5 Environmental Consequences

This chapter provides an analysis of the potential effect on environmental resources associated with implementing the management alternatives for the refuge complex. Medicine Lake NWR and the Northeast Montana WMD are combined because the actions and impacts for alternatives are similar. Lamesteer NWR is separated because the actions and impacts are different. Potential impacts are identified for each alternative on the basis of the conditions for each site, a review of relevant scientific literature, and the best professional judgment of Service staff and other resource specialists. Table 12, at the end of this chapter, summarizes the environmental consequences for each alternative for comparison.

5.1 Methods

This chapter is organized by resource. Each alternative was evaluated on the basis of its physical, biological, economical, and social factors, as well as how well it addresses the refuge purpose. Many of the potential management actions and resource impacts are similar among the alternatives; these are identified and combined. Differences in management actions and resource impacts are also discussed. Tables 12 and 13 provide a summary of consequences for comparing the alternatives.

Effects are evaluated at several levels, including whether they are adverse (negative) or beneficial (positive), and whether they are direct, indirect, or result in cumulative effects when combined with other reasonably foreseeable actions.

Direct effects are consequences for which the impact on the resource is immediate and is a direct result of a specific action or activity. Examples of direct effects include prescribed fire on habitat or hunting on wildlife. Indirect effects result from an action but are further removed in space or time. Examples include the upstream or downstream effect on water quality from diverting water on the refuge for management purposes, and the use of fertilizers upstream and its impact on the refuge. A cumulative effect is defined by the Council on Environmental Quality as "the impact of the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). Reasonably foreseeable future actions are described at the end of chapter 3, Affected Environment.

Impacts are often described in terms of their context, intensity, and duration. Where possible, the planning team used objective data, but where it was not available, relative comparisons were used. Although sometimes subjective, comparisons are helpful for understanding the level of impact. The planning team used the following impact threshold definitions:

Negligible—The impacts would be at the lower levels of detection (< 5 percent change).

Minor—The impact would be detectable (a change of 5-24 percent).

Moderate—Impacts would be readily apparent (change of 25-50 percent).

Major—Impacts would be severe, or if positive, would have exceptional beneficial effects (a change of >50 percent).

Impacts are often described as either short-term or long-term. Short-term effects would persist for a period of between 3 and 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 the project was initiated, and could outlast the 15-year life of the CCP.

Jerry Rodriquez/USFWS

The amount of prescribed fire varies by alternative.

5.2 Effects Common to all Alternatives

Effects common to all alternatives are discussed under three main topics: environmental justice, physical environment (air, geology, soils, and water), and cultural resources. Under some alternatives, the effects would be similar if not the same.

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 environmental assessment would disproportionately affect one or more minority groups compared to the general public. The Service is committed to ensure 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 participate meaningfully in activities and policy shaping.

Physical Environment (Air, Geology, Soils, and Water)

Air quality, geology, soil, and water are all components of the physical environment. Several of the management alternatives would result in similar impacts to these resources.

Habitat and Wildlife Management

None of the alternatives would result in long-term effects on air quality. Class I air quality would be maintained.

Under all alternatives, the use of prescribed fire would be conducted under approved fire management plans (appendix F). While the amount of prescribed fire varies by alternative, the use of prescribed fire under any alternative could result in localized, short-term releases of soil particles (or dust) into the air. As the section "Global Warming" in Chapter 4 states, the use of prescribed fire releases CO_2 directly into the atmosphere from the biomass consumed during combustion. However, this causes no net loss of carbon, because new vegetation quickly replaces lost vegetation (Dai et al. 2006). Alternative C would result in the most amount of smoke and particle releases in the air, followed by alternative B. Alternative A (no action or current management) would result in the least amount of prescribed fire.

In alternatives B and C, the use of habitat restoration tools, such as prescribed fire or grazing, temporarily would reduce above ground vegetation cover in a treatment area and could result in localized short-term erosion and soil loss. However, vegetation would recover quickly and stimulate root growth; fire typically stimulates new plant growth and increases the vigor of existing plant communities, thus improving soil conditions.

Visitor Services

Under all alternatives, hunting, fishing, and other wildlife-dependent recreational activities would have negligible impacts on environmental factors such as air quality, geology, and soils.

Refuge Operations

Under all alternatives, refuge operations, including maintenance of existing roads and development of visitor services facilities, could result in negligible-to-minor, short-term erosion and soil losses. Successful revegetation and planned use of erosion control measures during soil disturbances would minimize any short-term impacts.

Wilderness Management

All current water rights held by the Service that affect the wilderness area would continue to be protected, and water quality sampling would continue on a quarterly basis.

Cumulative Impacts

The cumulative impacts are similar for all alternatives.

Oil and Gas Development

None of the management activities for any of the alternatives would contribute measurably to the cumulative effects on air quality, soils, and water resources from oil and gas development within the Medicine Lake NWR and the Northeast Montana WMD. Under alternatives B and C, increased staff would be available to develop partnerships with the petroleum industry, environmental groups, and interested parties to ensure desired air and water quality is maintained.

Cultural Resources

Under all alternatives, there would be compliance with the NHPA and other pertinent cultural resource laws. Alternative C would include a cultural resource survey in areas of the refuge complex that have a high potential for cultural resources.

Cumulative Impacts

None of the management activities for any of the alternatives would contribute measurably to any cumulative effects on cultural resources within the refuge complex.

5.3 Environmental Consequences for Medicine Lake NWR

The environmental consequences of implementing alternative A are discussed for the following: Habitat and Wildlife; Endangered, Threatened, and Rare Species; Wilderness Management; Visitor Services; Research; Refuge Operations; and Socioeconomic Resources.

Habitat and Wildlife Management

Habitat and wildlife management activities under alternative A would affect the native prairie, planted grasslands, managed wetlands, wildlife, endangered species, and land acquisition as described in the following sections.

Native Prairie

At the current level of management, at least 50 percent of native prairie habitat on refuge complex lands would be maintained in the desired native plant community for that site. Some management treatments that mimic natural disturbance regimes, such as prescribed fire, control of invasive species, and rest, would be used to enhance native species. However, annual treatments would be minimal; very limited grazing has been used, and this would be eliminated.

Under alternative A, management treatments would result in some minor short-term reductions in the amount of available habitat, and could negatively affect some individuals of a species. In the long term, any treatments would result in minor beneficial effects for native species.

Prescribed fires would be conducted according to approved vegetation and fire management plans. Depending on timing, prescribed fire can improve plant vigor and help control weeds and maintain desired species composition.

Using herbicides to control weeds would provide a long-term benefit to native plant communities by reducing weed competition, maintaining desired species composition, and improving the production of grasses and sedges. Herbicides may result in reduced plant growth after the initial application, but vegetation would be expected to recover quickly in subsequent growing seasons.

Treatment applications would not be spread evenly throughout the refuge complex, and many prairie areas would remain untreated, due to lack of time, money, or staff. Many areas would continue to be left unmanaged, and prairie vegetation quality likely would deteriorate.

In the long term, without disturbances needed to maintain diverse and healthy prairies, native plant diversity would decrease, and invasions of nonnative vegetation grasses would increase. Residual vegetation would build up and suppress new growth. Nonnative plants would increase due to the decreased health of the native plants and their inability to compete. An overall long-term decline in native prairie quality throughout the refuge complex would occur, and some prairie nesting habitat cover would lose its attractiveness and effectiveness for many species of migratory birds, especially species of management concern.

Under this alternative, management of nonnative, invasive plants would be conducted when feasible, at levels required to meet legislative mandates. Emphasis would be on ensuring that negative impacts to neighboring landowners do not increase. It would not be possible to adequately manage invasive plants on refuge complex lands, and the spread of most invasive plants would increase over time.

Protection and conservation of native prairie on privately owned lands would increase on 1,000 or more acres annually through easements, fee-title purchases and other partnerships. These protection measures extending refuge management would have minor beneficial effects for grassland species.

Planted Grasslands

Currently, the refuge complex maintains plantings of dense nesting cover consisting of tall (>1 foot) tame (noninvasive, introduced) wheatgrasses with between 20 and 40 percent legumes on at least 50 percent of previously cultivated areas. Stands receiving appropriate management through haying, burning, interseeding, and cultivating would provide nesting habitat for waterfowl and numerous other bird species.

In sites that do not receive these periodic treatments, the physical structure and plant species composition degrade, and the quality of habitat for nesting waterfowl would decline over the long term. At current staffing and funding levels, it would not be possible to adequately manage all sites, and management would be sporadic. Each year, up to 5 percent of dense nesting cover plantings at the most degraded sites would be hayed, cultivated and reseeded to restore the stand's health. Many declining plantings seldom would receive treatment, and grassland quality and nesting bird habitat would

deteriorate. Any long-term beneficial effects from periodic treatments would be minimal.

Attempts to plant native species on previously cultivated lands would be limited because of the high costs of native seeds and the intensive management required for successful plantings. Fewer than 100 acres per year would be planted with native species.

Managed Wetlands

Impacts to wetlands may include agricultural runoff, sedimentation, surface and ground water contaminations, oil and gas contaminants, changes in the volume of ground and surface water, alkalinity, and influences of artificial nitrogen. These threats apply to all wetlands, not just actively managed or naturally influenced wetlands. There is little the refuge can do to reduce many of these threats and impacts outside of managing water levels, monitoring quality and quantity, and working with others to limit impacts.

Managing water levels to provide for a variety of wetland conditions would better protect and enhance the wetlands and would provide long-term benefits. When necessary, spring runoff would be diverted from Big Muddy Creek into Medicine Lake. Active management of water levels throughout the year could reduce the amount of water needed for the wetlands at various times of the year, allowing for more base flows downstream of the refuge. Dewatering wetlands that historically have experienced avian botulism outbreaks would make them unattractive for waterfowl and could minimize the number of bird deaths.

Wildlife

Over time, populations of waterfowl and other nesting grassland birds likely would decrease in the refuge complex, as the long-term health of grasslands declined, making high-quality nesting habitat less available. Predators still would be controlled in priority areas of the refuge to maintain good-to-excellent densities of nesting waterfowl and colonies of island-nesting birds. Refuge complex wetlands would continue to provide good brood-rearing, foraging, and migration habitat for waterbirds.

For grassland-nesting songbirds, refuge complex staff would have no information about limiting factors, threats, or reproductive success. Without this information, the refuge staff likely would have less management success for improving habitat conditions for these declining species. Some wildlife species would benefit from the limited acquisition of more habitat.

Endangered, Threatened, and Rare Species

The population of threatened piping plovers breeding in the refuge complex is the focus of site-specific management that would continue through a cooperative effort with The Nature Conservancy, state agencies, and private landowners. At current population objectives of 100 adults and a fledging rate of 1 chick per nesting pair, breeding piping plover populations could decrease within the refuge complex over time because of the overall decline in habitat quality. Fledgling rates must be at least 1.30 chicks per nesting pair for the population to remain stable, and higher for it to increase.

Whooping cranes would continue to be protected from accidental shooting through a refuge closure on sandhill crane and tundra swan hunting. Bald eagles, recently removed from the list of threatened species determined by the Endangered Species Act (June 2007), would continue to use the refuge complex during migration, and would be protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Other, as yet undocumented, rare flora and fauna might be negatively affected if the quality of refuge complex grasslands declines over time. However, land acquisitions could help protect additional populations of rare flora and fauna.

Land Acquisition (Northeast Montana WMD)

The quantity of privately owned wetlands within the refuge complex would increase by a negligible degree, due to the acquisition of wetland easements on up to 100 acres annually from willing sellers, and through outreach, education, and habitat improvement projects on up to 330 acres annually. This would result in minor beneficial effects in the long term for habitat and wildlife.

Wilderness Management

Minimal management of the wilderness would continue to protect wilderness resources from environmental degradation. Any planned action would attempt to mimic historic natural disturbances, such as prescribed fire every 10 to 15 years. Invasive plants would expand due to lack of resources for adequate control. The quality of wilderness habitat would decline slowly due to lack of management actions. When time and staff budgets allow, the refuge complex could conduct an inventory of plant resources and develop partnerships with groups and individuals to protect the wilderness.

Visitor Services

Areas of the refuge that are closed to the public would remain closed to limit disturbance to migratory birds and resident wildlife. Visitation would remain about the same. Law enforcement would be sporadic due to lack of staff resources, which could result in some negative impacts to wildlife. Trampling of vegetation due to public use would be minor. Refuge staff would not be able to address many of the issues, such as hunting opportunities and better access, that might be raised by the public during the planning process.

Research

Projects would continue as opportunities arose, but would not be a priority. There would be limited value in monitoring and evaluating the success of habitat restoration. Projects generally would result in negligible, short-term, direct effects on habitat and wildlife as a result of disturbance.

Refuge Operations

Operating at below-minimum staffing levels set by the regional office would have moderate to major negative impacts on the refuge complex's habitat, wildlife, and wilderness resources in the long term. Existing staff levels would not be able to provide adequate law enforcement coverage or provide adequate level of visitor services.

Socioeconomic Resources

Alternative A assumes continued management for habitat conservation and public use. Management of wildlife-dependent recreational activities would stay the same, and visitation would remain at current levels.

For purposes of evaluating and comparing the alternatives, staff would increase from 9 to 14 full-time employees (filling vacant positions would account for most of these increases), and the current level of between 7 and 10 part-time employees would stay the same, for a total increase of 5 FTEs.

Under alternative A, there would be no significant change to the local economy from the net economic contribution of Medicine Lake NWR and the Northeast Montana WMD through visitor spending, although staff increases would result in some positive impacts.

Current visitation levels are expected to remain the same, contributing about $202,350 to the local economy in visitor spending.

Refuge employment would vary between 12 and 17 FTEs, including seasonal staff. Filling vacant positions would increase employment, resulting in a total annual salary amount of $600,000. Assuming 79 percent of employee earnings are spent locally, employee spending would contribute about $471,000 to the local economy.

Combining visitation and employment effects, the total economic impact of alternative A would be approximately $673,000. This represents an increase of $138,500 over current conditions, considering several positions are vacant.

Cumulative Impacts

The implementation of alternative A would not contribute measurably to cumulative effects on socioeconomic conditions found within the refuge complex.

Alternative B—(Proposed) Increase Native Prairie Conservation and Restoration

The environmental consequences of implementing alternative B are discussed for the following goal topics: Habitat and Wildlife; Wilderness Management; Visitor Services; Research; Refuge Operations; and Socioeconomic Resources. The impacts on endangered, threatened, and rare species are discussed under Habitat and Wildlife Management because many of the impacts are related to habitat management activities.

Habitat and Wildlife Management

Habitat and wildlife management activities under alternative B would affect the native prairie, planted grasslands, managed wetlands, wildlife, endangered species, and land acquisition as described in the following sections.

Native Prairie

Implementing the CCP under alternative B would improve protection, enhancement, and restoration of native prairie within the refuge complex. At least 75 percent of native prairie on refuge complex lands would be maintained in the desired plant community. Prairie currently declining in quality would be managed with prescribed grazing, fire, and rest to maintain and restore the health of native plant species and associated fauna.

Similar to alternative A, management treatments would result in minor short-term impacts, including temporary losses of available habitat. In the

long term, however, treatments would result in moderate-to-major benefits for habitat and wildlife. Management efforts would be spread evenly throughout the refuge complex, and about 50 percent of the refuge could have some disturbance treatments each year.

Under alternative B, there would be a moderate increase in the amount of short-term disturbance within the refuge and WMD. With increased staffing and funding, regularly prescribed disturbances, such as fire and grazing, would help maintain long-term prairie health. Native plant diversity would increase, and nonnative plants would decrease in the long term due to improved health of native plants and management treatments.

Additional staff would allow for more progress toward reducing invasive species, rather than merely holding them in check within the refuge complex borders. More staff would allow for better monitoring to detect new infestations. The amount of useable habitat for prairie fauna would increase by a moderate amount.

Protection and conservation of native prairie on privately owned lands would increase under this alternative. Alternative B over 15 years would add 3,500 acres within the WMD through easements and fee-title purchases. Another 5,000 acres of privately-owned lands would benefit from outreach, technical assistance, education, and habitat improvement projects. Protection efforts would result in moderate-to-major benefits for grassland wildlife species on and off the refuge complex.

Preventing prairie lands from being converted to agriculture crops and other uses, and enhancing the quality of remaining prairies would provide long-term beneficial effects for declining native prairie birds, such as Sprague's pipit, Baird's sparrow, lark bunting, chestnut-collared longspur, marbled godwit and burrowing owl, and all types of prairie wildlife.

Planted Grasslands

Under alternative B, there would be minimal emphasis on dense nesting cover plantings. Instead, 2,000 acres of land that previously was cultivated would be restored to native prairie plant species. This effort would reduce cover for some bird species, but would increase habitat for native birds by a moderate amount, compared to alternative A. Native prairie plants would be expensive to establish in the short term, but are ecologically superior to seed sources from genetically altered plants (cultivars) and introduced plants established in old croplands. Restoration of native grassland would eliminate the need for frequent cover reseeding, haying, and disking. It would include warm and cool-season grasses and forbs, with priority given to areas that have become decadent and overrun by undesirable nonnative cool-season grasses.

Under alternative B, increased staffing and funding would improve management of planted grasslands. As many as 2,000 acres would be reseeded with native species, improving the diversity of grassland habitat for prairie wildlife. Outreach and technical assistance would increase from 1,000-plus acres in alternative A to more than 2,500 acres on private lands in alternative B. Tame grass plantings would convert highly erodible cropland or other environmentally sensitive acreage to year-round vegetative cover. They also would reduce soil erosion and wetland sediments, improve water quality, and establish better wildlife habitat. Conserving these lands would provide long-term benefits for migratory bird populations and provide substantial habitat for resident birds and other wildlife.

Managed Wetlands

The management strategy for alternative B would be similar to alternative A, and the long-term beneficial effects would be similar.

Wildlife

Native wildlife populations, particularly migratory grasslands bird species, would benefit from a moderate amount of wildlife management, compared to alternative A. Large increases in the amount of grassland and wetland habitat available to nesting birds would increase nesting populations, and continued strategic predator control would improve the nesting success of all migratory birds on the refuge and the WMD. Because there would be less emphasis on dense nesting cover plantings, some bird species could be negatively affected to some degree. Monitoring key species or groups of species would help evaluate habitat improvement activities. Expanded wildlife monitoring would cover a greater array of bird species, including all colony-nesting and shorebirds, and other prairie wildlife species.

Long-term wildlife diversity and health would be improved by better management of refuge complex grassland habitat and more high-quality protected grasslands and wetlands on privately owned lands. Grassland birds and other prairie fauna would benefit from more control of invasive plants in the refuge complex grasslands, because more useable habitat would be available. As in alternative A, continued predator management of land mammals and gulls would improve nesting success for many bird species. By identifying limiting factors and effects of management on breeding grassland songbirds and shorebirds, the refuge complex could focus on improving nest-success rates for species of concern.

Endangered, Threatened, and Rare Species

Similar to alternative A, the population of threatened piping plovers breeding in the refuge complex would continue to be the focus of site-specific management through a cooperative effort with The Nature Conservancy, state agencies, and private landowners. Under alternative B, fledgling rates of at least 1.13 chicks per nesting pair could be maintained through more conservation and restoration measures within the refuge complex and adjacent lands and more staff to work with oil companies.

Whooping cranes would continue to be protected from accidental shooting through a refuge closure on sandhill crane and tundra swan hunting. Bald eagles would continue to use the refuge complex during migration. Over time, the quality of refuge complex grasslands would improve by a moderate amount, compared to alternative A, which likely would protect undocumented, rare prairie flora and fauna. Future land acquisitions in the Northeast Montana WMD, conservation easements, or habitat improvement projects on private lands also would help protect additional populations of rare plants and wildlife.

Land Acquisition (Refuge)

Under alternative B, the Service would purchase fee-tile conservation easements on approximately 1,780 acres from willing landowners within the approved boundaries, increasing the size of the Medicine Lake NWR. The intent would be to maintain biological diversity and related wildlife values, and to conserve the natural systems and processes of the refuge. The land parcels would range in size from 37 acres to 612 acres.

The Service would purchase important wetland and grassland acres in fee-title or through conservation easements to expand protected conservation lands within the project area. Long-term benefits would include protecting habitat integrity, reducing fragmentation, and enhancing historic plant, animal, and insect biological diversity of native prairie habitats (figure 9, appendix G).

Wilderness Management

The quality of wildlife habitat would be enhanced by a moderate amount in alternative B, with greater emphasis on management practices. These would mimic historic natural disturbances, such as prescribed fire every 4 to 8 years. Invasive plants would be controlled faster with fewer and smaller infestations. With more professional staff, the refuge complex would conduct additional inventories to determine the numbers, kinds, and extent of plant and wildlife resources.

Visitor Services

Under this alternative, public use could increase by between 50 and 60 percent, from 16,000 to 25,000 visitors annually, due to additional opportunities for hunting, fishing, interpretation, wildlife observation, photography, and environmental education. These moderate-to- major increases would occur over the 15-year plan. An increase in public use would be accommodated by facility improvements and more staff, partnerships, and outreach. With more public use, there would be more potential for negative impacts to native prairie and wildlife, but an increase in law enforcement and education would offset impacts to habitat and wildlife to some degree. Most visitor activities would occur north and east of Medicine Lake (figure 12). The Homestead Unit would remain open to hunting.

The refuge complex generally would not experience significant increases in trail or road development unless it was necessary to minimize habitat or wildlife disturbance or for other safety-related reasons. Trail development would not be a priority, and only new foot-trail construction would be considered for restored prairie sites. Constructing trails would result in the direct long-term loss of vegetation, although this would be negligible-to-minor in the long term. More trail and road use could result in some fragmentation for wildlife or invertebrate species, trampling and soil erosion, and the introduction of noxious weeds. Appropriate trail maintenance and visitor management would limit those impacts.

Areas of the refuge that are closed to the public would remain closed to limit disturbance to migratory birds and resident wildlife. However, most of the new lands would be open to hunting, providing more public access. An increase in hunting opportunities could reduce disturbance to habitat and wildlife by dispersing hunters, but also could increase disturbances in areas that were not hunted previously. The species of wildlife hunted on the refuge probably would not change, and it is not likely that increased hunting would have more than a negligible-to-minor impact in additional wildlife taken during the hunting seasons (chapter 4, Affected Environment, Hunting). Even with habitat restoration activities, ring-necked pheasants would continue to be the most popular species hunted.

Visitor facilities would be upgraded. This could include developing additional interpretive signs, an observation blind, improved public access points, and a contact station that would be open weekly during normal business hours. These upgrades would result in direct short- and long-term impacts to vegetation, but they likely would be negligible overall. Upgrading facilities in existing disturbed areas would minimize additional habitat impacts and wildlife disturbance.

Research

Research projects would continue under alternative B but would be ranked according to priorities and focused on measuring the effectiveness of native habitat restoration. Research projects generally would result in negligible, short-term, direct effects on habitat and wildlife as a result of disturbance.

Refuge Operations

Increased staff levels under alternative B would enable the refuge staff to achieve more habitat conservation and restoration efforts, including working with partners and the community, and would have moderate-to-major beneficial effects for habitat, wildlife, and the wilderness area. Improved visitor services would lead to greater support and appreciation for the refuge resources over time. More resources could be used to work with oil and gas companies, which could lead to greater protection of refuge complex resources.

Socioeconomic Resources

Alternative B would lead to moderate improvements in natural resource management in terms of the amount, quality, and diversity of habitat, as well as a greater emphasis on public use and visitation in management. Wildlife-dependent recreational opportunities would be enhanced to minimize visitor congestion. Hunting and fishing opportunities would expand with additional new lands opening to hunters and anglers. Wildlife observation opportunities would be enhanced with an observation blind over Medicine Lake and a staffed visitor-contact station. Education opportunities would be enhanced through better outreach to schools, volunteer opportunities, and interpretative programs on the refuge.

This alternative could increase visitation from the current level of 16,000 to 25,000 visitor days annually. The new services would require staffing to increase from 9 to 18 full-time employees, and from 14 to 20 part-time employees; an increase of about 12 positions.

Under alternative B, the refuge would experience growth in visitation and employment. The increased visits predicted under alternative B would support about $316,000 in visitor spending annually.

Employment under alternative B could increase from 12 to about 24 FTEs. Increased employment would raise the total salary for refuge employees to about $834,000. Assuming 79 percent of earnings are spent locally, employee spending would contribute about $656,000 to the local economy.

Combining visitation and employment effects, the total economic impact of alternative B would be $972,000. This represents an increase of $437,000 from current conditions.

Cumulative Impacts

The implementation of alternative B would not contribute measurably to cumulative effects on socioeconomic conditions found within the refuge complex.

Alternative C—Maximize Native Prairie Conservation and Restoration

The environmental consequences of implementing alternative C are discussed for the following goal topics: Habitat and Wildlife, Wilderness Management; Visitor Services; Research; Refuge Operations; and Socioeconomic Resources. The impacts on endangered, threatened, and rare species are discussed under Habitat and Wildlife Management because many of the impacts are related to habitat management activities.

Habitat and Wildlife Management

Under alternative C, the effects of habitat and wildlife management activities on the native prairie, planted grasslands, managed wetlands, wildlife, endangered species, and land acquisition are described in the following sections.

Native Prairie

Under alternative C, many of the long-term benefits would be similar to alternative B. The amount of native prairie that is protected, enhanced, and restored within the refuge complex would be increased by between 80 and 85 percent, 30 percent greater than alternative A, and 5 to 10 percent more than alternative B.

There would be bigger increases in staff and funding, and most staff operations would be focused on achieving restoration objectives. Of all alternatives, control of nonnative invasive species would be the greatest under alternative C, and would include state-of-the-art control methods. Canada thistle would be reduced by 60 percent, leafy spurge by 90 percent, crested wheatgrass by 30 percent, smooth bromegrass by 50 percent, and Russian olive by 95 percent. This would greatly improve the health of native prairie communities and increase useable habitat for wildlife.

Planted Grassland

Under alternative C, there would be less emphasis on dense nesting cover plantings compared to alternative A, and about the same emphasis as alternative B. Some 3,000 acres of land that had produced crops would be restored to native prairie plant species, compared to 2,000 acres in alternative B. This would reduce cover for some species, but

would increase habitat for native species by a major amount compared to alternative A, and a moderate amount compared to alternative B. More staff and funding would assist in managing planted grasslands. More plantings—up to 10,000 acres—would be reseeded with native species, improving the diversity of grassland habitat for prairie wildlife. Outreach and technical assistance would increase to more than 10,000 acres on private lands.

Managed Wetlands

The management strategy for alternative C would be similar to alternative A, and the long-term benefits would be expected to be the same.

Wildlife

Native wildlife populations would be expected to benefit by a moderate-to-major degree compared to alternative A, and by a minor degree compared to alternative B. Large increases in the amount of grassland and wetland habitat available to nesting birds would increase nesting populations, and continued predator control would improve the nesting success of these birds in the refuge and the WMD.

Expanded wildlife monitoring would cover a greater array of bird species, including all colony-nesting and shorebirds, and other wildlife species. Intensive efforts would be carried out by an expanded biology-oriented staff. Additional law enforcement and a modest addition in interpretation and education would further protect wildlife from disturbance.

Endangered, Threatened, and Rare Species

Protection of endangered, threatened, and rare species would provide benefits similar to alternative B. For piping plovers, fledgling rates of at least 1.13 chicks per nesting pair likely would be maintained through more conservation measures within the complex and adjacent lands and more staff to work with oil companies.

Over time, the quality of refuge complex grasslands would improve by a moderate amount compared to alternative A, and a minor amount compared to alternative B.

Land Acquisition (Refuge)

Under Alternative C, the refuge boundary would increase by about 8,400 acres through fee-title acquisition from willing sellers, compared to about 1,784 acres in alternative B. Much of the acreage in alternative C would connect the Homestead Unit with the main boundary of Medicine Lake NWR, although some acquisition would occur around the main unit of the refuge. About 2,900 of the 8,400 acres are within the Big Muddy floodplain. About 2,168 acres are planted grassland (CRP), 3,118 acres are native prairie, and 3,548 are cropland.

This new acreage would unite the refuge into one unit while protecting from development a river floodplain and native mixed-grass prairie. It would increase the amount of protected habitat within the refuge boundary and improve protection of habitat. Although more acreage would be acquired (about four times more than under alternative B), land within the floodplain likely would be at less risk for development regardless of whether it were acquired. The highest priority lands for habitat and wildlife values would be protected under both alternatives B and C.

Wilderness Management

Similar to alternative B, the quality of wildlife habitat would be enhanced by a moderate to major amount in alternative C as a result of the greater emphasis on habitat management practices. These practices would mimic historic natural disturbances with the use of prescribed fire every 4 to 8 years. Invasive plants would be controlled more quickly with fewer and smaller infestations. With more professional staff, the refuge complex would conduct additional inventories to determine the numbers, kinds, and extent of plant and wildlife resources.

Visitor Services

Under this alternative, public use could increase by between 50 and 60 percent, from 16,000 to 23,000 visitors annually, from additional opportunities for hunting, fishing, interpretation, wildlife observation, photography, and environmental education. Unlike alternative B, a visitor contact station would not be built. Similar to alternative B, these moderate increases would occur over the 15-year plan. An increase in public use would be accommodated by modest improvements and more staff, partnerships, and outreach. With more public use, there would be more potential for negative impacts to native prairie and wildlife, but an increase in law enforcement and education to some degree would offset impacts to habitat and wildlife. Almost all of the visitor activities would occur north of Medicine Lake (figure 12).

The refuge complex generally would not experience increases in trail or road development unless it were necessary to minimize habitat or wildlife disturbance or for other safety-related reasons. Constructing trails would result in the direct long-term loss of vegetation, although this would be negligible-to-minor in the long term. More trail use could result in some fragmentation for wildlife or invertebrate species, trampling and soil erosion, and the introduction of noxious weeds. Appropriate trail maintenance and visitor management would limit those impacts.

Areas of the refuge that are closed to the public would remain closed to limit disturbance to

migratory birds and resident wildlife. However, most of the new lands would be open to hunting, providing more public access. An increase in hunting opportunities could reduce disturbance to habitat and wildlife by dispersing hunters, but also could increase disturbances in areas that were not hunted previously. The species of wildlife hunted on the refuge probably would not change, and it is not likely that increased hunting would have more than a negligible-to-minor impact in additional wildlife taken during the hunting seasons (chapter 4, Affected Environment, Hunting). Even with habitat restoration activities, nonnative pheasants would continue to be the most popular species hunted.

Visitor facilities would be upgraded. This could include developing additional interpretive signs, an observation blind, and improved public access points. These upgrades would result in direct short- and long-term impacts to vegetation, but they likely would be negligible overall. Upgrading facilities in existing disturbed areas would minimize additional habitat impacts and wildlife disturbance.

Research

Similar to alternative B, research projects would be ranked according to priorities and focused on measuring the effectiveness of native habitat restoration. Research projects generally would result in negligible, short-term, direct effects on habitat and wildlife as a result of disturbance.

Refuge Operations

Similar to alternative B, increased staff levels under alternative C would enable the refuge staff to achieve more habitat conservation and restoration efforts, including working with partners and the community and would have moderate to major beneficial effects for habitat, wildlife, and the wilderness area. Improved visitor services would lead to greater support and appreciation for the refuge resources over time. More resources could be used to work with oil and gas companies, which could lead to greater protection of refuge complex resources.

Socioeconomic Resources

Compared to alternative A, alternative C would offer major improvements in natural resource management to increase the amount, quality, and diversity of habitat. Alternative C also provides moderate emphasis on public use and visitation compared to alternative A, but less than alternative B, because staff will focus primarily on habitat restoration and conservation efforts.

Wildlife-dependent recreation opportunities would be enhanced to minimize visitor congestion. Hunting and fishing opportunities would improve through acquisition of additional lands that would be open for hunting. Wildlife observation opportunities would be enhanced with better facilities and access. Education offerings would be enhanced over alternative A by greater outreach to schools, volunteer opportunities, and interpretative programs.

This alternative could increase visitation from the current level 16,000 to 23,000 visitor days annually. The increased visitor days predicted under alternative C would be similar to alternative B, producing $316,000 or less, depending on the type of visitor, in visitor spending annually.

Employment under alternative C is expected to increase from 12 to 29 FTEs. The increased employment would increase the refuge complex salaries for all employees to about $1,022,000. Assuming 79 percent of employee earnings are spent locally, employee spending would contribute about $803,500 to the local economy.

Combining visitation and employment effects, the total economic impact of alternative C would be $1,119,500. This represents an increase of $446,500 from current conditions.

Cumulative Impacts

The implementation of alternative C would not contribute measurably to cumulative effects on socioeconomic conditions found within the refuge complex.

Jerry Rodriquez/USFWS

Western grebe.

Table 12. Summary of the Environmental Consequences for Medicine Lake NWR and Northeast Montana WMD

Impact Topic	*Impact Category*	*ALTERNATIVE A* *No Action (Current Management)*	*ALTERNATIVE B* *Increase Native Prairie Conservation and Restoration*	*ALTERNATIVE C* *Maximize Native Prairie Conservation and Restoration*
Effects Common to All Alternatives				
Air Quality *Geology* *Soils*	*Habitat* *Wildlife* *Management*	Minor short-term localized impacts (smoke particles, erosion) from use of prescribed fire would occur, with long-term beneficial effects. Class 1 air quality would be maintained.	Minor short-term impacts from use of prescribed fire would occur, with long-term beneficial effects. Class 1 air quality would be maintained.	Minor short-term impacts from use of prescribed fire would occur, with long-term beneficial effects. Most amount of fire used. Class 1 air quality would be maintained.
	Wilderness *Management* *Visitor Services* *Refuge Operations*	Consequences would be negligible-to-minor negative impacts from public use or refuge activities and operations.	Consequences would be negligible-to-minor negative impacts from public use or refuge activities and operations.	Consequences would be negligible-to-minor negative impacts from public use or refuge activities and operations.
	Cumulative Impacts-Oil/Gas Development	None	Same as alternative A	Same as alternative A
Water Resources	*All*	All current water rights held by the Service would be protected, and active management of water resources would reduce impacts on and off the refuge.	Same as alternative A	Same as alternative A
Cultural Resources		Only cultural resources associated with an undertaking would be reviewed. There would be no pro-active identification of new resources.	Same as alternative A	Resources would be identified in high probability areas, increasing the likelihood of better planning, protection, and research opportunities.
	Cumulative Impacts	None	Same as alternative A	Same as alternative A

Impact Topic	*Impact Category*	***ALTERNATIVE A*** *No Action (Current Management)*	***ALTERNATIVE B*** *Increase Native Prairie Conservation and Restoration*	***ALTERNATIVE C*** *Maximize Native Prairie Conservation and Restoration*
Impacts on Refuge Resources				
Habitat and Wildlife	*Native Prairie*	Negligible-to-minor short-term reductions in the amount of available habitat during restoration activities could negatively affect some individuals of a species. Minor beneficial effects include minimal invasive species control, and protection and conservation of lands within the complex and adjacent private lands.	Minor short-term reductions in the amount of available habitat during restoration activities could negatively affect some individuals of a species. Moderate long-term beneficial effects include increased protection and conservation within the complex and private lands projects, plus increased invasive species control.	Minor-to-moderate reductions in the amount of available habitat during restoration activities could negatively affect some individuals of a species. Moderate-to-major long-term beneficial effects include increased protection and conservation within the complex and private lands projects, plus increased invasive species control.
	Planted Grasslands	Little restoration of cultivated lands and lack of adequate management treatments (haying, fire, interseeding, disking, grazing) would result in overall deterioration of grassland quality and amount of nesting-bird habitat.	Restoration of 2,000 acres of land with crop production history to native prairie plant species would reduce cover for some wildlife species, but would increase habitat quality and quantity for native species by a moderate amount compared to alternative A.	Restoration of 3,000 acres of land with crop production history to native prairie plant species would reduce cover for some wildlife species, but would increase habitat quality and quantity for native species by a major amount compared to alternative A and a moderate amount compared to alternative B.
	Wetlands	Careful management of water levels for a variety of conditions would improve protection and enhancement of the wetlands, could reduce some impacts and threats, and could minimize some impacts downstream.	Same as alternative A	Same as alternative A

Impact Topic	*Impact Category*	*ALTERNATIVE A* *No Action (Current Management)*	*ALTERNATIVE B* *Increase Native Prairie Conservation and Restoration*	*ALTERNATIVE C* *Maximize Native Prairie Conservation and Restoration*
Impacts on Refuge Resources, cont.				
Habitat and Wildlife, cont.	*Threatened and Endangered Species*	Focus would be on management of piping plovers breeding in the complex. Other species would be protected. Other rare flora and fauna could be adversely affected if the quality of refuge complex grasslands declines over time.	Same as alternative A, except moderate improvements to refuge complex grassland would protect undocumented, rare prairie flora and fauna.	Similar to alternative B
	Land Acquisition	Only wetland acquisitions would be within the authorized boundary (2007) or the Northeast Montana WMD (about 100 acres annually). This alternative would have a minor long-term beneficial effect within the WMD, but important wetland and grassland habitats next to the main refuge and Homestead Unit would be at risk for development or other disturbances.	1,780 acres acquired from a willing seller would protect the most important wetland and grassland habitats adjacent to the main refuge and Homestead Unit. Long-term beneficial effects include increased habitat integrity, reduced fragmentation, and enhanced flora and fauna diversity.	8,400 acres acquired from a willing seller would protect important wetland and grassland habitats and connect the Homestead Unit with the main refuge. Long-term beneficial effects include habitat integrity, reduced fragmentation, and enhanced flora and fauna diversity. This would provide the greatest protection for lands between the two units and important wetland and grassland habitats.
Wilderness Management		Minimal management of habitat would result in degradation of habitat over time from invasive species and lack of fire and grazing.	The quality of habitat in the wilderness area would be enhanced by a moderate amount. Practices would follow historical natural disturbances.	The quality of habitat in the wilderness area would be enhanced by a moderate to major amount. Practices would follow historical natural disturbances.
Visitor Services	*Hunting*	Areas currently closed to hunting would remain closed to protect migratory birds or wildlife.	Same as alternative A	Same as alternative A

Impact Topic	*Impact Category*	*ALTERNATIVE A* *No Action (Current Management)*	*ALTERNATIVE B* *Increase Native Prairie Conservation and Restoration*	*ALTERNATIVE C* *Maximize Native Prairie Conservation and Restoration*
Impacts on Refuge Resources, cont.				
Visitor Services, cont.	*Fishing*	Medicine Lake is large but shallow, and the water is alkaline by nature, so the lake is not suited for a self-sustaining sport fishery. Direct and indirect effects from wildlife disturbance would occur, but these generally would be temporary and minor.	Fishing on Medicine Lake only would reduce disturbances to wildlife on other lakes.	Same as alternative B
	Wildlife Observation and Photography	Limited activities would occur on the refuge, with negligible impacts overall.	Most activities would occur on the north and east side of Medicine Lake (the Homestead Unit would remain open to hunting) . This would reduce impacts to wildlife from increased visitation and improvements to facilities.	Same as alternative B
	Interpretation Outreach Environmental Education	Limited improved services likely would reduce the overall level of support for refuge management activities.	Improvements in facilities, access, outreach, and programs would result in better support for the refuge complex's restoration efforts. Improvements to visitor facilities would result in direct short- and long-term impacts to habitat, but the overall effect is negligible. Using existing disturbed areas would reduce disturbances to wildlife and minimize impacts to vegetation.	Same as alternative B
	Cumulative Impacts	None	Same as alternative A	Same as alternative A

Impact Topic	*Impact Category*	*ALTERNATIVE A* *No Action (Current Management)*	*ALTERNATIVE B* *Increase Native Prairie Conservation and Restoration*	*ALTERNATIVE C* *Maximize Native Prairie Conservation and Restoration*
Impacts on Refuge Resources, cont.				
Refuge Operations and Staffing		Operating at below minimum staffing levels set by the region would have moderate-to-major negative effects to the complex's resources in the long term.	Increased staff would enable the refuge to achieve habitat conservation and restoration efforts, improve visitor services, and gain support and appreciation for refuge programs. More staff resources could work with oil and gas companies to reduce impacts to the refuge complex.	Similar to alternative B, but more resources would allow for extensive habitat conservation and restoration and enable staff resources to work with oil and gas companies to reduce impacts to the refuge complex. Visitor service improvements would be more modest compared to alternative B, and could result in less support and appreciation by the public.
	Cumulative Impacts			
Socio-economic Resources		Combining visitation and employment effects, the total economic impact would be about $673,000.	Combining visitation and employment effects, the total economic impact would be about $972,000.	Combining visitation and employment effects, the total economic impact would be about $1,119,500.
	Cumulative Impacts	None	None	None

5.4 ENVIRONMENTAL CONSEQUENCES FOR LAMESTEER

Table 13 summarizes the environmental consequences by alternative forLamesteer NWR.

Table 13. Description of Consequences by Alternative for Lamesteer NWR

Issue	*Alternative A (No Action)*	*Alternative B (Proposed Action)*
Water Management	Continued dependence on annual rainfall and maintenance of dam structure is required.	Same as alternative A, except the cooperative agreement would no longer be in place, and the easement would be removed.
Habitats and Wildlife	This provides minimal habitat value for migratory birds.	Same as alternative A
Visitor Services	Hunting would continue by permission from the landowner.	Current visitor activities, including nonwildlife-dependent activities, would continue. Noncompliance with the Improvement Act no longer would be an issue.
Cultural Resources	No cultural resource management is provided unless it is initiated by the landowner.	Same as alternative A
Operations and Maintenance	This continues the current level of operations and maintenance by the Service.	Maintenance would be taken over by the landowner.
Socioeconomic Impacts	No change would occur regarding socioeconomic climate.	No change would occur regarding socioeconomic climate.