

CHAPTER 5—Environmental Consequences



Patience Wiederrick / USFWS

Sunrise at Lake Bowdoin

This chapter provides an analysis of the potential effects on the environment associated with the implementation of the management alternatives for the Bowdoin National Wildlife Refuge Complex, Montana. The U.S. Fish and Wildlife Service assessed the environmental consequences of implementing each of the alternatives on the physical, biological, socioeconomic, and cultural resources of the refuge complex.

Note: Environmental consequences for two separate analyses—(1) proposed divestiture of Lake Thibadeau National Wildlife Refuge, and (2) proposed action to address the salinity and blowing salts issues at Lake Bowdoin—are described in chapters 3 and 6, respectively, and are not repeated here.

5.1 Analysis Methods

The determination of effects is evaluated at several levels including whether the effects are adverse or beneficial and whether the effects are direct, indirect, or cumulative with other independent actions. In addition, the duration of effects is used in the evaluation of environmental consequences.

Direct effects are those where the effect on the resource is immediate and the direct result of a specific action or activity. Examples of a direct effect include the effect of trail construction on vegetation along the trail or the effect of hunting on wildlife.

Indirect, or secondary, effects are those induced by implementation actions but that occur later in time or farther removed from the place of action through a series of interconnected effects. Examples of indirect effects include the effects on downstream water quality from an upstream surface disturbance or the effect that recreational use along a trail may have on nearby plant communities.

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 action regardless of what agency (Federal or non-Federal) or person undertakes such other actions” (40 CFR 1508.7).

Impacts are often described in terms of their context, intensity, and duration. The duration of effects are either short term or long term. Short-term effects would persist for a period of 3–5 years and would consist primarily of temporary disturbance due to habitat restoration or facility construction and subsequent revegetation efforts. Long-term effects would last more than 5 years after project initiation and may outlast the 15-year lifespan of the CCP. Many long-term effects consist of long-term benefits to wildlife habitat resulting from management actions.

5.2 Effects Common to All Alternatives

The following potential effects would be similar under for each of the three alternatives:

- Implementation of the management direction (goals, objectives, and strategies) would follow the refuge complex’s best management practices.
- Management activities and programs would avoid and minimize adverse effects on federally threatened and endangered species, to the extent possible and practicable.
- The refuge complex staff, contractors, researchers, and other consultants would acquire all applicable permits, such as those for future construction activities.

The sections below describe in more detail other effects expected to be similar for each alternative.

Regulatory Effects

As indicated in chapter 1 of this draft CCP, the Service must follow Federal laws, administrative orders, and policies in the development and implementation of its management actions and programs. Among these mandates are the National Wildlife Refuge System Improvement Act of 1997, the Endangered Species Act of 1973, the Clean Water Act of 1977, and compliance with Executive Order

11990–Protection of Wetlands and Executive Order 11988–Floodplain Management. The implementation of any of the alternatives described in this draft CCP and EA would not lead to a violation of these or other mandates.

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 draft CCP and EA would disproportionately place any adverse environmental, economic, social, or health effects on minority or low-income populations compared with the general public.

The Service is committed to ensuring that all members of the public have equal access to the Nation’s fish and wildlife resources, as well as equal access to information that would enable them to participate meaningfully in activities and policy shaping.

Cultural Resources

All of the alternatives would enhance cultural resources through protection of existing resources and extension of protection to newly discovered cultural resources.

There have been limited cultural resource surveys performed on the refuge complex, so additional surveys would be required before any new construction or excavation to fully satisfy provisions of the National Environmental Policy Act and other applicable acts and policies related to historical and archaeological resources.

Potentially negative effects from construction of trails or facilities would require review by the Mountain–Prairie Region’s archaeologist and consultation with the Montana State Historic Preservation Office.

Climate Change

The actions proposed in this draft CCP and EA would conserve or restore land and habitat, thus retaining existing carbon sequestration throughout the refuge complex. This would contribute positively to efforts to mitigate human-induced global climate change.

The use of prescribed fire, which releases carbon dioxide, would result in no net loss of carbon because new vegetation would quickly replace the burned-up biomass. Overall, there should be little to no net change for carbon sequestered on the refuge complex from any of the management alternatives.

As it relates to global climate change, documenting the long-term changes in vegetation, species, and hydrology is an important part of research and monitoring. Adjustments in management may be necessary over time to adapt to a changing climate.

The refuge complex would continue to reduce its carbon footprint by using renewable energy and green technologies such as wind and solar energy.

Geology and Soils

All alternatives would positively affect soil formation processes on the refuge complex. Some disturbance to surface soils and topography would occur at locations selected for (1) administrative, maintenance, and visitor facilities; (2) removal and eradication of invasive plant species; and (3) restoration of native habitat.

5.3 Description of Consequences

Management actions are prescribed in the alternatives as a means for achieving the vision and goals for the refuge complex, while responding to issues raised by Service managers, the public, and governmental partners. Because management would differ for each alternative, the environmental and social effects resulting from implementation would likely differ as well.

The environmental consequences discussed in this chapter are the estimated potential effects on a resource from carrying out the actions of an alternative. “Chapter 3—Alternatives” presents the management scenario for each alternative that could create the consequences described here. The effects of each of the three alternatives—alternative A (no action), alternative B (proposed action), and alternative C—are described under the major resource topics described throughout this document.

In addition, table 5 (find in “Chapter 3—Alternatives”) summarizes the alternatives’ actions and the associated consequences as described below.

Upland Habitat and Associated Wildlife

This section discusses the effects of alternatives pertaining to native grassland, disturbed grassland, invasive species, shelterbelts, habitat protection and acquisition, and greater sage-grouse.

Native Grassland in Alternative A (No Action)

Using various management techniques (including burning, grazing, and resting periods), native grasslands would be maintained at current conditions providing marginal habitat for many grassland-nesting birds. The current management regime would maintain the dominance of clubmoss and increaser species while minimizing the regeneration of other native grasses and forbs. (Increaser species are those plants, primarily grass species, that increase or expand in response to grazing or herbivory. Many of these are introduced species, such as brome, that flourish in less diverse and disturbed habitats.)

Currently, management actions are based on outside research and do not follow an established management plan. When management actions such as livestock grazing or burning do take place, there is no evaluation of habitat response. A lack of on-refuge experimentation, planning, and monitoring may result in undesirable habitat modifications and a continued decline of native grasslands.

Native Grassland in Alternative B (Proposed Action) and Alternative C

The Service would manage native grasslands to mimic the natural processes of burning and grazing (including timing and frequency). Rather than just maintaining the grasslands in their current condition, this would enhance the native grasslands with emphasis on restoring dominant historical communities that are still found within the refuge complex. Native plant species diversity would increase, providing improved habitat for most grassland-nesting birds, particularly those identified as target species (refer to table 13 in chapter 7) and other resident wildlife. However, any management practice, such as prescriptive grazing, that disturbs native areas may result in nonnative plant infestations if not closely monitored and treated. This type of monitoring can be very time-consuming and would require additional partners and staff.

Developing a management plan for grassland habitat would focus efforts and resources on the most critical needs using the latest proven technologies while guiding future management.

Disturbed Grassland in Alternative A (No Action)

Disturbed grasslands that were planted to DNC would be periodically treated using various techniques including burning, grazing, haying, clipping, and resting periods. Without rejuvenation (such as reseeding), most of the disturbed grasslands

have lost optimal species composition and structure needed for many nesting grassland birds.

As resources became available, cropland on waterfowl production areas would be restored to mainly native grasses and forbs, which increase plant diversity and nesting habitat for grassland birds and other wildlife. Since native plantings may take time to become established, planting DNC on hillsides and highly erodible lands would quickly stabilize soils while providing cover and nesting habitat for some grassland-nesting birds. To maintain the habitat qualities that make this type of grass seeding attractive to wildlife, these lands would require continual maintenance wherever prescribed management actions are used.

Disturbed Grassland in Alternative B (Proposed Action) and Alternative C

Same as alternative A, plus management would focus on the restoration of historical native plant communities in all disturbed grasslands, not just cropland. Converting these areas to native grasses and forbs that support the habitat needs of the selected target upland species (refer to table 13 in chapter 7) would provide greater plant species diversity and attract a wider variety of grassland-nesting birds. There would be considerable cost and effort to restore and maintain native grasslands.

Two short-term consequences of planting native vegetation would be (1) low-quality habitat for the first few years, and (2) the increased possibility of allowing invasive plants to become established. Due to the arid environment of the Bowdoin National Wildlife Refuge Complex, establishment of the native plantings may take several years and require annual maintenance of invasive plants until native vegetation gains a dominant edge.

By removing DNC from the landscape, some bird species that select for the composition provided by DNC may be displaced. In addition, managing grasslands for target bird species may reduce habitat for other nonselected, but desirable, species.

Invasive and Nonnative Species in Alternative A (No Action)

The Russian olive control effort has been slow and ineffective due to a lack of staff and funding needed to address the tremendous expanse of the invasion. Without comprehensive and consistent treatment of rapidly spreading Russian olive trees, they would continue to fragment the native grasslands, which would negatively affect migratory grassland birds and other native wildlife. This loss of habitat would prevent the refuge complex from meeting the purposes for which its units were established.

Russian olive trees provide food, cover, and nesting and perching sites for some birds and mammals, but this includes nest predators (such as magpie, raptors, raccoon, and skunk) and nest parasites (such as brown-headed cowbird).

Using early detection and rapid response to control or eradicate small infestations of invasive and noxious species protects habitat. Lack of treatment on widespread infestations such as crested wheatgrass continues to provide low-quality nesting habitat and allows these infestations to spread into native areas, resulting in degradation of more upland-nesting habitat.

Invasive and Nonnative Species in Alternative B (Proposed Action)

Same as alternative A, except that refuge complex staff would work with the Service's Montana Invasive Strike Team and other partners to ensure that treated areas are mapped, restored with native plant species, monitored, and re-treated as necessary to prevent reinvasion. This would allow more efficient use of resources due to improved awareness, planning, treatment, and monitoring.

Large, contiguous blocks of grassland habitat would be restored with the removal of nonnative woody vegetation, particularly Russian olive trees. These larger blocks of unfragmented grassland habitat would provide nesting and cover habitat for a variety of grassland-dependent birds and other native wildlife, including the target species identified in table 13 in chapter 7. Predation of nests and young would be reduced and additional nesting territories would be provided. Restoration and followup treatments would eradicate Russian olive trees from target areas, preventing additional invasive plant problems. Species that feed and roost on Russian olive trees may migrate to native and other wooded habitats on and off the refuge complex. Initially, there would be some negligible loss of carbon sequestration from the removal of nonnative trees and shrubs, but the restored grassland and benefits to native wildlife would offset this.

Through partnerships, the Service would develop an education and outreach program that discusses the impacts of Russian olive trees on native habitat and wildlife, and would provide information on native trees (instead of nonnative Russian olive trees) to plant. Educating the public about the impacts of Russian olive trees may reduce off-refuge seed sources and increase off-refuge native plantings for the benefit of native wildlife.

Staff would conduct experiments within the refuge complex to determine the best methods for reducing crested wheatgrass and for restoring treated sites to native grasses. These experimental treat-

ments would result in an effective, long-term treatment program and restore native grasslands, which would improve habitat for grassland-dependent birds.

Invasive and Nonnative Species in Alternative C

Same as alternative B, except that, through partnerships, the Service would increase the annual acreage treated, with an emphasis on preventing further encroachment of crested wheatgrass and Russian olive trees into native grassland. This would more quickly reduce monotypic stands of Russian olive trees and crested wheatgrass infestations while native prairie habitat would be improved and restored. This would require additional staff and money to treat, restore, and monitor targeted sites.

Shelterbelts in Alternative A (No Action)

The Service is not currently managing shelterbelts in the refuge complex, so shelterbelts would gradually deteriorate while continuing to cause fragmentation of the surrounding grassland and would serve as seed sources for invasive trees and shrubs. They provide marginal habitat for various wildlife species, including nest predators and parasitic species such as magpie and brown-headed cowbird.

Shelterbelts in Alternative B (Proposed Action) and Alternative C

Excluding the office compound, the Service would remove all shelterbelts to create more contiguous blocks of grassland habitats and restore these areas to prevent invasive plants from encroaching. No additional shelterbelts would be permitted. Upland-nesting conditions would immediately improve, with restoration and less fragmentation, while seed sources for invasive plants would be eliminated.

Habitat Protection and Acquisition in Alternative A (No Action)

Grassland habitat protection would continue at current levels that, over the 15-year time period, could result in 8,000 acres being protected. Most of these acres would be protected under grassland easement contracts from willing sellers. Fee-title acquisitions would be minimal. Land acquisition in fee title would focus on in holdings and “round-outs” of current Service lands. The Service would offer easement contracts to willing sellers within the wetland management district whose lands meet minimum qualifications for the Montana realty program. Through the addition of fee-title land and easement acquisi-

tions, grassland habitat would be permanently protected and managed for the benefit of wildlife.

Alternative funding sources, in addition to yearly allocations of Migratory Bird Stamp Act monies, would be pursued. These additional resources would offer more flexibility in working with willing landowners for acquisitions. Protection of upland habitats would be more immediate and provide long-term protection of grassland for migratory birds and native, resident wildlife.

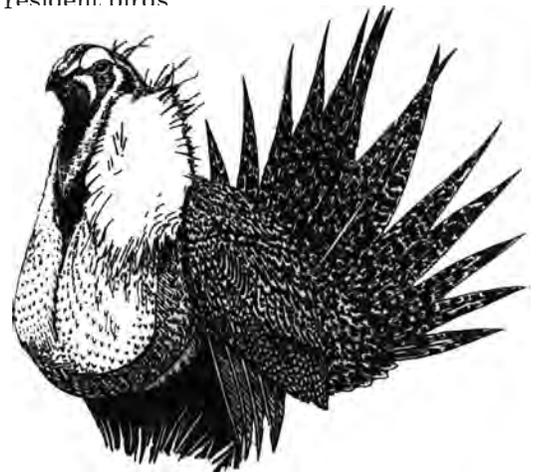
Habitat Protection and Acquisition in Alternative B (Proposed Action) and Alternative C

Same as alternative A, plus the Service would identify, using HAPET data, critical priority areas for protection including large tracts of native prairie with wetland complexes. This would ensure that the most critical waterfowl breeding and nesting habitats are given priority and protected, as resources and opportunities become available. Focusing easement acquisitions on tracts of land with native prairie and wetland complexes would keep the native landscape intact and reduce habitat fragmentation, while accommodating the needs of the livestock grazing community.

New acquisitions for waterfowl production areas would be evaluated, and proposals for purchases would be submitted for approval. Purchases in fee title would not only increase the amount of land managed primarily for wildlife but also provide additional wildlife-dependent recreational opportunities. This would provide additional opportunities for wildlife viewing and would address the overcrowding of areas currently open to hunting.

Greater Sage-Grouse in Alternative A (No Action)

Protecting existing habitat for greater sage-grouse would continue to provide protected, quality habitat for these resident birds



Greater Sage-Grouse in Alternative B (Proposed Action) and Alternative C

Same as alternative A, except that identifying all potential sage-grouse habitat would allow the Service to better manage, protect, and restore or enhance it. Restoring sagebrush habitat to these waterfowl production areas would provide additional nesting and feeding habitat for greater sage-grouse, currently a candidate species for listing under the Endangered Species Act.

Wetland Habitat and Associated Wildlife

This section discusses the effects of alternatives pertaining to managed wetlands, natural wetlands, riparian habitat, water rights, habitat protection and acquisition, wildlife disease, invasive species, and threatened and endangered species.



Dave Menke / USFWS

The sora finds refuge and a nest site in emergent vegetation.

Managed Wetlands in Alternative A (No Action)

Management of water levels and drawdowns in developed wetlands would continue to mimic natural wetland cycles, thereby maintaining high levels of productivity for wetland plants and invertebrates.

By continuing current management activities, the Service anticipates a positive effect on one or more of the following: waterfowl production, shorebird migrations, and production of wetland plant and animal foods.

The use of prescribed fire and prescriptive grazing and haying to consume or remove wetland vegetation would improve nutrient recycling and help control invasive plants. In addition, the Service would treat monotypic stands of cattails and invasive plants such as Canada thistle in dry wetland basins or in wetland edge areas. Reduction in cattails would negatively affect certain species such as red-winged blackbirds and marsh wrens; however, wetland habitats managed with fire, grazing, haying, and other mechanical and chemical treatments should benefit other nesting species such as marbled godwit and Wilson's phalarope. Reduction in the extent of cattails should also improve migratory habitat for ducks and shorebirds. Russian olive trees would be removed as resources allow.

Maintaining perennial grass cover around wetland perimeters would minimize negative effects such as sedimentation.

Managed Wetlands in Alternative B (Proposed Action)

Same as alternative A, except additional emphasis would be placed on improving habitat diversity within wetland habitats. Improving vegetative diversity would also improve plant structural diversity, invertebrate diversity, seed diversity, and food resources within wetlands. More staff and equipment would improve the Service's ability to maintain, repair, and manage facilities (such as water control structures, levees, and dikes) needed to adequately manage modified wetlands. Additional biological staff could enhance management capabilities, thereby improving habitat for wetland birds and other native wildlife.

Herbicide applications, which could be used to expedite the restoration process, potentially could have short-term negative effects; however, herbicide applications are expected to decrease following restoration activities. The short-term negative effects would be offset by the long-term improvements to wetland habitat.

Managed Wetlands in Alternative C

Same as alternative B, except that construction of new infrastructure would facilitate and improve the capability to manage these wetlands, which would increase habitat for migratory wetland birds. The new infrastructure would be expensive to construct initially and to maintain.

With additional biological staff, monitoring of sedimentation in wetlands would be beneficial in maintaining productive and functioning wetlands for migratory birds and other wildlife. Removal of sedimentation would require planning and additional funding and equipment to restore these wetlands.

Natural Wetlands in Alternative A (No Action)

The lack of resources and staff to effectively restore and maximize the potential of natural wetlands would result in many missed opportunities to provide important habitat for wetland-dependent wildlife.

With the current staffing level, control of invasive plants and cattail in wetlands would continue on a small scale; therefore, some wetland habitat for migratory birds would be improved as invasive plants were controlled or eradicated, but many natural wetlands would remain unproductive for most species.

Natural Wetlands in Alternative B (Proposed Action)

Same as alternative A, except additional natural wetlands would be restored while current wetlands would be properly managed and includes the treatment of invasive plants and noxious weeds. This would create more quality habitat for migratory birds.

Natural Wetlands in Alternative C

Same as alternative B, plus monitoring of sedimentation would determine maintenance needs and improve the health and productivity of natural wetlands.

Riparian Habitat in Alternative A (No Action)

Excluding cattle from riparian areas should allow these areas to revegetate naturally with the potential of introducing nonnative or invasive species. Riparian habitat would be protected and improved by controlling or eradicating small infestations of invasive and noxious species, including Russian olive.

Riparian Habitat in Alternative B (Proposed Action)

Same as alternative A, except that identifying and mapping invasive species would allow more efficient use of resources through improved awareness, planning, treatment, and monitoring. Monitoring of

treated areas would help in determining the best method of control and would also remove the seed source for reinvasion.

Restoration of native species would provide habitat for riparian-dependent wildlife species. Species that feed and roost on Russian olive trees may relocate to native forested areas on the refuge complex or onto adjacent wooded lands.

Riparian Habitat in Alternative C

Same as alternative B, plus native tree plantings would provide vertical structure and additional nesting, roosting, and food sources for native birds and other wildlife. Planting trees would be costly and time-consuming.

Water Supply and Rights in Alternative A (No Action)

The Service would continue to exercise its water rights on all Service-owned lands. Water supply and rights (provided under the MOA with Reclamation) for the Bowdoin National Wildlife Refuge would continue to be exercised. However, current funding levels would not allow for the purchase of additional water to adequately manage all wetlands in the Bowdoin Refuge, resulting in a loss of habitat for wetland-dependent wildlife, including nesting habitat for the threatened piping plover.

Water Supply and Rights in Alternative B (Proposed Action) and Alternative C

Same as alternative A, except that the Federal reserved water rights would be adjudicated for all Service-owned lands in the refuge complex. A water rights compact for Bowdoin National Wildlife Refuge between the Montana Department of Natural Resources and Conservation and the Service would be finalized. The Service would buy water from the Malta Irrigation District when additional water is available from the Milk River Project. This additional water may improve water quality while providing the water resources necessary to properly manage and expand wetland habitats, including nesting habitat for the threatened piping plover. There may be substantive costs associated with acquiring these additional water deliveries.

Habitat Protection and Acquisition in Alternative A (No Action)

Wetland habitat protection would continue to occur at current rates, which over 15 years would result in protecting about 500 acres. Most of these acres would be protected under wetland easements from

willing sellers; easement contracts would only be offered to willing sellers within the wetland management district. Fee-title acquisitions would be minimal but focus on inholdings and “round-outs” of current Service lands. Through the addition of fee-title land and easement acquisitions, wetland habitat would be permanently protected and managed for the benefit of migratory and native resident wildlife.

Alternative funding sources, in addition to yearly allocations of Migratory Bird Stamp Act monies, would be pursued. These additional resources would offer more opportunities and flexibility in working with willing landowners for acquisitions. Protection of these wetlands would be widespread and immediate.

Habitat Protection and Acquisition in Alternative B (Proposed Action) and Alternative C

Same as alternative A, plus the Service would use HAPET data to identify priority wetland complexes. This would ensure that critical waterfowl breeding and nesting habitats are given priority and protected as resources and opportunities become available. Focusing easement acquisitions on tracts of land with high wetland densities would protect wetland diversity in the landscape. Wetland diversity is essential to the life cycle needs of wetland-dependent wildlife.

New acquisitions for waterfowl production areas would be evaluated, and proposals for purchases would be submitted for approval. Purchases in fee title would not only increase the amount of land managed primarily for wildlife but also provide additional wildlife-dependent recreational opportunities.

Wildlife Disease in Alternative A (No Action), Alternative B (Proposed Action), and Alternative C

Rising or fluctuating water levels would be avoided on areas that are hotspots for outbreaks of avian botulism by continuing to avoid water deliveries to Lake Bowdoin during late spring and summer. Monitoring and checking Lake Bowdoin and other wetland units would help staff to detect disease. Dead bird samples would be sent to the Service’s wildlife health lab to determine the cause. In areas where visitors frequent, the Service would collect and dispose of dead birds. This early detection and immediate response to avian disease outbreaks would alert staff and the public to the presence of diseases that can be transmitted to humans, such as West Nile virus.

Ongoing review and updating of the refuge complex’s Disease Contingency Plan, along with staff

training to recognize causes and effects of disease, would increase early detection of outbreaks. Knowing what to do in the case of an outbreak or an encounter with an individual sick or dead animal would help keep health risks to Service employees and the public to a minimum. Disease monitoring and cleanup can take up a great deal of time, money, and equipment.

Invasive and Nonnative Species in Alternative A (No Action)

The refuge complex would continue to use the current methods of chemical and mechanical treatments (such as prescribed fire, haying, and grazing) to control known infestations of invasive plants and noxious weeds to create open-water habitat for migratory birds. Early detection and rapid response would be used to control and possibly eradicate small infestations around wetlands, dikes, and water delivery systems.

Invasive and Nonnative Species in Alternative B (Proposed Action) and Alternative C

Same as alternative A, plus the Service would use mapping technology to identify and locate areas with invasive plant infestations. Mapping these areas would increase awareness of infestations, assist in planning treatments, help determine the best method for treatment, and monitor the effectiveness of the treatment. The refuge complex would share this information with county weed boards to aid in identifying species, new infestations, and seed sources and to prioritize treatment sites. The removal of Russian olive trees from around wetlands, dikes, and water delivery systems would improve habitat for grassland-nesting birds, protect wetland management infrastructure, and increase the Service’s ability to properly manage wetland resources.

Threatened and Endangered Species in Alternative A (No Action)

The Service would continue to conduct surveys and monitoring for piping plovers at the Bowdoin and Hewitt Lake refuges during the breeding and nesting seasons. Staff would continue to work with the Montana Piping Plover Recovery Committee to preserve and improve piping plover habitat on these refuges with the resources that are available.

Without additional water or improved infrastructure for water management, Piping Plover Pond would not receive water before the plover’s breeding season during most years. Since this species establishes breeding territories almost immediately on

their spring arrival, they would bypass the refuges for other, less protected areas if the habitat were not available when they arrived. This could have negative effects on the overall survival and nesting success of the species.

Threatened and Endangered Species in Alternative B (Proposed Action) and Alternative C

Same as alternative A, except that additional water would permit the Service to manage wetlands specifically to attract piping plovers, which may keep them from migrating to less protected off-refuge sites. Increased water management would allow the Service to ensure that wetlands with the best habitat for breeding and nesting piping plovers are filled to the desired capacity before the spring migration without having to fill other wetlands first.

Visitor Services

This section discusses the effects of alternatives pertaining to hunting and trapping, fishing, wildlife observation and photography, environmental education and interpretation, public access, and cultural resources.

Hunting and Trapping in Alternative A (No Action)

The hunting and trapping program would continue at current levels and would provide hunters with many opportunities to hunt without compromising the purposes of the refuges and district. Updated public use brochures and the refuge complex Web site would be readily available to hunters. Hunter success and satisfaction would continue to be monitored using the hunter registration kiosk.

Roads, trails, and water management structures on Bowdoin Refuge would continue to be protected from burrowing animals. Trapping of mammalian predators can increase nest success as well as protect vulnerable birds that have been live-trapped for banding or disease detection.

Hunting and Trapping in Alternative B (Proposed Action) and Alternative C

Same as alternative A, plus, working with the State, the refuge would be able to determine if the opportunity for big game archery hunting was compatible and could be provided safely and with minimal impact to other users.

Fishing in All Alternatives

Recreational fishing opportunities would continue to be allowed along the Milk River at McNeil Slough WPA and along Beaver Creek at Beaver Creek WPA. However, these areas would continue to receive little or no use, because there are many superior fishing areas within 100 miles of the Bowdoin Wetland Management District. The remainder of the wetlands within the refuge complex have minimal habitat or do not support game fish and have not traditionally been open to fishing, so there would be no loss of opportunity.

Wildlife Observation and Photography in Alternative A (No Action)

Wildlife observation and photography opportunities would remain constant. Maintaining the 15-mile auto tour route and current established trails and blinds would continue to provide visitors of all abilities with opportunities for quality wildlife observation and photography.

Wildlife Observation and Photography in Alternative B (Proposed Action) and Alternative C

Same as alternative A, plus the wildlife observation and photography opportunities would be expanded and enhanced to create a greater understanding and appreciation of the refuge complex resources. The proposed wildlife-viewing area along the auto tour route and accompanying scopes and informational panels would enhance the visitor experience while educating them about the resources they were viewing.



Marsh Wren
© Cindie Brunner

Expanding opportunities for wildlife observation and photography may lead to increased disturbance to wildlife and trampling of vegetation, particularly if visitors travel off roads and trails. Additional staff and resources would be required to manage the increased public use to minimize disturbance to wildlife and habitat and to educate photographers and wildlife observers about the local resources.

Environmental Education and Interpretation in Alternative A (No Action)

Environmental education would minimally meet the public demand. Opportunities to educate students and the public about the values and purposes of the refuge complex and the Refuge System would be lost. This lack of understanding and appreciation would result in a loss of support for the refuge complex and the Refuge System.

Public outreach and interpretation would meet minimum Service requirements. Visitors would have adequate resources to independently learn about the refuge complex environment; however, there would be minimal contact with refuge complex staff to answer questions and offer further interpretation.

Refuge complex brochures and other independent interpretive materials would continue to minimally meet Service requirements and may not be updated due to limited resources.

Environmental Education and Interpretation in Alternative B (Proposed Action)

With additional resources and greater support from a Friends group and the local community, the Service would be able to expand interpretive, outreach, and educational programs that would increase the public's understanding and appreciation of the refuge complex's purposes, resources, and issues. Visitation by the public as well as school groups and organizations would increase, allowing the Service to reach a broader audience. This increased use of the refuge complex would have to be managed to minimize disturbance to wildlife and habitat.

Environmental Education and Interpretation in Alternative C

Same as alternative B, plus increased use of the Bowdoin Refuge as an outdoor classroom by schools and other organizations would result in a greater awareness and appreciation for preserving the area's natural resources. By educating teachers, a greater number of students would receive this environmental education.

Public Access in Alternative A (No Action)

The Service would continue to provide access for compatible, wildlife-dependent public use by maintaining public roads and trails as needed and providing current public use information and regulations in the refuge complex brochures and Web site. Foot traffic would not be limited except in the closed area surrounding the shop, residences, and equipment storage areas.

Public Access in Alternative B (Proposed Action)

Same as alternative A, except closing the eastern portion of Bowdoin National Wildlife Refuge to all foot traffic from the beginning of the waterfowl-hunting season through November 30 would provide additional sanctuary for waterfowl and shorebirds. Increased use within the hunting portion of the refuge could lead to more conflicts between hunters and nonhunters and a decrease in overall visitor satisfaction during hunting season. However, hunters may have a greater opportunity to hunt waterfowl, because this sanctuary area may encourage birds to remain on the refuge, including the areas open to hunting. Additional staff time and resources would be required to enforce and manage the closure.

The Service would improve public access to compatible wildlife-dependent use activities on Black Coulee National Wildlife Refuge by developing the entrance road and parking for the reservoir. Maintenance costs and needs would increase.

The Service would work with Phillips County to determine the feasibility of rehabilitating the remaining portion of Old U.S. Highway 2 that runs through the north end of the refuge to enhance and expand wildlife-viewing opportunities at Bowdoin National Wildlife Refuge. Although the road would be safer to travel, additional use of this road may lead to increased littering and may cause additional wildlife disturbance and wildlife fatalities from collisions.

Public Access in Alternative C

Same as alternative B, plus, with improved access through landowner cooperation, public use opportunities and visitor satisfaction may increase on Creedman Coulee Refuge.

Cultural Resources in Alternative A (No Action)

The Service would continue to inventory the refuge complex's cultural resources only as required by

section 106 of the National Historic Preservation Act or by documenting incidental findings during the course of other duties. Although this would protect cultural resources from planned Service activities, the lack of a complete inventory for the refuge complex would make it difficult to adequately protect cultural resource sites from vandalism and theft.

Cultural Resources in Alternative B (Proposed Action)

The Service would increase the awareness of local cultural resources by working with the zone archaeologist, contractors, local tribes, and universities to complete a comprehensive inventory for the refuge complex. Increased awareness and mapping of cultural resources would enhance protection of these assets from Service and public activities and would provide additional information to interpret the unique cultural history of this area.

Cultural Resources in Alternative C

Same as alternative B, plus the Service would create an interpretive cultural resource display to educate the public about the early history of the refuge complex. Knowledge of these resources could augment appreciation for local history.

Partnerships

This section discusses the effects of alternatives pertaining to partnership development and maintenance and on energy development on Service lands.

Partnership Development and Maintenance in Alternative A (No Action)

Existing partnerships would be maintained, allowing the refuge complex to expand its capability to restore, maintain, and protect wildlife habitats and complete projects of mutual interest on Federal or private lands where the Service has acquired interest. Continued support of the Partners for Fish and Wildlife Program would improve relationships between the Government and landowners while protecting additional habitat on private lands.

Partnership Development and Maintenance in Alternative B (Proposed Action)

Same as alternative A, plus additional partnership opportunities would be sought to expand the Ser-

vices' ability to restore, maintain, and protect wildlife habitats on surrounding public and private lands. These new relationships would include private landowners, Federal and State agencies, and nongovernmental organizations. These partnerships would focus on addressing impacts from offsite activities on neighboring land.

Working with Phillips County to determine if it is possible to repair the road surface of old U.S. Highway 2 through Bowdoin Refuge could improve travel conditions and provide a quality experience for wildlife-dependent recreation. Because of these better travel conditions, vehicles may travel at higher rates of speed, which may result in animals being harmed or killed.

Partnership Development and Maintenance in Alternative C

Same as alternative B, plus the Service would develop a new partnership between the Bowdoin Refuge and Burlington Northern Sante Fe railroad, which would provide a cleaner landscape and a quality refuge experience for visitors. Invasive species control and monitoring would also be addressed as train and maintenance vehicle traffic via the railroad right-of-way would be a source for new infestations.

The partnership with the Malta Irrigation District would focus on the removal of Russian olive trees on the Dodson South Canal. The removal of these trees would eliminate a major seed source for invasions on Bowdoin Refuge.

Energy Development on Service Lands in Alternative A (No Action)

As natural gas exploration and production continued to occur within the refuge complex, partnerships with energy developers would continue to encourage good stewardship practices on Service-interest lands. Negotiating surface use activities on lands owned or covered by a Service easement would help minimize impacts while preserving the maximum amount of wetland and grassland habitat. The negotiations for easement disturbance are limited to the reasonable protection of the Service's acquired interest. On Service-owned land, approved energy development operations would be conducted without interference to Service operations and be of minimal size compatible with efficient mineral operations. The refuge complex would modify its operations to support future Service and other related energy policies for Federal lands.

Displacement of wildlife would continue as habitat fragmentation increased due to the growing demand for energy.

Energy Development on Service Lands in Alternative B (Proposed Action)

Same as alternative A, plus the Service would evaluate current or potential effects of energy development on lands proposed for protection. This evaluation would help the Service in making decisions that are more informed and prioritize acquisition proposals.

Energy Development on Service Lands in Alternative C

Same as alternative B, except the Service would not acquire an interest where there is the potential for energy development. This may lessen impacts to future easements caused by oil and gas development, but may discourage landowners from entering into any agreements with the Service, thus limiting the quantity and quality of lands available for easement or acquisition.

Operations

This section discusses the effects of alternatives pertaining to staff, operations, facilities, and signs and boundary designation.

Staff in Alternative A (No Action)

All refuge complex programs would remain at current staffing levels. Service lands would continue to degrade due to a significant lack of resources and staff to conduct adequate monitoring of management actions.

The single maintenance worker would not be able to keep up with the constant demand of maintaining and repairing facilities throughout the refuge complex. This would result in a continued accumulation of maintenance projects and the degradation of facilities and infrastructure.

Refuge complex tours and environmental education programs would continue to be a low priority due to the limited staff and resources available to conduct these programs. There would continue to be a loss of opportunities to interact with and teach visitors about the purposes and values of the lands and waters within the refuge complex. It would become increasingly difficult for a single collateral-duty law enforcement officer to enforce regulations and protect the refuge complex's natural resources while performing the employee's primary duties.

Staff in Alternative B (Proposed Action) and Alternative C

Additional funding would be required for the salary, equipment, facilities, and office space needed for the additional positions needed to accomplish the objectives and strategies in this alternative. Additional staff and volunteers would be able to adequately manage and protect habitats and provide visitors with increased quality wildlife-dependent programs and recreational opportunities. Refuge complex facilities and equipment would be maintained and most maintenance issues would be resolved.

Research and monitoring could be conducted that would be used to evaluate management actions and adapt and improve biological and visitor services programs.

Visitor services, environmental education opportunities, outreach, natural resource protection, and facility and public protection would be enhanced, as well as the total visitor experience.

Operations in Alternative A (No Action)

Current levels of funding would continue to be inadequate to acquire the staff, facilities, equipment, and other resources necessary to properly manage and protect refuge complex resources, maintain facilities



Cattail

and equipment, and provide quality visitor services programs across a four-county area. This would continue to result in habitat degradation and a growing backlog of maintenance projects.

Operations in Alternative B (Proposed Action) and Alternative C

Added funding would ensure enhancement and protection of refuge complex resources and facilities while improving safety and expanding opportunities for visitors to participate in wildlife-dependent activities and programs. The refuge complex facilities and infrastructure would be maintained and many of the backlogged maintenance projects would be completed.

A substantial increase in annual funding for staff, equipment, and supplies would be necessary for the full implementation of these alternatives.

Facilities in Alternative A (No Action)

Facilities would continue to be inadequate for staff office space, visitor services, seasonal housing, and storage of vehicles and heavy equipment. Currently, all heavy equipment and many vehicles are stored outside continually exposing them to the elements, which may cause them to deteriorate more rapidly. Vehicles, boats, and other equipment not stored in secure buildings would be susceptible to theft and vandalism.

Current office space would continue to be sufficient for current, permanent staff only but would not accommodate any seasonal staff or volunteers. The visitor contact area is small and would not allow for interpretive materials such as displays and educational materials, which would result in lost opportunities to educate and interact with visitors. Insufficient seasonal housing would continue to make it difficult to recruit additional seasonal staff and volunteers needed to conduct refuge complex programs.

Facilities in Alternative B (Proposed Action) and Alternative C

Additional staff would have proper office space with all the necessary technology and equipment to conduct their job and programs properly and meet the needs of the public. Visitors would feel more welcome in an expanded visitor contact area and have new opportunities to learn about the refuge complex's resources through interpretation.

Additional office and living space (for seasonal staff and volunteers) would accommodate the additional staff needed to properly manage and protect refuge complex resources while providing visitors

quality, safe wildlife-dependent recreation and programs. Additional housing would also aid in attracting qualified seasonal employees to a semiremote station that has limited housing nearby. Equipment would be protected from environmental damage, reducing maintenance costs. The refuge complex would reduce its carbon footprint by using green technologies such as wind and solar power.

Signs and Boundary Designation in Alternative A (No Action)

Current signs and boundary posting on most Service lands are adequate and the visiting public, adjoining neighbors, and surrounding communities are aware of the locations and permitted activities for the refuges and waterfowl production areas. Hewitt Lake National Wildlife Refuge has been challenging to post and fence properly because the lake bottom is co-owned by a private landowner. This boundary line would require the fence to be constructed in a wetland basin, which would pose a significant flight hazard to waterfowl when the lake fills. A land exchange on Hewitt Lake Refuge would make the refuge easier to manage and post and make the land ownership less confusing to the public.

Signs and Boundary Designation in Alternative B (Proposed Action)

Same as alternative A, except that wildlife losses would be reduced and wildlife would be able to migrate more freely as fences were replaced with wildlife-friendly designs.

Signs and Boundary Designation in Alternative C

Same as alternative B, except a unique boundary sign for the limited-interest (privately owned) refuges would reduce confusion over land ownership and permitted uses.

Socioeconomics

The socioeconomic impacts are described by alternative.

Socioeconomics in Alternative A (No Action)

There would not be any significant change in the net economic contribution of Bowdoin National Wildlife Refuge Complex to the local economy through visitor spending and employee earnings. Current visitation levels are expected to remain the same,

contributing \$594,000 to the local economy. Employment would remain at five full-time employees, which would contribute \$316,000 in employee spending to the local economy. Combining visitation and employment effects, the total direct economic impact of alternative A on the study area would remain about \$910,000 annually.

Socioeconomics in Alternative B (Proposed Action)

Increases in employment and visitation to the refuge complex would cause an increase in the economic activity the Service generated in the local area. Visitation would increase due to enhanced outreach efforts and increased wildlife production as a result of habitat improvements. Visitation is expected to increase to 28,750 visitor days, 25,875 of which would be from nonlocal visitors. Assuming nonlocal hunters spent an average of \$55 per day and wildlife observers spent an average of \$18 per day, visitation to the refuge complex would generate roughly \$683,000 in annual local spending.

The addition of 7.5 employees would increase employment from 5 full-time equivalents to 12.5. The new employment would increase the salary of all refuge complex employees to about \$866,500. Assuming 79 percent of employee earnings were spent locally, employee spending would contribute about \$684,500 to the local economy, which represents an increase of \$368,500. Combining visitation and employment effects, the total direct economic impact would be nearly \$1,367,500 annually. This represents an increase of \$457,500 over current levels.

Socioeconomics in Alternative C

Increases in visitation and employment would cause a slightly more significant increase in economic activity generated by the refuge complex compared with alternative B. Visitation would increase due to enhanced outreach efforts, programming, and other offerings at the refuge complex. Visitation is expected to increase to 30,000 visitor days per year under this alternative, where 27,000 are from nonlocal visitors. Assuming nonlocal hunters spent an average of \$55 per day and wildlife observers spent an average of \$18 per day, visitation to the refuge complex would generate roughly \$713,000 in annual local spending.

The addition of seven and one-half, full-time-equivalent employees would match the increased

employment in alternative B, also contributing about \$684,500 to the local economy due to employee spending. Combining visitation and employment effects, the total direct economic impact would be nearly \$1,397,500 annually. This represents an increase of \$487,500 over current levels.

5.4 Cumulative Impacts

Cumulative impacts include the incremental effects of the actions for an alternative when added to past, present, and reasonably foreseeable future actions. Cumulative impacts can be the result of individually minor effects, which can become significant when accumulated over time.

The Council on Environmental Quality regulations that implement the National Environmental Policy Act requires mitigation measures when the environmental analysis process detects possible significant impacts on habitat, wildlife, or the human environment.

None of the activities proposed for the CCP are expected or intended to produce significant levels of cumulative environmental impacts that would require mitigation measures. Nevertheless, the final CCP would contain the following measures to preclude significant environmental impacts from occurring:

- Federally listed species would be protected from intentional or unintended impacts by having activities banned where these species occur.
- All proposed activities would be regulated to lessen potential impacts to wildlife, fish, and plant species, especially during sensitive reproductive cycles.
- Monitoring protocols would be established to determine goal achievement levels and possible unforeseen impacts to resources and for application of adaptive resource management to ensure wildlife and habitat resources as well as the human environment are preserved.
- The Service could revise and amend the CCP after 5 years of implementation, for application of adaptive resources management to correct unforeseen impacts that occur during the first years of the plan.

