources that would result from implementing the alternatives. An irreversible commitment of resources means nonrenewable resources are consumed or destroyed. These resources are permanently lost due to plan implementation. In contrast, an irretrievable commitment of resources is the loss of resources or resource production, or use of renewable resources during the 15-year of the plan.

All alternatives would result in an irreversible commitment of soil resources. Topsoil would be removed before a facility construction for the use in revegetation of disturbed areas or the excavation of fossils. Even with the best management practices, some irreversible soil loss due to erosion would occur. Livestock grazing, particularly in any riparian areas where it still occurs, could contribute to soil erosion, although the amounts would vary by alternative. The use of prescribed fire would improve plant vigor and health, but there could be some temporary losses of soil. Major wildfires could lead to severe soil erosion. Loss of soil, as well as changes to visual resources due to facility development would be an irretrievable commitment of resources.

The digging of fossil resources would be an irreversible commitment of resources. These resources would no longer be in the ground in their original context, although they would continue to be available to the public for research and educational purposes.

Federal money for staff and operations would be an irretrievable commitment of resources. These resources would not be available for other Federal programs or projects.

Fossil fuel used by motor vehicles, boats, and equipment, either by the Service or the public would represent an irreversible commitment of resources because their use is lost for future generations. In addition, they would result in irretrievable negative effects on air quality and global climate change.

Like fossil fuel, prescribed fires and wildfires would emit carbon and particulates in the air and would result in irretrievable negative effects on air quality and global climate change.

The loss of income for some livestock permittees could result in an irreversible commitment of resources and an irretrievable loss of revenue for the six adjacent counties. The trend toward imple-

menting prescriptive grazing over annual grazing to meet Service legal mandates for managing habitat and wildlife could result in lost income and revenue depending on several factors. The use of livestock grazing would not be ended on the refuge, but permittees would need to adapt their operations to graze on the refuge. Reduction of income and net ranch returns would depend on an individual ranch's level of dependency on refuge grazing, the financial solvency of the ranch, and the availability of alternative sources of forage (Taylor et al. 2008). Refuge grazing only accounts for 1 percent of the revenues across the six counties; therefore, revenue losses for the counties would not be significant. Losses would be greater under alternatives B and D and to a lesser degree under alternative C and A, but under all alternatives the Service would continue to carry out prescriptive grazing. Excluding livestock grazing, the refuge would continue to generate jobs and local income in the six-county economy. The overall economic effect of alternative B would be negligible and under alternatives C and D, there could be negligible to minor benefits in revenue for the local economies, which would offset revenue losses for the counties. Therefore, losses would not necessarily be irreversible.

The continued transition toward implementing prescriptive grazing across the refuge could result in an irreversible commitment of revenue resources for DNRC for local schools. The degree of the loss of income would depend on several factors. If permittees no longer desired to keep their grazing permits on DNRC lands, as has been done in the past, the Service would work with DNRC to assume the permits, providing that money exists. This could offset any revenue loss for DNRC and there would not be an irreversible or irretrievable commitment of resources.

5.12 SHORT-TERM USES of the ENVIRONMENT and MAINTENANCE of LONG-TERM PRODUCTIVITY

Historical uses of the refuge including early settlement, agricultural uses, roads and access, livestock grazing and developed recreational areas, have affected the long-term productivity of the refuge's ecological environment. Short-term uses of the refuge associated with implementing the CCP include (1) restoration of former agricultural areas, (2) restoration of riparian areas or water impoundments, (3) construction of facilities or boundary fences, (4) removal of fencing, and (5) improving and maintaining roads. Implementing the CCP modifications and enhancement of the natural environment—using prescribed fire, livestock grazing, and hunting to control wildlife populations—would contribute to the maintenance and enhancement of long-term productivity of the refuge environment.

5.13 ADHERENCE to PLANNING GOALS

The following sections are descriptions by goal of how and how well each alternative meets that goal for the refuge. Table 57 summarizes this discussion.

HABITAT and WILDLIFE MANAGEMENT

The goal is to conserve, restore, and improve the biological integrity, environmental health, and ecological

Table 57. Ratings for how well the actions in the CCP alternatives meet the goals for the Charles M. Russell and UL Bend Refuges.

Goal	Alternatives—adherence to goals*			
	A	B	C	D
Habitat and wildlife management	×	■	■	●
Threatened and endangered species and species of concern	■	●	■	●
Research and science	■	●	■	●
Fire management	×	●	×	●
Public use and education	■	■	●	●
Wilderness	■	●	■	●
Cultural and paleontological resources	●	●	●	●
Refuge operations and partnerships	■	●	●	●

*Ratings note that an alternative either satisfies (●) the goal, partially satisfies (■) the goal, or does not satisfy (×) the goal.

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.

The most important component of this goal is the first sentence. Alternatives A and C would not restore biological integrity, environmental health or ecological diversity. Alternative A would not enable the refuge to manage wildlife and habitat in a comprehensive fashion as the 1986 plan was not intended to be comprehensive. The Service would manage 65 habitat units that were originally established by BLM for grazing purposes and not for wildlife. Alternative C would take some steps toward improving existing conditions but would only minimize damaging effects in some areas. Alternative B would only partially improve biological integrity, environmental health, and ecological diversity primarily because maximizing populations would not necessarily improve biological diversity, integrity, and environmental health. Alternative D would fully meet the biological integrity, health, and diversity goal, plus have an emphasis on improving resiliency. All alternatives would work with others to reduce and control the spread of invasive species, but alternative A would maintain only existing program levels, whereas alternatives B, C, and D would work to achieve greater reductions (25–50 percent). Therefore, alternative A does not satisfy this goal.

THREATENED and ENDANGERED SPECIES and SPECIES of CONCERN

The goal is to 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.

All alternatives would meet basic requirements of this goal; however, alternative A would only maintain the status quo. There would not be any extra effort to contribute to the preservation of threatened and endangered species, so it only partially satisfies the goal, where as alternatives B, C, and D would protect, conserve, and enhance threatened and endangered species.

RESEARCH and SCIENCE

The goal is to 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.

Alternative A would maintain only existing research programs. Alternative C would not advance

the understanding of ecological processes although research would continue under all alternatives. Alternatives B and D would fully meet the goal.



A researcher checks a deer for signs of disease.

FIRE MANAGEMENT

The goal is to manage wildland fire using a management response that promotes fire's natural role in shaping the landscape while protecting values at risk.

Alternatives A and C would not promote fire's natural role while alternatives B and D would. All alternatives would protect private property.

PUBLIC USE and EDUCATION

The goal is to 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.

All alternatives would provide for a variety of hunting and fishing opportunities. Alternative C would focus on more opportunities (quantity) whereas alternative D would focus on providing quality experiences. There would be minor increases in hunting visitors in alternatives C and D and a negligible decrease in alternative B.

Alternative A would not have an outdoor recreation planner and there would very limited environmental education opportunities and few improvements for nonconsumptive wildlife-dependent users. Alternative B would have one outdoor recreation planner,

which would enable the refuge to improve programming but would still be limited and would not advance wildlife-dependent public uses or environmental education program to any great degree. Visitation would in essence remain stagnant over 15 years. Alternatives C and D would staff two outdoor recreation planners, which would enable the refuge to provide for more quality wildlife-dependent recreation and environmental education programs and would seek some moderate increases in the number of visitors participating in those programs.

WILDERNESS

The goal is to 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.

Alternatives A and C would maintain the status quo but would not improve or promote wilderness qualities; therefore, it would only partially satisfy the wilderness goal. Alternatives B and D would fully satisfy the goal.

CULTURAL and PALEONTOLOGICAL RESOURCES

The goal is to identify, value, and preserve the paleontology and cultural resources of Charles M. Russell National Wildlife Refuge to connect refuge staff, visitors, and the community to the area's prehistoric and historic past.

All alternatives would identify, value, and preserve paleontological and cultural resources.

REFUGE OPERATIONS and PARTNERSHIPS

The goal is to, through effective communication and innovative use of technology and resources, use money, personnel, partnerships, and volunteer programs for the benefit of natural resources while recognizing the social and economic connection of the refuge to adjacent communities.

All alternatives would maintain existing partnerships. Alternative A would not have a volunteer program nor would the refuge work to increase conservation strategies across the landscape, whereas alternatives B, C, and D would seek to increase partnerships across the conservation landscape and start a volunteer and Friends program.

5.14 UNAVOIDABLE ADVERSE EFFECTS

Generally most adverse and negative environmental effects associated with implementation of the CCP

would be short term and minimal. During construction of more facilities on the refuge, wildlife would be disturbed and temporarily displaced. Facilities construction also would result in minor, short-term disturbance of soils and erosion. Excavation of paleontological resources would result in short-term disturbance of soils and the removal of fossils from the refuge. The use of prescribed fire would result in short-term losses of vegetation. Although there is the potential for prescribed fire to escape the refuge boundary and burn private lands resulting in unavoidable adverse effects, by following prescribed fire plans and approved fires prescriptions, the risk would be greatly reduced. The long-term effects of implementing the CCP would be beneficial to the biological community and the diversity and productivity of the refuge ecosystem. Moving toward a prescriptive grazing and fire program would enable the refuge to use grazing to meet specific habitat objectives. Restoring former agricultural fields would reduce the growing infestation of invasive species on the refuge. There would be some increases in the level of visitation, particularly in alternatives C and D, but they would be minor to moderate differences over existing conditions. Changes to the refuge grazing program would not be significant for the six-county economy but could affect individual ranches with grazing permits. Similarly, the reduction of fences, stock pond removal, and increased transportation costs could result in moderate impacts for some permittees. Close communication with permittees as new habitat management plans are carried out could reduce some of these impacts. With proper planning and placement of new facilities, effects on refuge resources would be minimal.

5.15 CONFLICTS with FEDERAL, STATE, TRIBAL, and LOCAL AGENCIES

Actions considered in this environmental impact statement do not appear to conflict with USACE, BLM or tribal goals, objectives, policies, or plans.

Where USACE has primary jurisdiction and the Service has secondary jurisdiction, a memorandum of understanding guides how habitat and wildlife resources are managed. None of the actions in this CCP and EIS conflicts with any memorandum of understanding the Service has with USACE. The Service did not analyze issues related to lake levels on Fort Peck, the developed recreation areas, real estate activities related to the cabin sales on the east end of the refuge, or fishing tournaments as these are actions where USACE has primary jurisdiction.

The Service has consulted with Fort Belknap and Fort Peck Tribes in the development of this CCP and EIS. The tribes are interested in collecting and using plants or other resources for ceremonial and traditional purposes. The CCP and EIS does not conflict with this interest as the tribes only need to contact the refuge manager and obtain a special use permit. Although wild bison are not currently managed on the refuge, many of the tribes consider them as central to their culture. This CCP and EIS has proposed and evaluated an option in alternatives B and D to only consider a reintroduction of wild bison if MFWP led the issue and addressed all pertinent concerns of the Service and the public. Any future wild bison restoration would be a part of a separate planning effort involving multiple partners. Additionally, the tribes also have any interest in conducting ceremonial hunts on the refuge as elk and deer are also central to their culture. Because hunting is regulated by the State of Montana, the tribes would need to work with State on arranging for a ceremonial hunt on the refuge.

As a cooperating agency, the State of Montana has played an important role in the development of this CCP and EIS. None of the actions in this CCP and EIS would close or take away access to State lands within the refuge. The Service would eliminate any end-of-route effects such as parking on State lands.

The Service has coordinated closely with MFWP in the development of this CCP and EIS and has reviewed all State management plans including those for deer, elk, prairie dogs, fish, and many other wildlife species. Nearly all of the objectives for wildlife management are consistent with MFWP's objectives.

The six adjacent counties and the Missouri River Council of Conservation Districts have also been

cooperating agencies in this planning effort. The counties and conservation districts have expressed concerns about the Service's actions in this planning process. Foremost, the counties and the conservation districts are opposed to any change that would negatively affect livestock grazers on the refuge (refer to upland objectives in chapter 3 and the discussion on other effects on livestock operations).

The counties are also concerned about issues related to roads and particularly about recognizing rights-of-way under R.S. 2477 or where they believe they have a valid county-petitioned right-of-way.

This CCP and EIS does not negate any valid rights-of-way the counties may have, but determining the legal validity of any right-of-way is outside the scope of the plan. The roads that are reflected in alternative A reflect the refuge's current guide map.

Other issues that concern the counties and conservation districts include the use of prescribed fire, wilderness protection, land acquisition, wildlife and habitat management and reintroductions. The Service fully evaluated several alternative options in the draft CCP and EIS, which considered all of these concerns.

5.16 COMPARISON of ENVIRONMENTAL CONSEQUENCES

Table 58 summarizes the above environmental consequences, by estimated level of benefit, to compare refuge management under each alternative.

Table 58. Summary of the environmental consequences for actions of the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Alternative A</i> No action	<i>Alternative B</i> Wildlife populations	<i>Alternative C</i> Public and economic uses	<i>Alternative D</i> Ecological processes (preferred alternative)
Climate change			
Habitat management actions would result in benefits; vehicle emissions would result in effects.	→	→	→
Negligible overall effect on global climate change.	→	→	→
Air quality			
Motorized equipment use would have a negligible effect.	→	→	→
Motorized vehicle use would concentrate emissions during high use periods.	Negligible to minor increases in vehicle emissions due to increased visitation.	→	→
Short-term negligible impacts from prescribed fire; short-term major impacts from large wildfires.	More frequent negligible prescribed fire effects and reduced short-term impacts (moderate) from large wildfires.	Similar to B, except greater effects from large wildfires due to greater biomass.	Same as B.
Visual resources			
Negligible overall effects from facilities and structures.	→	→	→
Negligible effect based on current road visibility.	Minor benefit due to road closures.	Same as A.	Negligible to minor benefit due to closed roads.
Negligible to moderate benefits from management efforts for invasive species control and river bottom restoration.	→	→	→
Short-term negligible impacts from prescribed fire and wildfire.	Short-term negligible impacts and long-term minor benefits from prescribed fire and wildfire.	Same as A.	Same as B.
Minor impact to some users from livestock grazing.	Moderate benefit to some users due to prescriptive livestock grazing regime.	Negligible impact to some users from livestock grazing.	Same as B.
Soundscapes			
Negligible to minor impacts due to motorized boats, road use, and facility construction.	Same as A, with minor benefits in localized areas due to road closures.	Same as A, with minor to moderate impacts in localized areas due to snowmobile access.	Same as B.
Negligible impact from gunshots.	→	→	→
Soils			
Negligible short-term impacts and long-term benefits from river bottom restoration.	→	→	→

Table 58. Summary of the environmental consequences for actions of the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Alternative A</i> No action	<i>Alternative B</i> Wildlife populations	<i>Alternative C</i> Public and economic uses	<i>Alternative D</i> Ecological processes (preferred alternative)
Soils (continued)			
Negligible short-term impacts and long-term benefits from prescribed fire.	Minor short-term impacts and long-term benefits from prescribed fire.	→	→
Moderate to major short-term impacts due to fire suppression and large wild-fires.	Minor to moderate short-term impacts due to fire suppression and large wild-fires.	→	→
Continued moderate to major impacts from livestock grazing in some areas; long-term improvements where prescriptive grazing is carried out.	Same as A, except improvements from prescriptive grazing would be greater.	Same as A.	Same as B.
Minor overall impacts from public use; moderate to major impacts in localized areas. Negligible short-term impacts due to facility construction.	→	→	→
Negligible effects on localized areas from research excavations for cultural and paleontological resources.	Same as A.	Greater impacts (negligible to minor) due to increased research opportunities for cultural and paleontological resources.	Same as A.
Water resources			
Negligible effect on hydrology and water quality.	→	→	→
Vegetation			
Minor, short-term, negative effects on uplands; moderate to major long-term impacts due to continuation of existing management (fire suppression, slow conversion to prescriptive grazing, and little prescribed fire).	Variable effects on uplands depending on target and focal species and management emphasis; overall long-term moderate benefits but some overbrowsing could occur.	Minor long-term benefits for uplands due to improved management including prescriptive grazing and balanced use by wild and domestic ungulates.	Long-term major benefits for uplands due to emphasis on restoring natural processes using prescribed grazing and fire.
Minor to moderate long-term benefits for river bottoms that are restored to native communities; longer timeframe due to minimal commitment of resources.	Minor to moderate long-term benefits for river bottoms (same as A), except more aggressive approach is more likely to succeed in a shorter timeframe.	Same as B, except cooperative approach would allow restoration to begin more quickly.	Same as B, with a less aggressive approach.
Shorelines primarily under USACE jurisdiction; negligible effects.	→	→	→

Table 58. Summary of the environmental consequences for actions of the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

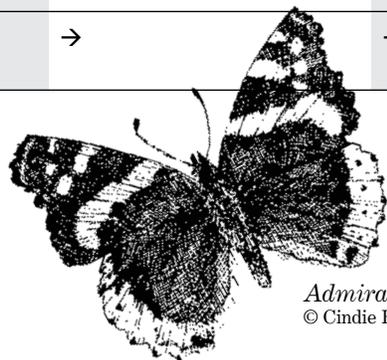
<i>Alternative A</i> No action	<i>Alternative B</i> Wildlife populations	<i>Alternative C</i> Public and economic uses	<i>Alternative D</i> Ecological processes (preferred alternative)
Vegetation (continued)			
Minor long-term benefits for riparian areas and wetlands from grazing and habitat management actions. Continued moderate impacts in localized areas from grazing and severe wildfires.	Moderate long-term benefits for riparian areas and wetlands due to more extensive prescriptive grazing, prescribed fire, and water impoundment removal. Continued moderate impacts in localized areas from grazing and severe wildfires. (Same as A)	Minor to moderate long-term benefits for riparian areas and wetlands due to more extensive prescriptive grazing and water impoundment rehabilitation. Continued moderate impacts in localized areas from grazing and severe wildfires. (Same as A)	Same as B, with moderate to major benefits and continued moderate impacts in localized areas from grazing and severe wildfires. (Same as A)
Wildlife			
Minor benefits for big game from ongoing population management and habitat improvements.	Minor to moderate long-term benefits for big game from management toward natural ecosystem processes and reduced livestock conflicts.	Moderate, long-term, negative effects on big game from management that emphasizes maximum harvests.	Moderate long-term benefits for big game from a balanced approach to population, habitat, and harvest management.
Negligible effects on furbearers and small predators (no changes in management).	Major long-term benefits for furbearers and small predators due to active reintroduction of some species.	Minor to major impacts due to increased harvest of furbearers and small predators.	Negligible impact on furbearers and small predators from harvest opportunities based on acceptable population levels.
Negligible effects on birds. Habitat impacts would generally offset benefits. Moderate to major, localized, negative effects on birds due to grazing.	Moderate to major long-term benefits for birds due to upland and riparian habitat management. Moderate to major, localized, negative effects on birds due to grazing. (Same as A)	Similar to B, with minor long-term benefits. Moderate to major, localized, negative effects on birds due to grazing. (Same as A)	Same as B. Moderate to major, localized, negative effects on birds due to grazing. (Same as A)
Minor, incremental, negative effects on amphibians, reptiles, and fish due to upland and riparian habitat degradation. Negligible effects on small mammals.	Moderate benefits for amphibians, reptiles, and fish due to upland and riparian habitat improvements. Negligible to minor benefits to small mammals from prescriptive grazing and habitat improvements.	Same as B for amphibians, reptiles, and fish, with minor benefits. Negligible to minor negative effects on small mammals due to continued fire suppression and loss of native habitat structure.	Same as B for other wildlife, with moderate to major benefits.
Negligible benefits on TES and species of concern (no specific objectives). Direct effects on TES and species of concern from wolf and wild bison management objectives would be negligible.	Moderate to major long-term benefits due to prescriptive grazing, fire management, and general habitat improvements. Direct effects on TES and species of concern from wolf and wild bison management objectives would be negligible. (Same as A)	Same as B.	Same as B.

Table 58. Summary of the environmental consequences for actions of the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

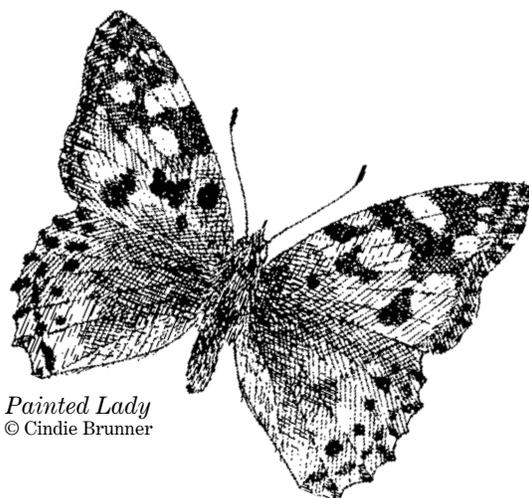
<i>Alternative A</i> No action	<i>Alternative B</i> Wildlife populations	<i>Alternative C</i> Public and economic uses	<i>Alternative D</i> Ecological processes (preferred alternative)
Special management areas			
Negligible impact on wilderness. No effects on other special designations.	Minor benefit due to new recommendations for wilderness study areas (+25,869 acres).	Negligible impact on wilderness.	Minor benefit due to new recommendations for wilderness study areas (+19,942 acres).
No effects on other special management areas.	→	→	→
Visitor services			
Negligible effects on hunting. No long-term change from current hunting opportunities.	Negligible to minor benefits including unique and expanded hunting opportunities and improved access management.	Minor to moderate benefits from an expanded emphasis on hunting opportunities and harvest.	Minor to moderate benefits for hunting, depending on individual preferences.
Negligible effects on fishing.	Same as A.	Same as A, plus negligible benefits from expanded boat ramp access.	Same as A.
Negligible effects on wildlife observation and photography. Visitation levels would remain flat. Facilities would not meet demand.	Negligible to minor benefits for wildlife observation and photography with increased staff (1), facilities, and programs to accommodate increased visitation.	Moderate benefits for wildlife observation and photography with increased staff (2), facilities, and programs with an emphasis on economic benefits.	Moderate benefits for wildlife observation and photography with increased staff (2) and a greater emphasis on quality programs.
Negligible effects on environmental education. Very little environmental education would be offered.	Negligible benefits for environmental education with increased staff (1) and programming.	Minor benefits for environmental education with increased staff (2), programs, and facilities.	Same as C, with greater emphasis on quality programs.
Negligible effects for interpretation (limited programs and facilities).	Negligible benefits for interpretation with increased staff (1) and modest improvements in facilities and programs.	Minor benefits for interpretation with increased staff (2), and expanded facilities.	→
Negligible effects for outreach.	Negligible benefits due to increased outreach efforts.	Minor benefits due to increased and targeted outreach.	→
Negligible effects on access. 670 miles of road open to visitors.	Minor negative effects on access due to 106 miles of closed road.	Minor benefits for access due to road improvements along Knox Ridge and road 108 or game retrieval on some formerly closed roads (outside of wilderness) and consideration of winter access to fishing areas from the south and north side of the Missouri River.	Negligible impact on access due to 21 miles of closed road and 15 miles of seasonal closures. Minor benefits for access due to road improvements along Knox Ridge road or game retrieval on some closed roads (outside of wilderness) and a winter access route to an ice-fishing area from the south side of the Missouri River.
Negligible effect for commercial recreation. Current level of permits (11) would remain.	Negligible benefits for commercial recreation due to efforts to minimize conflicts.	Minor benefits for commercial recreation due to additional permits and efforts to reduce conflicts.	Same as B.

Table 58. Summary of the environmental consequences for actions of the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

<i>Alternative A</i> No action	<i>Alternative B</i> Wildlife populations	<i>Alternative C</i> Public and economic uses	<i>Alternative D</i> Ecological processes (preferred alternative)
Cultural and paleontological resources			
Negligible effects on cultural resources.	Negligible to minor benefits for cultural resources due to increased resource protection.	→	→
Negligible effects on paleontological resources.	Negligible to minor benefits for paleontological resources due to increased management, interpretation, and law enforcement.	→	→
Socioeconomics			
Negligible impact on regional economics.	Negligible impact on regional economics, generating an additional \$216,000 in local output and one more job.	Minor benefits for regional economics, generating \$3.9 million in local output and 48 additional jobs.	Minor benefits for regional economics, generating \$2.1 million in local output and 25 additional jobs.
Negligible to minor impact on livestock permittees.	Moderate to major impact on livestock permittees due to transition to prescriptive grazing, fence removal, and stock pond removal.	Same as A, with minor impact on some permittees due to boundary fence construction.	Same as B.
No effect on environmental justice.	→	→	→



Admiral
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Painted Lady
© Cindie Brunner



Fritillary
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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 management response: The response to a wildfire based on an evaluation of risks to firefighter and public safety, the circumstances under which a fire occurs including weather and fuel conditions, natural and cultural resource management objectives, protection priorities, and values to be protected.

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 pur-

poses 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.

conspecific: An individual belonging to the same species as another.

cool-season grasses: Grasses that begin growth earlier in the season and often become dormant in the summer. These grasses will germinate at lower temperatures. Examples of cool-season grasses at the refuge are western wheatgrass, needle and thread, and green needlegrass.

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.

drawdown: The act of manipulating water levels in an impoundment to allow for the natural drying-out cycle of a wetland.

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.

endemic species: Plants or animals that occur naturally in a certain region and whose distribution is relatively limited to a particular locality.

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.

EPA: Environmental Protection Agency.

extinction: The complete disappearance of a species from the earth; no longer existing.

extirpation: The extinction of a population; complete eradication of a species within a specified area.

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 includ-

- ing 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.
- FTE:** A full-time equivalent; one or more job positions with tours of duty that, when combined, equate to one person employed for the standard Government work-year.
- 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*.
- grassland tract:** A contiguous area of grassland without fragmentation.
- 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*.
- HUA:** Hydrologic unit area.
- hunnable:** 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 under consideration 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).

lentic: Still-water wetlands. These wetlands occur in basins and lack a defined channel and floodplain. Examples include perennial, intermittent bodies of water like lakes, reservoirs, stock ponds.

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 portions of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.

native species: A species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

neotropical migrant: A bird species that breeds north of the United States and Mexican border and winters primarily south of this border.

nest success: The percentage of nests that successfully hatch one or more eggs of the total number of nests 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).

passive management: This management approach allows for natural processes such as fire, grazing, and flooding to occur with little human assistance or funding, which conserves limited funds while increasing the likelihood of self-sustaining communities.

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 fenced 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 NEPA 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 EA 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 NEPA 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.

properly functioning condition: Qualitative method for assessing the condition of riparian-wetland areas. It describes both the assessment and the conditions of the wetland area. It evaluates how well the physical processes are functioning through use of a checklist.

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 con-

trolled 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.

SAMMS: *See Service Asset Maintenance Management 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 F).

Service: *See U.S. Fish and Wildlife Service.*

Service Asset Maintenance Management System (SAMMS): A national database that contains the unfunded maintenance needs of each refuge; projects include those required to maintain existing equipment and buildings, correct safety deficiencies for the implementation of approved plans, and meet goals, objectives, and legal mandates.

shorebird: Any of a suborder (Charadrii) of birds such as a plover or a snipe that frequent the seashore or mudflats.

spatial: Relating to, occupying, 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 (The 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*.
- UWA:** Unified watershed assessment.
- 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 funds 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

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

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*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.

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Appendix B

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.

B.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 that would be inclusive of diverse stakeholder interests and would involve 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 in the scoping report (FWS 2008b), which was posted on the project's 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), 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.

Press 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/cmr/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.

B.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, Petroleum, Garfield, McCone, 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, Petroleum, Garfield, McCone, 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).

B.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 believes 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 allows the public an opportunity to provide input earlier into the alternatives process. It also gives the refuge staff a chance to talk about what they would like to achieve. The Service does not select a preferred alternative until the preparation and publication of the final CCP and EIS.

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.

Press Release

On August 18, 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 inches by 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, Mon-

tana 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.

B.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 31st 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 Garfield 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.

B.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. Suggestions for alternative approaches that were not carried forward in the analysis are discussed in chapter 3.

B.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). The comment period was extended through 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 identified under section B.8 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). Press 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 this 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.

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 this final EIS and CCP.

B.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 E). 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 would be designated as game retrieval roads. These include roads 440, 331, 332, and 333. These roads would be open for retrieval of game for about 4 hours per day during hunting season. This would provide for greater wildlife security and as a result would likely enhance elk harvest in these areas. It would also pro-

vide 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 would meet or exceeds 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 habitat management plans and would be tailored to regional habitat conditions, productivity and other considerations. Those objectives would 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 would 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 would continue regardless of the alternative selected. Several 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 F, plant and wildlife 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 chapter 1, section "1.4 Bird Conservation"). Greater connectivity between the focal bird species and the sentinel plant monitoring pro-

gram 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 would 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 chapter 1, section 1.9) 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.

B.8 LIST OF ENTITIES RECEIVING the 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 final CCP and EIS. 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.

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 C

Compatibility Determinations

C.1 USES

- Hunting
- Fishing
- Wildlife observation, photography, environmental education, and interpretation
- Camping
- Geocaching
- Guided hunting (outfitting)
- All-terrain vehicle, bicycle, and snowmobile use
- Prescriptive grazing
- Research

C.2 REFUGE NAMES

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

C.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

C.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.

C.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 refuge-wide 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 would exist to wildlife near the activity. Animals surplus to populations would 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 would 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 would 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 meet-

ings 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 designated as one of the priority public uses as specified in the Refuge Improvement Act of 1997. 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.

C.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 would 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 would 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-dependent 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's preferred alternative (alternative D) 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 Refuge Improvement Act of 1997. 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.

C.7 DESCRIPTION of USE: Wildlife Observation, Photography, Environmental Education, and Interpretation

The Service estimates the number of visitors who take part in nonconsumptive uses at about 87,100. Refer to table 28 in chapter 5. 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 would help with activities when available. Organized groups, such as schools, Scouts, and 4-H organizations, may have instructors or leaders who would 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's preferred alternative (alternative D) recommends expanding interpretation and environmental education and maintaining wildlife observation programs and facilities. The interpretation and environmental education programs would emphasize the principles of natural plant and animal communities and ecological processes and restoration.

Implementing improvements or expanding public use opportunities would be addressed in future step-down management plans and through future money requests. Program expansion would require increased money for operations and maintenance. When money is not adequate to run and maintain programs, they would 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 would 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 Refuge Improvement Act of 1997. Special regulations are in place to minimize negative effects on the refuges and associated wildlife. The preferred alternative (D) for the refuge CCP would support 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.

C.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 National Wildlife Refuge System Improvement Act of 1997, 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 would 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 would 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 would 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 would 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.

C.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 would be allowed refuge wide with the exception of closed areas. Those participating in geocaching would be responsible for following all rules and regulations required of all refuge users. Geocaching would 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 would 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, would 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 would be an additional administrative resource involved. 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 would 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 would be 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 qual-

ity 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 nonexistent.

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 would 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 conserva-

tion mission, to be environmentally educated and involved in conservation.

Mandatory 10-year Reevaluation Date. 2022.

C.10 DESCRIPTION of USE: Guided Hunting (Outfitting)

The refuge would 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 would be responsible for regulating the use and any compliance issues that arise. Each outfitter would 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 officers 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 would 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 would not be measurably greater than the disturbance from the general hunting public.

Temporary disturbance would exist to wildlife near the activity. Animals surplus to populations would 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 would 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 would 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 would 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 would 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 would 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 would 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 would 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 would 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 would 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.

C.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 would 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 would 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.

C.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 habitat management plans. 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 would be implemented across the refuges where the Service has control over the use. For example, habitat units that are fenced from common pastures would be the first units enrolled into prescriptive grazing. Habitat units that are not fenced from private or other government-owned lands would be managed under existing management plans.

The use would be conducted according to approved habitat management plans to meet specific wildlife and habitat objectives. Use could occur during any season depending on the specific objectives to be achieved. Prescriptive grazing would be administered through issuance of a special use permit. Permittees would be selected using the criteria identified in the Refuge Manual. Habitat management plans would 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 better 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 would 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 typi-

cally only rest pastures for 1 entire year or less from livestock use (with no rest from wild ungulate use). A prescriptive grazing program would allow the refuge to fulfill the intent of the National Wildlife Refuge System Improvement Act of 1997.

AVAILABILITY of RESOURCES

Resources Involved in the Administration and Management of the Use: Refuge staff would continue to monitor permittees for violations of permit conditions and trespass. Biologists and station managers would monitor habitat conditions using current HDP and sentinel plant species.

Special Equipment, Facilities, or Improvements Necessary to Support the Use: The refuge would continue to monitor grazing activities using ground surveys and aerial counts. New permanent or temporary fences would 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 prescriptive grazing program according to CCP alternatives. There may be additional costs with the construction and maintenance of boundary fences, which would 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 would continue to decline over the years. These funds do not cover current expenses incurred managing current grazing program and probably would not cover the costs of implementing the prescriptive grazing program.

ANTICIPATED IMPACTS of the USE

Short-Term Impacts: Short-term impacts would include loss of vegetative cover, which could result in increased soil erosion. Highly palatable forbs and shrubs would be heavily impacted by grazing affect-

ing a large number of wildlife species from pollinators to big game. However, the benefit would 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 would 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 would be carried out over time and with input from current permittees to lessen potential financial 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 would promote healthy habitats that promote biodiversity and resiliency to climate change.

Cumulative Impacts: Changes in grazing management would 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 would 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 would 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 would 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.

C.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 the U.S. Geological Survey, 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 would be determined by the focus of the study. Research requests would 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 would be conducted, especially if it is during a specific hunting season.

Researchers would be required to submit a written proposal that outlines the methods, materials, timing, and justification for proposed projects. These proposals would 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 would 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 would improve and strengthen decisions on managing natural resources. All research requests would 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 would 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 excess of available refuge resources would 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 con-

sidered 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 would 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 would 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, would enhance restoration activities of native species, would help in control of invasive species or provide valuable information that would

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 would 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 would be performed in accordance with stipulations in this determination and in specific special use permits.
8. Researchers would 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 would be minimized with the stipulations above and are not considered significant in nature. Conducting research studies on the refuge would 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.

SIGNATURE

 16 Feb 2012

Richard Potts
Project Leader
Charles M. Russell National Wildlife Refuge Complex
Lewistown, Montana

Date

CONCURRENCE

 2/16/12

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Appendix D

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 Complex.

D.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.

D.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 Code of Federal Regulations (CFR), 40 CFR 1500]

National Historic Preservation Act (1966), as amended: Establishes as policy that the Federal Government is to provide leadership in the preservation of the Nation's prehistoric and 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 funds are 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 E

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.

E.1 HISTORY of WILDERNESS at CHARLES M. RUSSELL 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. Refer to table A for a timeline of wilderness decisions and actions that affected the refuge.

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 retain 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 “E.3 Wilderness Inventory”).

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 E.2 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.

Table A. Timeline for wilderness on the Charles M. Russell and UL Bend Refuges.

<i>Date</i>	<i>Action</i>
September 13, 1964	The Wilderness Act of 1964 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 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.

Table A. Timeline for wilderness on the Charles M. Russell and UL Bend Refuges.

<i>Date</i>	<i>Action</i>
August 28, 1974	Assistant Secretary of the Interior officially forwards Charles M. Russell Refuge wilderness recommendations to the President of the United States.
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."

E.2 CURRENT PROPOSED WILDERNESS

The map for alternative A (figure 7) in chapter 3 and the wilderness map (figure A) in this appendix show the locations of the 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 Black-

foot 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.

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.

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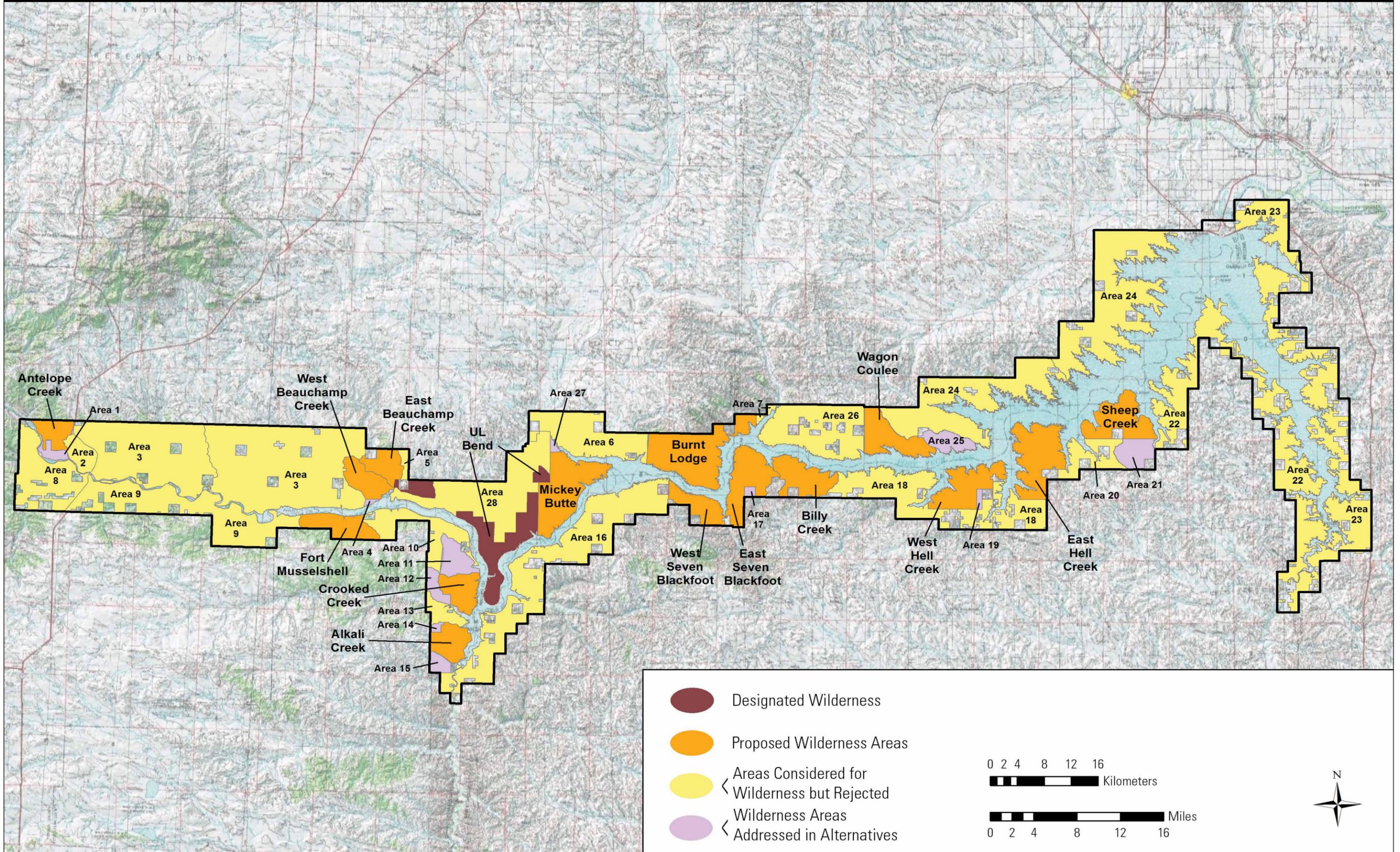


Figure A. Map of the wilderness review areas for the Charles M. Russell and UL Bend Refuges.

Figure A (wilderness)

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 portions 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 forested 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.

E.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.

Table B. Wilderness inventory for the Charles M. Russell and UL Bend Refuges.

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 (see “A” in figures 8 and 10)				
(1) No 1,836 acres	(2) Yes No bisecting roads. Part of refuge road 306 is recommended for closure in alternative B to increase connectivity with Antelope Creek proposed wilderness.	(3a) Yes, (3b) Yes Bounded by the Missouri River and Antelope Creek proposed wilderness, connecting to BLM Upper Missouri River Breaks National Monument WSA. Opportunities for land and water recreation (Missouri River).	(4) Yes River edge is important habitat for spiny softshell turtle and the American white pelican.	YES Addition to Antelope Creek proposed wilderness unit in alternatives B and D.
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. Portions of road 201, the main artery on the north side of the refuge, pass through this unit. Contains four State sections and three privately owned tracts.	(3a) No, (3b) No Auto tour route and Slippery Ann viewing area results in significant vehicular traffic. Recreation opportunities are disrupted by roads and year-round closure of the Slippery Ann area.	(4) Yes Important elk breeding habitat.	NO

Table B. Wilderness inventory for the Charles M. Russell and UL Bend Refuges.*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 (see “B” in figure 8)				
(1) No 359 acres	(2) Yes Bordered by roads 201 and 302, but does not contain any bisecting roads. Road 302 recommended for closure in alternative B.	(3a) No, (3b) Yes Too small to offer solitude. Adjacency to Missouri River provides water recreation access.	(4) No	YES Addition to West Beauchamp Creek proposed wilderness in alternative B.
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 vehicular access to the State lease south of unit.	(3a) No, (3b) No Unit 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 Fourchette Creek Recreation Area. Unit is intersected by five refuge roads and contains three State parcels.	(3a) No, (3b) No Recreation area visited by hunters and recreationists year-round. Installations and development at recreation 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 the unit and provides access to Timber Creek Bay.	(3a) No, (3b) No A road disrupts solitude, and the small size limits recreation opportunities.	(4) No	NO

Table B. Wilderness inventory for the Charles M. Russell and UL Bend Refuges.

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. Also contains Sand Creek Field Station and administrative area, multiple pri- vately owned tracts, and three State sec- tions.	(3a) No, (3b) No Contains the major east–west refuge road on the southern 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 Contains two private inholdings, two State sections, and several refuge roads that pro- vide important BLM access.	(3a) No, (3b) No Contains two impor- tant roads, 311 and 315, that cross adja- cent BLM land. Several roads and the narrow refuge prop- erty along the Mis- souri River in this unit confines recre- ation.	(4) No	NO

Table B. Wilderness inventory for the Charles M. Russell and UL Bend Refuges.*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 11 • NORTH, EAST: Refuge road 315, Missouri River • WEST: Refuge road 838 • SOUTH: Crooked Creek proposed wilderness (see “C” in figure 8)				
(1) Yes 5,568 acres	(2) Yes No interior roads and bordered by refuge roads 315, 838, and 311. Alternative B closes all or parts of roads 311, 838, and 315. Alternative D closes road 838.	(3a) Yes, (3b) Yes Closure of roads under certain alternatives increases solitude. Bordering roads allow for hunting access.	(4) Yes Important sage-grouse habitat.	YES (alternative B) NO (alternative D)
AREA 12 • NORTH: Refuge road 311 • SOUTH: Refuge road 411, Missouri River • EAST: Crooked Creek proposed wilderness • WEST: Refuge boundary (see “D” in figures 8 and 10)				
(1) No 2,826 acres	(2) Yes No interior roads and bordered by roads 311, 377, and 411.	(3a) No, (3b) Yes Surrounded by refuge roads on two sides and close to Crooked Creek Recreation Area. Bordering roads allow for hunting access.	(4) No	YES Addition to Crooked Creek proposed wilderness in alternatives B and D.
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 Recreation Area precludes primitive recreation.	(4) No	NO
AREA 14 • NORTH: County road, Crooked Creek Road • SOUTH, EAST: Alkali Creek proposed wilderness • WEST: Refuge boundary (see “E” in figures 8 and 10)				
(1) No 640 acres	(2) Yes Contains no roads and is 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 Addition to Alkali Creek proposed wilderness in alternatives B and D.

Table B. Wilderness inventory for the Charles M. Russell and UL Bend Refuges.

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 15 • NORTH: Alkali Creek proposed wilderness • SOUTH, WEST: Refuge boundary (see “F” in figures 8 and 10)				
(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 Addition to Alkali Creek proposed wil- derness in alterna- tives B and D.
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 (see “G” in figures 8 and 10)				
(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 Addition to East Seven Blackfoot pro- posed wilderness in alternatives B and D.
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 pro- vides public access to the Hell Creek Rec- reation area and near Round Butte. A mosaic of private and refuge lands. Contains refuge developments at Hell Creek Recreation Area.	(4) No	NO

Table B. Wilderness inventory for the Charles M. Russell and UL Bend Refuges.*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 19 • NORTH, WEST: West Hell Creek proposed wilderness • EAST: State section (see “H” in figures 8 and 10)				
(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 Addition to West Hell Creek proposed wil- derness in alterna- tives B and D.
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 ref- uge 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 (see “I” in figures 8 and 10)				
(1) Yes 5,726 acres	(2) Yes Only one adjacent road: refuge road 356/357.	(3a) Yes, (3b) Yes Adjacent roads pro- vide hunting access and water recreation access via Gilbert Creek Bay.	(4) No	YES Addition to Sheep Creek proposed wil- derness in alterna- tives B and D.
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. Inhold- ings and roads break up the unit, so there is not a single, contigu- ous 5,000-acre block. The Rock Creek Rec- reation Area is within the unit. It consists of multiple, privately owned cabin sites.	(3a) No, (3b) No Primitive nature of unit is broken up by numerous transecting roads.	(4) Yes Area contains signif- icant paleontological resources.	NO

Table B. Wilderness inventory for the Charles M. Russell and UL Bend Refuges.*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 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. Area is riddled with roads and developed structures.	(4) No	NO
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 (see "J" in figures 8 and 10)				
(1) No 4,843 acres	(2) Yes No interior roads or installed structures other than a navigational marker on the shoreline.	(3a) Yes, (3b) Yes Limited access on adjacent refuge road 327.	(4) No	YES Addition to Wagon Coulee proposed wilderness in alternatives B and D.
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 the Bone Trail Boat Ramp and multiple private in-holdings.	(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 (see "K" in figures 8 and 10)				
(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 Addition to Mickey Butte proposed wilderness in alternatives B and D.

Table B. Wilderness inventory for the Charles M. Russell and UL Bend Refuges.

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 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 fishing and hunting. Roads disrupt opportunities for unconfined recreation.	(4) Yes Habitat for the endangered black-footed ferret and associated black-tailed prairie dog.	NO

*Wilderness inventory numbers in this table reference labeled areas in figure A.

E.4 WILDERNESS STUDY

The wilderness inventory identified 11 areas within 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 (identified as A in figures 8 and 10).

Evaluation of Wilderness Values

BLM currently manages several wilderness study areas next to the refuge (see figure 7, map of the no-action alternative A, in chapter 3). 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 11 recommended wilderness study areas are free from private inholdings and interior roads and are next to existing, proposed Charles M. Russell Refuge wilderness areas.

To improve the naturalness of the following wilderness study areas, this CCP and EIS’s alternative B recommends the closure of refuge roads next to the following units: Antelope Creek WSA, Crooked Creek WSA, and Wagon Coulee WSA.

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 wilderness 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, West Beauchamp Creek 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 11 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 would 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 would 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 all 11 wilderness study areas would be fully compatible with current and proposed refuge management, and none of the resource values identified above would be foregone or adversely affected as a result of designation.

E.5 DEVELOPMENT of CCP and EIS ALTERNATIVES

The Service has evaluated four alternatives in this CCP and EIS for managing wilderness on the refuge (refer to table C and to the wilderness analysis under section 5.7 in chapter 5 for a full discussion of the effects). All CCP and EIS 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.

Alternative A

Alternative A is the no-action alternative, and there would be no modifications to existing wilderness acreage (see figure 7, map of alternative A, in chapter 3 and figure A).

Alternative B

Alternative B emphasizes management that improves the abundance of wildlife populations. To achieve this goal the Service is recommending 11 additions or adjustments to current wilderness units for alternative B. These additions all are denoted by a “Yes” in the “Qualifies as a wilderness study area” column in table C. These additions to current, proposed wilderness would improve landscape scale habitat conser-

Table C. Summary of wilderness study areas (WSAs) recommended in the CCP alternatives for the Charles M. Russell and UL Bend Refuges.

WSA unit ¹	Unit name	Acres	Recommended in alternatives			
			A	B	C	D
1(A)	Antelope Creek	1,836	No	Yes	No	Yes
4 (B)	West Beauchamp Creek	359	No	Yes	No	No
11(C)	Crooked Creek 1	5,568	No	Yes	No	No
12 (D)	Crooked Creek 2	2,826	No	Yes	No	Yes
14 (E)	Alkali Creek 1	640	No	Yes	No	Yes
15 (F)	Alkali Creek 2	2,240	No	Yes	No	Yes
17(G) ²	East Seven Blackfoot	640	No	Yes	No	Yes
19 (H)	West Hell Creek	641	No	Yes	No	Yes
21 (I)	Sheep Creek	5,726	No	Yes	No	Yes
25 (J)	Wagon Coulee	4,843	No	Yes	No	Yes
27(K) ²	Mickey Butte	550	No	Yes	No	Yes
Total acres by alternative			0	25,869	0	19,942

¹ Wilderness study area unit numbers in this table reference labeled areas in figure A and figures 8 and 10.

² Wilderness study area Unit 17 (G) was not included in alternatives B and D and wilderness study area Unit 27 was not included in alternative D (K) in the released draft CCP and EIS due to discrepancies in map review.

vation capabilities. The total net wilderness acreage increase would be 25,869 acres. The additions are shown in figure 8 (map of alternative B) in chapter 3.

Alternative B also recommends the closure of refuge roads next to the following recommended wilderness study areas to improve naturalness: Antelope Creek WSA, Crooked Creek WSA, and Wagon Coulee WSA.

Alternative C

Alternative C aims to expand wildlife-dependent recreational opportunities and economic uses while protecting wildlife populations and their habitat. To maintain maximum, mechanized access for recreation this alternative does not propose any wilderness study areas be recommended for inclusion in the National Wilderness Preservation System. Like alternative A, this alternative would result in no modifications to existing wilderness acreage (see figure 7, map of alternative A, in chapter 3 and figure A).

Alternative D

This alternative has an emphasis on promoting natural ecological processes with minimal management to promote biological diversity, biological integrity, and environmental health. Through this alternative the Service would expand or adjust nine proposed wilderness units by recommending adjacent wilderness study areas be considered for inclusion in the National Wilderness Preservation System. This would allow more efficient management of large landscapes.

The nine wilderness study areas that are recommended in alternative D follow: Alkali Creek 1 WSA, Alkali Creek 2 WSA, Antelope Creek WSA, Crooked Creek WSA, Mickey Butte WSA, Seven Blackfoot WSA, Sheep Creek WSA, Wagon Coulee WSA, and West Hell Creek WSA. This alternative would result in a net gain of 19,942 acres (see figure 10, map of alternative D, in chapter 3).

Two wilderness study areas are not recommended in alternative D. Crooked Creek 1 WSA is not recommended to allow the most management options for wildlife-dependent recreational use and the use of prescribed fire and livestock grazing in this area's habitat unit. West Beauchamp Creek WSA is bordered by the heavily recreated refuge road 302. To maintain access for wildlife-dependent recreation, this area is excluded from alternative D.

In summary, alternatives B and D would result in the establishment of new wilderness study areas. These areas would become proposed wilderness following transmission to the United States President per 610 FW 4.23. An act of Congress is required for all proposed wilderness units to then become designated wilderness.

E.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, areas for which a final determination of suitability and recommendation for wilderness designation in the record of decision for the CCP and EIS is pending, and areas recommended for wilderness designation in a final CCP and awaiting approval by the

Director. The Service considers areas recommended by the Director “recommended wilderness.”

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 F

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 artemisifolia</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. tridentata 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

<i>Scientific name</i>	<i>Common name</i>
<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>	buttecandle
<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. pennsylvanica</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>	Canadian milkvetch
<i>A. crassicaulus</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

Scientific name	Common name
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

<i>Scientific name</i>	<i>Common name</i>
<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
<i>Polygonaceae</i>	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 chrysocarpa</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
Limnitiinae	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. hydaspae</i>	hydaspae 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>Sources: 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

<i>Scientific name</i>	<i>Common name</i>
<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

<i>Scientific name</i>	<i>Common name</i>
<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*#

<i>Scientific name</i>	<i>Common name</i>
<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

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