CHAPTER 5—Environmental Consequences

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Thousands of migrating birds use Complex lands each year.

This chapter discusses environmental consequences that may result from implementing the actions of each of the three alternatives. Chapter 3, "Alternatives," describes the actions that could result in the consequences described here, and chapter 4, "Affected Environment," describes resource conditions and interactions.

This chapter describes (1) effects common to all of the alternatives, (2) the environmental consequences of each alternative, and (3) the cumulative impact of the alternatives.

5.1 Effects Common to All Alternatives

All alternatives would have the same impacts related to air quality, environmental justice, socioeconomics, and global warming, as described below.

Air Quality

No adverse effects on air quality are expected. Short-term effects on air quality from prescribed burning on Complex lands would not vary significantly between the alternatives. The Great Plains Fire District staff would plan prescribed fire operations to reduce negative effects on neighbors. Rapid mop-up would mitigate the amount and duration of smoke near the ground. Use of ignition techniques that result in slow spread would reduce the amount of particulates in the air. Prescriptions would be used that require wind directions and smoke dispersal that reduce smoke impacts on neighboring occupied dwellings and roadways. Rapid mop-up would mitigate the amount and duration of smoke near the ground.

Environmental Justice

None of the alternatives considered would pose adverse environmental effects on minority or low-income populations. Access to and use of Complex lands is free.

Socioeconomics

Economic impacts are typically measured in numbers of jobs lost or gained and the associated result on income. None of the alternatives would significantly impact the economics of the surrounding area.

Global Warming

All of the alternatives would conserve vegetated habitat and retain a similar level of carbon sequestration. The use of prescribed fire, which releases carbon dioxide, would result in no net loss of carbon, due to the rapid recovery of burned vegetation. Overall, there would be little significant change in carbon sequestered between alternatives.

As it relates to global climate change, the documentation of 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.

5.2 Description of Consequences by Alternative

The following section provides a description of the effects expected for each alternative. Table 2 at the end of this chapter summarizes each alternative and its environmental consequences.

ALTERNATIVE A (NO ACTION)

Wetlands Goal

Water Quality and Quantity on Lake Andes Refuge. Complex staff would continue to work with CMCLRO to enhance the efforts of government agencies to improve water quality in Lake Andes and its watershed. Complex staff would continue to seek clarification of the Service's authority over the lake portion of Lake Andes Refuge.

Removal of high-nitrogen, high-phosphorus sediment and improved soil conservation in surrounding watersheds would improve water quality. Potential actions may include planting buffer strips to reduce agricultural runoff, fencing livestock out of seasonal drainages, and cost-sharing agricultural waste containment systems. Sediment removals and increased soil conservation would reduce algae blooms and fish kills.

The presence of carp would continue to damage water quality in Lake Andes. The feeding behaviors of rough fish agitate the water to the degree of blocking sunlight penetration, which can reduce aquatic vegetation growth and ultimately limit invertebrate food sources for waterfowl and sport fish species.

Water quantity would remain inadequate for effective management of water levels optimum for fish and wildlife.

Disease Control. Through these actions, Complex staff would continue to monitor disease on Lake Andes Refuge (especially the Owens Bay Unit) weekly during peak spring and fall migration periods. Opportunistic monitoring would continue elsewhere on the Complex. Staff would continue to contain disease within Complex lands, remove dead birds, and submit samples of dead birds to the USGS National Wildlife Health Center in accordance with the current WDCP. As a result of the limited range of disease monitoring, outbreaks off Complex lands may continue to be undetected or may be reported after containment procedures are no longer possible, which could lead to the spread of disease to other birds and increased risk to humans.

Riparian Goal

Cottonwood Restoration on Karl E. Mundt Refuge. Dams on the Missouri River would continue to erode important riparian habitats and limit the regeneration of cottonwoods, leading to a decline in cottonwood habitat. Replanting of cottonwood stands would continue to take place sporadically and only as funding and opportunities allowed. Under this alternative, cottonwood habitat would continue to reduce in size as erosion and lack of regeneration persisted. Cottonwoods are essential to bald eagles that nest and roost in these trees. The lack of cottonwood regeneration would directly impact bald eagles and other migratory bird species.

Uplands Goal

Avian Nest Predator Control. Avian nest predators—foxes, skunks, and raccoons—would remain uncontrolled by the Complex due to insufficient funding and staff. Recreational trapping and hunting of mammalian predators would continue to be allowed, although these activities would not occur to the degree at which predator populations would be controlled. As a result, nest predation would continue at the current level, which could be detrimental to waterfowl populations.

Restoration of Fee-Title Lands. Under alternative A, uplands would continue to be burned, sprayed, and grazed to improve nesting habitat. The lands would continue to be hayed to remove the buildup of vegetative litter and duff on government-owned lands (fee-title lands). Previously farmed lands that are dominated by nonnative plants would continue to be restored to desirable plant species with the aid of herbicides. However, restoration must comply with invasive plant control efforts, and this limits opportunities to plant native forbs. Nonnative trees will continue to be removed through prescribed burns and mechanical means.

Under this alternative, uplands throughout the Complex would continue to be restored to their native grass condition, but due to the lack of restoration of native forbs and the slow pace of restoration, the value of these habitats to migratory birds and insects (for example, butterflies) would continue to be inadequate.

Issues and Areas of Concern Related to All Habitats

Invasive Species Control. Under alternative A, invasive plant control methods on wetlands, uplands, and riparian habitat would remain unchanged. Canada thistle, musk thistle, leafy spurge, wormwood sage, eastern red cedar, and Russian olive are primary invaders. Smooth brome, Kentucky bluegrass, and crested wheatgrass are invasive species controlled only secondary to the primary invaders. Mechanical control methods (haying, tree cutting), chemical control methods (herbicide applications), and biological control methods (for example, flea beetles for destruction of leafy spurge) would continue to be integrated and implemented according to specific site needs. Individual infestations would be treated an average of once every 3 years. Invasive plants would continue to exist on Service lands at the current infestation level. Some neighboring landowners see Complex lands as

the source of invasive plants on their lands, and they are mandated by law to control those species on their lands. Complaints and resentment from these landowners would continue at current levels.

Habitat Protection. Complex staff would continue to acquire high-quality wetland and grassland easements. Acquisition of government-owned land (fee-title land) with high wildlife values that is next to Refuge System lands would be inspected for possible purchase if budget allows. Lands currently under Service management would continue to be protected. However, currently lands with high wildlife values within the Complex that could be protected are being lost to agriculture, urbanization, and development caused in part by the Service's slow acquisition response; private landowners sometimes wait 2–5 years or more for an offer and need a quicker response from the Service. Due to existing Service responsibilities, management of Complex lands with minimal wildlife value will continue to require diversion of personnel, funds, equipment, and other resources that could be better allocated to manage Complex lands with high wildlife value.

Complex staff will continue to monitor and enforce easement provisions and FmHA conservation easement provisions in accordance with current policies. These lands will remain protected for the benefit of waterfowl and other grassland or migratory bird species.

Complex staff would continue to pursue a conservation easement on the nearly 2,000 acres of land that falls between the North Unit and South Unit of the Karl E. Mundt Refuge. The acquisition of this conservation easement would reduce the risk of this land being developed and prevent further fragmentation of riparian habitat. Bald eagles and other migratory birds that depend on this habitat would be protected from disturbance.

On riparian habitat, the trapping and removal of nuisance beavers would continue periodically to protect and safeguard cottonwood habitat as needed. The current, low level of beaver removal would lead to continued loss of mature cottonwoods and reduced nesting and roosting sites for bald eagles and other migratory birds.

Visitor Services Goal

Hunting. Under alternative A, hunting would continue on all waterfowl production areas and the Center Unit of Lake Andes Refuge. As has been the trend in pheasant hunting over the long term, hunting would likely increase in these areas, eventually decreasing the quality of hunting experience.

Fishing. Fishing would continue on all waterfowl production areas and the Center and South Units of Lake Andes Refuge. Support would continue for CMCLRO's efforts to restore a fishery on the South Unit of Lake Andes and to develop a fishing pond on the edge of the town of Lake Andes. Despite continual water fluctuations in Lake Andes, water quality enhancements would improve the fishery. Under this alternative, boat ramps would not be fixed or improved, and the quality of boat access for fishing would continue to be poor.

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Lake Andes National Wildlife Refuge

Environmental Education and Interpretation. The current level of environmental education and interpretation provided to the public would remain unchanged. Limited environmental education and interpretation opportunities such as hosting occasional school group tours, providing hunter safety training, and participating in outdoor festivals and other offsite events would continue throughout the Complex. As a result, the Complex's potential to reconnect people with nature would be unrealized.

Wildlife Observation and Photography. Under this alternative, the Complex would continue to provide limited opportunities for wildlife observation and photography. Foot trails on Atkins Waterfowl Production Area and the Owens Bay Unit of Lake Andes Refuge would be maintained, and the public would be allowed access to the Prairie Ponds for wildlife observation and photography opportunities. Trails for people with disabilities would remain only marginally accessible, and public access to portions of the Complex with high potential for wildlife observation and photography, specifically Karl E. Mundt Refuge, would remain closed. Under this alternative, the Complex would not reach its full potential for wildlife observation and photography.

Operations Goal

Staffing and Funding. Budget cuts have led to a 22 percent reduction in permanent staff of the Complex over the last 10 years. Current funding and staffing levels are inadequate to properly manage the resources and facilities of the Complex, and current staff levels are not adequate to implement alternative A. The restoration of one deputy wildlife refuge manager (one FTE)

and the conversion of one career seasonal maintenance worker to full time (currently at 0.7 FTE) would be necessary to restore the staff to previous levels and implement alternative A (appendix E); however, under alternative A, staffing levels would not change.

The grassland habitats that dominate the Complex require frequent management disturbance (for example, burning, grazing, and haying) to remain productive for wildlife. Such management is lacking, and Complex habitats are suffering as a result. Wildlife populations that depend on these habitats are being affected. Lack of adequate staffing continues to allow the degradation of infrastructure including fences, signs, and buildings throughout the Complex. Inadequate staffing impedes full development of wildlife-dependent recreation throughout the Complex. Under current staffing levels, outreach is not possible.

Infrastructure, Equipment, and Operations and Maintenance. The Complex would continue to operate at the current level of maintenance of equipment, vehicles, and real property. Some portions of infrastructure (for example, fences) would remain in poor condition. The maintenance shop would continue to operate with current deficiencies including its leaking roof. No additional heavy equipment would be acquired. The efficiency of the Complex maintenance programs would continue to be compromised by a deficient shop building.

Fences and other infrastructure would continue to deteriorate over time and would impact habitat and wildlife management efforts.

Monitoring and Research. No changes would be made to the current monitoring and research procedures. Staff would continue conducting limited monitoring of habitat conditions and wildlife populations on wetlands (the 4-square-mile waterfowl survey, breeding shorebird survey, and waterfowl population survey on wetlands), on riparian lands (the bald eagle nesting survey, migratory bird use of the riparian forest survey, and bald eagle winter roosting survey) and on uplands (the breeding waterfowl survey, dove counts, Christmas bird counts, Karl E. Mundt Refuge upland migratory bird survey, and breeding shorebird survey). The limited amount of monitoring and research would continue to hinder staff's basic knowledge of habitat characteristics, vegetative cover management, invasive species infestation, and wildlife populations present as well as their relationships with the habitats. This will continue to prevent the staff from developing effective management activities and using adaptive resource management to improve success.

Requests for habitat and wildlife research would continue to be supported if it complies with Complex purposes. This research would continue to be initiated although it typically does not address questions essential to the management of the Complex.

Cultural Resources. Impacts on cultural resources would be neutral, as the staff would continue to survey for and protect these resources, on an as-needed basis. Any projects involving potential adverse effects on significant cultural resources would follow the procedures outlined in Section 106 of the National Historic Preservation Act.

Partnerships. Complex staff would be unable to take full advantage of partnership opportunities, to the detriment of the habitats and wildlife present in the Complex, due to inadequate funding and staffing. Complex staff would continue supporting existing partnerships with private cooperators, agencies and organizations; specifically the Partners for Fish and Wildlife program which allows for wildlife conservation on private lands. Most of these projects would continue to focus on wetland and grassland restoration and implementation of grazing systems that are beneficial to ground-nesting birds and other wildlife. Public support for the Complex and its programs is limited.

ALTERNATIVE B (MODIFIED MANAGEMENT)

Wetlands Goal

Water Quality and Quantity on Lake Andes Refuge. Under this alternative, Complex staff would work with CMCLRO as described in alternative A. Water quality management would focus on investigating the effectiveness of utilizing fish screens to reduce the number of rough fish in Lake Andes Refuge and improve water quality and aquatic plant growth. Improved water quality and increased aquatic plant growth may allow for the presence of sport fish and other waterfowl in Lake Andes.

Water quantity management would focus on investigating (and designing and building, if feasible) a water system that would pump water from the Center Unit into the South Unit of Lake Andes. This pumping system would provide a water depth in the South Unit adequate for sport fishing while providing shallower depths for waterfowl habitat in the Center Unit. Under this alternative, Complex staff could manage water levels to provide optimum conditions for fish and wildlife.

Disease Control. Under alternative B, management would be the same as alternative A, plus staff would initiate surveys of other Service lands that have high concentrations of birds susceptible to HPAI. As a result, under this alternative disease outbreaks would be more likely to be detected and contained than under alternative A, reducing the risk of the spread of disease to other birds and humans.

Riparian Goal

Cottonwood Restoration on Karl E. Mundt Refuge. Effects would be the same as under alternative A, plus Complex

staff would develop and implement a riparian woodland habitat management plan for Karl E. Mundt Refuge. The decline of cottonwood-dominated habitats would be slowed, thus extending the use of the Complex by bald eagles, migratory birds, and other wildlife of this habitat.

Uplands Goal

Avian Nest Predator Control. To improve nesting success of waterfowl and other ground-nesting birds, Complex staff would facilitate implementation of large block trapping of significant nest predators conducted by partner organizations. Overall nesting success of waterfowl and other ground-nesting birds throughout the Complex would increase, thus sustaining or increasing current bird populations. Nest predator control would focus on blocks of land that average 40 duck pairs or more per square mile.

Restoration. Uplands restoration would be similar to that described in alternative A, plus management would primarily focus on restoration with a high diversity of native grasses and forbs. However, on low priority waterfowl production areas where it is not feasible to plant natives, alfalfa may be interseeded on a small scale. Approximately 200 acres of upland would be restored annually. Lands with no record of farming will be managed by burning, grazing, or haying to encourage native grass and forb growth. Sites that do not respond to the above management treatments may be interseeded with native grasses or a mix of forbs.

Target grassland restoration and management would be implemented to provide habitat for grassland-nesting birds (a guild of species representing a broad spectrum native to the area), but efforts would concentrate on waterfowl and migratory species of highest management concern, and for those known to nest on the Complex. Success of grassland bird management in a given area requires managers to consider the habitat requirements of grassland birds and thus identify management actions to enhance habitat quality for the local grassland bird. By doing so, the Complex would be able to provide better habitats for waterfowl and other selected migratory birds with the necessary components throughout their life cycles.

Issues and Areas of Concern Relating to All Habitats

Invasive Plant Control. Actions would be the same as under alternative A, except infestations on refuges and high priority waterfowl production areas would be treated annually rather than only once every 3 years. This would decrease the density and reoccurrence of invasive plant infestations. Landowner complaints and resentment would decrease as a result of reduced invasive plant infestations. It is also expected that public perception and attitudes towards the Complex and its staff would improve, with a likely increase in support for the purposes and goals of the Complex.

Staff would initiate formal monitoring and mapping of invasive plant infestations on the Complex.

Under this alternative, the staff would seek to form an invasive species "strike team" for South Dakota that would focus on the control and eradication of invasive species on uplands.

Surveys to detect the presence of invasive plant species that are not widely established on the Complex would be conducted annually. Any plants detected would mapped and treated annually with the goal of eradication. The habitat quality of Service lands for ground-nesting birds, waterfowl, and other wildlife would improve as a result of the reduced infestations.

On riparian habitats, there would be an increased emphasis on the control of Russian olive, eastern red cedar, and other invasive tree species. All herbaceous weeds—leafy spurge, Canada thistle, musk thistle—would be treated once annually. Increased control of invasive tree species would allow natural regeneration of native plants that provide better habitat for native wildlife and reduce the spread of invasive plants downstream. Infestations of invasive plants would decrease to a maintenance level where they can be more efficiently controlled. Overall ecosystem health and wildlife habitat would improve.

Habitat Protection. Management would be the same as under alternative A, with the addition that staff would evaluate existing government-owned lands held in fee title for their value to trust species. Complex staff would pursue exchange of Service lands with marginal wildlife value and pursue acquisition of lands with high wildlife value (from willing sellers as opportunities allow), even if these lands do not adjoin existing Service lands. The ability to exchange lands of low wildlife value for lands with high wildlife value would free limited resources to focus on managing Service lands (and acquiring new lands) that are more valuable to trust species.

Currently the two units of the Karl E. Mundt Refuge are separated by a tract of private land. Rather than focusing only on acquiring one conservation easement, this alternative would also permit acquisition (if the landowner is willing) of fee title to the tract of land that lies between the two units of the Refuge.

Additional emphasis would be placed on investigating and implementing new methods to reduce streambank erosion on riparian habitat by using instream structures (for example, weirs) to pull river flow away from the streambank. Using weirs and other instream structures would negate the need to add additional riprap and would protect the scenic value of the Missouri River corridor next to Karl E. Mundt Refuge. Instream structures would reduce

erosion, helping reduce the loss of hardwoods along the Missouri River and increasing nesting and roosting sites for bald eagles and other migratory birds.

Mature cottonwood trees that appear to be at risk from beaver would be identified and protected with a basal wrap that prevents herbivory. Trapping beaver and protecting selected trees would decrease the rate of cottonwood loss and thus extend the use of this habitat by bald eagles, migratory birds, and other wildlife. It would also decrease the current need to control beaver.

Visitor Services Goal

Hunting. This alternative would be the same as alternative A except a park ranger would be added to the Complex staff and would investigate providing limited big game hunting opportunities (for example, archery or muzzleloader hunting only) on portions of Lake Andes Refuge and Karl E. Mundt Refuge where hunting is currently prohibited. This would improve the quality of the hunting experience and provide a measure of control for wildlife populations not currently manageable through hunting. However, opening Karl E. Mundt Refuge to hunting may result in fewer trophy animals being available for harvest on neighboring public and private lands.

Boat access to the Center Unit of Lake Andes Refuge would be improved by constructing a boat ramp that is ice resistant and functional over a wide range of water depths. This would allow for easier access to the lake for waterfowl hunting.

Fishing. Actions would be the same as alternative A, but boat access to the South Unit of Lake Andes Refuge would be improved by constructing an ice-resistant boat ramp that would be functional over a wide range of water depths. Access for fishing on the South Unit of Lake Andes would improve.

Environmental Education and Interpretation. Actions would be the same as under alternative A, except an outdoor recreation planner would be added to the Complex staff. Environmental education and interpretation opportunities would be expanded. The Complex's potential to reconnect people with nature would be more fully realized. Environmental education activities would be expanded and would include holding teacher workshops, hosting school groups, conducting refuge tours, providing hunter safety courses, and hosting outdoor festivals, fairs, and expos. Additional interpretive exhibits and brochures would be created. Interpretative and environmental education programs would increase understanding and support of Complex programs, as well as be an integral part of the Service's efforts to reconnect children with nature. Complex headquarters would be remodeled and expanded to provide a visitor center and environmental education classroom that would attract greater numbers of visitors and provide the facilities needed for an effective environmental education program.

Wildlife Observation and Photography. Actions would be the same as under alternative A, except the Complex would provide access for wildlife observation and photography on portions of Karl E. Mundt Refuge and Lake Andes Refuge that are currently closed. Observation and photography blinds would be provided on selected areas of the Complex, and the accessibility of existing foot trails would be improved and provide better access for people with disabilities. As a result, the Complex's potential for wildlife observation and photography would be more fully realized, and visits to the Complex would increase.

Operations Goal

Staffing and Funding. Additional staff would be needed to implement this alternative (appendix E). The amount of conservation and restoration work included in this alternative would be commensurate with staffing levels. A greater range of priority areas would receive proper attention and management effort. Habitat and wildlife resources would receive a greater level of protection (that is, through acquisition, easements, and law enforcement). All wildlife-dependent recreational opportunities would be expanded and enhanced.

Infrastructure, Equipment, Supplies, and Operations and Maintenance. Under alternative B, the maintenance and condition of Complex infrastructure would improve. Operational and maintenance support for management of wetland, riparian, and upland habitats would increase. The headquarters building would be expanded and remodeled to provide more wildlife-dependent recreation opportunities and to support additional employees. The maintenance shop would be remodeled to correct existing deficiencies and accommodate additional staff and equipment, and additional heavy equipment would be acquired (for example, a soil packer). A seed harvest, processing, and drying facility would be constructed.

As a result of these upgrades, conditions of infrastructure throughout the Complex would improve. Upland restoration would be accelerated and would be more cost efficient through use of the Complex's own seed harvest and seed storage equipment. Habitat management activities would be accomplished in an expedited manner. Complex employees would work in a safe and healthy environment, and the efficiency of Complex operations would be enhanced.

Monitoring and Research. Monitoring and research under this alternative would be similar to that under alternative A. However, research efforts would be more proactive. Complex staff would determine and prioritize research needs for the Complex. Examples

Wood Duck

of such needs could include habitat mapping, identifying more effective strategies to restore uplands or cottonwoods in riparian areas, and conducting studies to determine the effectiveness of management actions (like prescribed fire). Complex staff would then approach the research community with these needs. Information gathered by focused, specific research would allow the staff to make better habitat management decisions.

University-led research to develop methods for riparian and prairie restoration and weed control on waterfowl production areas and refuges would be encouraged. The implementation of alternative B would yield improved knowledge on current levels of weed infestation, management of invasive species, and which upland and riparian habitat restoration techniques would help to achieve the goals of the CCP.

Cultural Resources. Impacts on cultural resources would be neutral, as the staff would continue to survey for and protect these resources on an as-needed basis. Any projects involving potential adverse effects on significant cultural resources would follow procedures as outlined in Section 106 of the National Historic Preservation Act.

Partnerships. Actions would be the same as alternative A, except that Complex staff would pursue new partnerships with government agencies, sporting groups, landowners, and other groups to achieve the visions of this plan. This alternative also calls for the creation of a "friends" group to support Complex management. These new partnership opportunities would expand wildlife conservation and increase public support for the Complex and its programs.

Alternative C (Intensive Management)

Wetlands Goal

Water Quality and Quantity on Lake Andes Refuge. Management would be the same as under alternative B, plus the Complex would enhance the efforts of the Natural Resources Conservation Service to improve water quality in the Lake Andes watershed through the Partners for Fish and Wildlife Program (for example, by planting buffer strips to reduce soil erosion). Enhanced soil conservation in the surrounding watershed would improve water quality—in part by reducing nutrients and organic and chemical inputs into the lake—and benefit wildlife, fisheries, vegetative communities, and invertebrates.

Disease Control. Disease control would follow the same method provided in alternative B with the addition of initiating active sampling of live (trapping) and dead birds (hunter check stations). Oropharyngeal and cloacal swabs would be used to test for the presence or absence of disease. Disease outbreaks would be more likely to be detected and contained than under alternative B.

Riparian Goal

Cottonwood Restoration on Karl E. Mundt Refuge. Under alternative C, the management actions and environmental consequences regarding cottonwood restoration would be the same as under alternative B.

Uplands Goal

Avian Nest Predator Control. Under alternative C, the management actions and environmental consequences regarding avian nest predator control would be the same as under alternative B.

Restoration. Under alternative C, the management actions and environmental consequences regarding uplands restoration would be the same as under alternative B.

Issues and Areas of Concern Related to All Habitats

Invasive Plant Control. Invasive plants would be controlled on wetlands, uplands, and riparian habitats as described in alternative B, except infestations on both refuges and high priority waterfowl production areas would be treated twice annually. The remainder of the Complex's infestations would be treated on average once every 3 years. Invasive plant densities would decrease even more quickly than under alternative B. Over time, invasive plant infestations would be reduced to a maintenance level where less staff time and funding would be necessary to control invasive plants. It is also expected that public perception and attitudes towards the Complex and its staff would improve, with a likely increase in support for the purposes and goals of the Complex.

Under this alternative, the Complex would pursue the formation of an invasive species "strike team" for South Dakota to more effectively control invasive plants on Service lands in South Dakota.

On the Karl E. Mundt Refuge, all mature cottonwoods would be protected with a basal wrap that prevents herbivory. Wrapping most cottonwood trees would further decrease the rate of cottonwood loss, and thus extend the use of this habitat by bald eagles, migratory birds, and other wildlife.

Protection. Under alternative C, the management actions and environmental consequences regarding habitat protection would be the same as under alternative B.

Visitor Services Goal

Hunting. Under alternative C, the management actions and environmental consequences regarding hunting would be the same as under alternative B.

Fishing. Under alternative C, the management actions and environmental consequences regarding fishing would be the same as under alternative B.

Environmental Education and Interpretation. Actions and effects would be the same as under alternative B, except a new headquarters and visitor center would be constructed instead of remodeling the existing headquarters as in alternative B.

Wildlife Observation and Photography. The level of wildlife observation and photography opportunity on the Complex would be the same as alternative B with an additional focus on providing an observation tower and developing a self-guiding auto tour route on Lake Andes Refuge. The existence of the auto tour route and observation tower would provide people of all ages and abilities previously unavailable opportunities to observe and photograph wildlife, as well as a panoramic view of the landscape in a more natural setting.

Operations Goal

Staffing and Funding. Additional staff would be required to implement this alternative (appendix E). The amount of conservation and restoration work would be commensurate with staffing levels. A greater range of priority areas would receive proper attention and management effort. Habitat and wildlife resources would receive a greater level of protection (that is, through acquisition, easements, and law enforcement).

All wildlife-dependent recreational opportunities would be expanded and enhanced. All habitat areas (not just priority areas) would be improved. The staff would have better access to habitat and wildlife information and the opportunity to query and refine data output and thus finely adjust management efforts, research, and monitoring.

Infrastructure, Equipment, Supplies, and Operations and Maintenance. Actions would be the same as under alternative B, except the existing headquarters building would be replaced with a new headquarters and visitor center. Additional heavy equipment would be acquired (for example, an excavator, combine, soil packer, bulldozer, transport truck, and trailer) and a seed drying facility would be constructed. As a result of this alternative, upland restoration would be accelerated and would be more cost efficient through use of the Complex's own seed harvest and seed storage equipment. Habitat management activities would be accomplished in an expedited manner.

Monitoring and Research. Under alternative C, monitoring and research would be conducted as described in alternative B. This alternative calls for the additional pursuit of funding and research opportunities (for example, native prairie restoration projects) with universities on habitat management and new, effective surveying methodologies. This could improve the monitoring and research methods of the Complex. This is an even more proactive approach than that of alternative B.

Cultural Resources. This action would be similar to that in alternative B, with the addition of a comprehensive cultural resources survey on all Complex lands. Having lands proactively cleared for cultural resources would increase the efficiency of land-disturbing management activities on the Complex. Law enforcement would be able to better protect cultural resources sites once they were identified.

Partnerships. Alternative C calls for the same management actions as alternative B and would result in the same environmental consequences.

5.3 Cumulative Impacts

Cumulative impacts are the potential effects that could result when the proposed action is added to the actions of the past, present, and future. These impacts could be the result of several independent impacts, which could become significant when added together over time.

Implementing alternative B, the proposed action, would reduce the risk of cumulative impacts because of the procedure in which habitat and wildlife management and other programs would be conducted.

NEPA requires mitigation measures when the environmental analysis process detects possible significant impacts on habitats, wildlife, or the human environment. All activities proposed under alternative B are not expected nor intended to produce significant levels of environmental impacts that would require mitigation measures. Nevertheless, the CCP will contain the following measures to preclude significant environmental impacts from occurring:

- Federally listed species will be protected from intentional or unintended impacts by having activities banned and/or restricted where these species occur.
- Hunting safety regulations will be closely coordinated with, and enforced by, personnel from the Complex and SDGFP personnel.
- All proposed activities will be regulated to reduce potential impacts on wildlife and plant species, especially during their sensitive reproductive cycles.
- Monitoring protocols will be established to determine goal achievement levels and possible unforeseen impacts to resources for application of adaptive management to ensure wildlife and habitat resources, as well as the human environment, are preserved.

The CCP can be revised and amended after 5 years of implementation, for application of adaptive management to correct unforeseen impacts that occur during the first years of the plan.

Table 2. Summary of CCP alternatives for the Lake Andes National Wildlife Refuge Complex, South Dakota.

Alternative A—no action	*Alternative B—modified management*	*Alternative C—intensive management*
GOAL for Wetlands. Acquire, restore, manage, and protect wetlands for the conservation of migratory birds and other water-dependent species endemic to the Plains and Prairie Pothole Region.		
Water Quality and Quantity on Lake Andes Refuge—Actions		
Continue working with the CMLRO to improve water quality and quantity in Lake Andes through partnerships and cost-sharing actions such as: sediment removal, improved soil conservation practices, control of rough fish population, and water augmentation.	*Same as alternative A, plus:* Investigate the effectiveness of using fish screens to improve sports fishery in Lake Andes. Investigate and, if feasible, design and build a water system that would pump water from the Center Unit into the South Unit of Lake Andes to provide increased water depth in the South Unit for sport fishing, while providing shallower depths for waterfowl habitat on the Center Unit.	*Same as alternative B, plus:* Enhance the Natural Resources Conservation Service's efforts to improve water quality in the Lake Andes watershed through the Partners for Fish and Wildlife Program (improve cost share for private landowners on projects that improve water quality in the Lake Andes watershed).
Water Quality and Quantity on Lake Andes Refuge—Environmental Consequences		
Water quality would improve through the removal of sediments laden with high levels of nitrogen and phosphorus and the effort to improve soil conservation in the surrounding watershed. Algae blooms and fish kills would be reduced. Rough fish would continue to damage water quality and limit aquatic plant growth through their feeding habits. Water quantity would remain inadequate for effective management of water levels for fish and wildlife.	*Same as alternative A, plus:* The incorporation of fish screens may help alleviate the predominance of rough fish on the lake and thus improve water quality and aquatic plant growth. A pumping system would allow refuge managers to provide water levels that are more optimal for fish, waterbirds, and other wildlife.	*Same as alternative B, except:* Enhancing soil conservation in the surrounding watershed would improve water quality (that is, fewer nutrients and less organic and chemical input into the lake) and benefit wildlife, fisheries, vegetative communities, and invertebrates.
Invasive Plant Control—Actions		
Continue to use mechanical, chemical, and biological control methods to control invasive plants. Individual infestations would be treated on average once every 3 years.	*Same as alternative A, except:* Infestations on Lake Andes Refuge, Karl E. Mundt Refuge, and high priority waterfowl production areas would be treated annually. Remaining infestations would be treated once every 3 years. Surveys to detect the presence of saltcedar would be conducted annually. Any saltcedar plants detected would be eradicated.	*Same as alternative B, except:* Infestations on Lake Andes Refuge, Karl E. Mundt Refuge, and high priority waterfowl production areas would be treated twice annually. Remaining infestations would be treated once every 3 years. In addition, the staff would pursue the formation of an invasive species strike team to more effectively control invasive plants on Service lands in South Dakota.

Table 2. Summary of CCP alternatives for the Lake Andes National Wildlife Refuge Complex, South Dakota.

Alternative A—no action	*Alternative B—modified management*	*Alternative C—intensive management*
Invasive Plant Control—Environmental Consequences		
Invasive plants would continue to exist on Service lands at current levels of infestation. Neighboring landowner complaints and resentment would continue at current levels.	The density of invasive plant infestations would decrease. Landowner complaints and resentment would decrease. The habitat quality of Service lands for ground-nesting birds would improve.	Invasive plant densities would decrease even more quickly than under alternative B. Over time invasive plant infestations would be reduced to a maintenance level where less staff time and funding would be necessary to control invasive plants. Social consequences would be similar to those under alternative B.
Protection (easements; acquisition of wetlands; cultural resources)—Actions		
Continue monitoring and enforcing provisions of conservation easements. Continue acquiring easements. Continue acquiring fee-title "round outs" of existing Service lands from willing sellers as opportunities allow. Continue protecting cultural resources according to regulations and guidelines.	*Same as alternative A, plus:* Evaluate existing lands held in fee title for their value to trust species. Pursue divestiture of Service lands with marginal wildlife value. Pursue acquisition of lands with high wildlife value (from willing sellers as opportunities allow), even if such lands do not border existing Service lands.	*Same as alternative B, plus:* Conduct a comprehensive cultural resources survey of all Service lands in the Complex.
Protection (easements; acquisition of wetlands; cultural resources)—Environmental Consequences		
Lands currently under Service management would continue to be protected; however, lands with high wildlife value that are not next to existing Service lands could be lost to development. Management of Service lands with marginal wildlife value would continue to be a diversion of limited resources that could be better allocated to manage lands with high wildlife value. Cultural resources would be adequately protected.	*Same as alternative A, plus:* The ability to divest of lands with marginal wildlife value would free limited resources to focus management on Service lands that are more valuable to trust species. Complex staff would have greater flexibility to pursue protection of lands with high wildlife value within the wetland management district. Cultural resources would be adequately protected.	*Same as alternative B, plus:* A Complex-wide cultural resources survey would allow for better protection of cultural resources. Having lands proactively cleared for cultural resources would increase the efficiency of land-disturbing management activities on the refuge complex. Law enforcement staff would be better able to protect cultural resources sites once such sites were identified.
Disease Control—Actions		
Continue weekly disease monitoring on Lake Andes Refuge during peak spring and fall migration periods and opportunistic monitoring elsewhere on the Complex. Continue containment, removal of dead birds, and submittal of samples to the USGS National Wildlife Health Center when disease outbreaks occur in accordance with the "Lake Andes National Wildlife Refuge Disease Contingency Plan."	*Same as alternative A, plus:* Survey other Service lands that have high concentrations of birds susceptible to HPAI.	*Same as alternative B, plus:* Sample live birds (trapping) and dead birds (hunter check stations) using oropharyngeal and cloacal swabs to test for the presence or absence of disease.
Disease Control—Environmental Consequences		
Outbreaks outside Lake Andes Refuge may remain undetected, or may be reported after effective containment is no longer possible, leading to greater spread of disease and greater risk to humans, in the case of epizootic diseases.	Disease outbreaks would be more likely to be detected and contained than in alternative A.	Disease outbreaks would be more likely to be detected and contained than in alternative B.

Table 2. Summary of CCP alternatives for the Lake Andes National Wildlife Refuge Complex, South Dakota.

Alternative A—no action	*Alternative B—modified management*	*Alternative C—intensive management*
Monitoring and Research—Actions		
Continue conducting limited monitoring of habitat conditions and wildlife populations (for example, invertebrate survey, breeding waterfowl surveys, and breeding shorebird surveys). Continue supporting habitat and wildlife research as requested.	*Same as alternative A, plus:* Expand existing surveys and add surveys that address refuge management issues. Determine and prioritize research needs for the Complex. Approach the research community with these needs.	*Same as alternative B, plus:* Pursue funding to facilitate research on Complex lands.
Monitoring and Research—Environmental Consequences		
Limited analysis of habitat management treatments would continue to hinder the Complex staff's understanding and ability to use adaptive resource management to improve success and attain management goals. Research would continue to be initiated by outside researchers and typically would not address the key management questions of the Complex.	Additional surveys would provide additional data to inform staff decisions. Research would become pro-active and focus on the key management questions of the Complex. Information gathered by focused, specific research would allow the staff to make better habitat management decisions.	*Same as alternative B, plus:* Facilitate additional research on the Complex.
GOAL for Riparian Habitat. Acquire, restore, manage, and protect riparian habitats endemic to the lower Missouri River for the conservation of bald eagles, other species of concern, and migratory birds.		
Cottonwood Restoration on Karl E. Mundt Refuge—Actions		
Dams on the Missouri River would continue to limit cottonwood regeneration and lead to a decline in cottonwood habitat. Continue replanting cottonwood stands on Karl E. Mundt Refuge as funding and opportunities allow.	*Same as alternative A, plus:* Develop and implement a riparian restoration plan for Karl E. Mundt Refuge that includes establishment of native understory plant species along with plains cottonwood.	*Same as alternative B.*
Cottonwood Restoration on Karl E. Mundt Refuge—Environmental Consequences		
Cottonwood-dominated habitats would continue to decrease in size due to lack of natural cottonwood regeneration and loss of habitat to erosion. Loss of habitat would directly impact bald eagles (nesting and roosting) and other migratory bird species (migration and nesting) dependent on cottonwood riparian habitats.	The decline of cottonwood-dominated habitats would be slowed, thus extending the use of the refuge by bald eagles, migratory birds, and other wildlife of this habitat.	*Same as alternative B.*
Invasive Species Control on Karl E. Mundt Refuge—Actions		
Continue using mechanical, chemical, and biological control methods as needed to control invasive plants (weeds and trees).	*Same as alternative A, plus:* Increase emphasis on control of Russian olive, eastern red cedar, and other invasive tree species. All herbaceous weeds (leafy spurge, Canada thistle, musk thistle) would be treated annually. An annual survey to detect the presence of the invasive tree, saltcedar, would be initiated. Any plants found would be eradicated.	*Same as alternative B, except:* Herbaceous weeds would be treated twice annually.

Table 2. Summary of CCP alternatives for the Lake Andes National Wildlife Refuge Complex, South Dakota.

Alternative A—no action	*Alternative B—modified management*	*Alternative C—intensive management*
Invasive Species Control on Karl E. Mundt Refuge—Environmental Consequences		
Invasive plants (trees and weeds) would continue to exist on Service lands at current levels of infestation. Control of beaver at current levels would allow continued loss of mature cottonwoods on which bald eagles and other migratory birds depend.	Increased control of Russian olive, eastern red cedar, and other invasive tree species would allow natural regeneration of native plants that provide better habitat for native wildlife and reduce the spread of invasive plants downstream. Infestations of invasive plants would decrease to a maintenance level where they can be more efficiently controlled. Ecosystem health and wildlife habitat would be improved. An annual survey to detect saltcedar would provide an excellent opportunity to eradicate any plants discovered. Protecting selected trees would lead to a decrease in the rate of loss of cottonwoods and thus extension of the use of this habitat by bald eagles, migratory birds, and other wildlife. It would also decrease the current need to control beaver.	*Regarding invasive trees, same as alternative B. Regarding other invasive species, same as alternative B, except:* Biannual treatments of herbaceous weeds would result in further reduction of infestation levels compared to alternative B. Also, wrapping most cottonwood trees would further decrease the rate of loss of cottonwoods to herbivory, and thus extend the use of this habitat by bald eagles, migratory birds, and other wildlife.
Habitat Protection on Karl E. Mundt Refuge—Actions		
Continue to pursue a conservation easement on lands between the north and south units of the Karl E. Mundt Refuge. Continue protection of cultural resources according to current policies and regulations. Continue to allow periodic removal of beaver to safeguard cottonwood habitat as needed.	*Same as alternative A, plus:* Investigate and implement new methods to reduce streambank erosion by using in stream structures (for example, weirs) to pull river flow away from the streambank. Pursue acquisition of fee title of the conservation easement on a willing-seller basis. Mature cottonwood trees that appear to be at risk from beaver would be identified and protected with a basal wrap that prevents herbivory.	*Same as alternative B, plus:* Conduct a comprehensive cultural resources survey on the riparian habitats of Karl E. Mundt Refuge. All mature cottonwoods would be protected with a basal wrap that prevents herbivory.
Habitat Protection on Karl E. Mundt Refuge—Environmental Consequences		
The risk of development of lands next to the refuge and fragmentation of riparian habitats would be reduced. Bald eagles and other migratory birds dependent on riparian habitat would continue to be protected from disturbance. Cultural resources would continue to be protected under existing regulations from development and management activities.	Using weirs and other instream structures to protect streambanks from erosion would negate the need to add riprap, thus protecting the scenic value of the Missouri River corridor next to Karl E. Mundt Refuge.	*For streambanks, same as alternative B. For all other considerations, same as alternative B, plus:* A Complex-wide cultural resources survey would allow for better protection of cultural resources. Having lands proactively cleared for cultural resources would increase the efficiency of land-disturbing management activities on the Complex. Law enforcement would be better able to protect cultural resources sites once they were identified.
Monitoring and Research—Actions		
Continue conducting limited monitoring of habitat conditions and wildlife populations (for example, bald eagle nesting, migratory bird use of the riparian forest, and bald eagle winter roosting). Continue supporting habitat and wildlife research as requested.	*Same as alternative A, plus:* Expand existing surveys and add surveys that address refuge management issues. Determine and prioritize research needs for the Complex. Approach the research community with these needs.	*Same as alternative B, plus:* Pursue funding to facilitate research on Complex lands.

Table 2. Summary of CCP alternatives for the Lake Andes National Wildlife Refuge Complex, South Dakota.

Alternative A—no action	*Alternative B—modified management*	*Alternative C—intensive management*
Monitoring and Research—Environmental Consequences		
Limited analysis of habitat management treatments would continue to hinder the Refuge Complex staff's understanding and ability to use adaptive resource management to improve success and attain management goals. Research would continue to be initiated by outside researchers and typically would not address the key management questions of the Complex.	Additional surveys would provide additional data to inform staff decisions. Research would become pro-active and focus on the key management questions of the Complex. Information gathered by focused, specific research would allow the staff to make better habitat management decisions.	*Same as alternative B, plus:* Additional research would be facilitated on the Complex.
GOAL for Uplands. Acquire, restore, manage, and maintain a diverse mix of native grassland habitats to support migratory and resident wildlife found in the northern mixed-grass prairie ecosystem.		
Avian Nest Predator Control—Actions		
Continue without control of significant avian nest predators (for example, fox, skunk, and raccoon) due to lack of funding and staff.	Facilitate implementation of large block trapping of significant nest predators (such as that sponsored by Delta Waterfowl), to improve nesting success of waterfowl and other ground-nesting birds.	*Same as alternative B.*
Avian Nest Predator Control—Environmental Consequences		
Portions of the Complex may suffer from nest predation that is a detriment to waterfowl populations.	Overall nesting success of waterfowl and other ground-nesting birds throughout the Complex would increase, thus sustaining or increasing current bird populations.	*Same as alternative B.*
Invasive Plant Species Control—Actions		
Continue to use mechanical, chemical, and biological control methods to control invasive plants. Individual infestations would be treated on average once every 3 years. Approximately 3,000 infested acres would be treated annually.	*Same as alternative A, plus:* A total of 33 percent of infestations would be treated annually instead of once every 3 years. The staff would seek to form an invasive species "strike team" for South Dakota.	*Same as alternative B, plus:* A total of 33 percent of infestations would be treated annually with a follow-up inspection and spot treatment(s) as needed. The remainder of the Complex's upland infestations would be treated on average once every 3 years.
Invasive Plant Species Control—Environmental Consequences		
Neutral impacts; invasive and nuisance species would continue to exist on Service lands at current levels of infestation; accordingly, many neighboring landowners would continue to resent the presence of invasive species on Service lands next to their own while other neighbors of the Complex would compliment staff efforts to control invasive/nuisance species.	Under this alternative it is expected that invasive species infestations would be reduced from current levels throughout the Complex. It is also expected that public perception and attitudes towards the Complex and its staff would improve, with a likely increase in support for the purposes and goals of the Complex.	Under this alternative it is expected that invasive species infestations would continue to decline and be reduced from levels achievable under alternatives A or B. It is also expected that public perception and attitudes toward the Complex and its staff would improve, with a likely increase in support for the purposes and goals of the Complex.
Protection—Actions		
Continue evaluating and acquiring high-quality grassland easements and fee title of "round outs" from willing sellers as opportunities arise and budgets allow. Continue monitoring and enforcing easement provisions on easement lands. Continue meeting existing cultural resources protection policies.	*Same as alternative A, plus:* Analyze and pursue divestiture or exchanges of fee-title and easement lands with marginal wildlife value and pursue protection of other lands with high wildlife value, even if these lands are not "round outs" to existing properties. Identify ownerships and conduct a com.	*Same as alternative B, plus:* Pursue a cultural resources survey of all fee-title lands in the Complex.

Table 2. Summary of CCP alternatives for the Lake Andes National Wildlife Refuge Complex, South Dakota.

Alternative A—no action	*Alternative B—modified management*	*Alternative C—intensive management*
	prehensive analysis of high-value wildlife habitat throughout the district and establish contact with those landowners to pursue options to protect those lands	
Protection—Environmental Consequences		
Lands currently under Service management would continue to be protected. However, lands with high wildlife values that are not protected would continue to be lost to agriculture, urbanization, and development caused in part by the Service's slow acquisition response (private landowners sometimes wait 2–5 years or longer for an offer and need a quicker response from the Service). Because of existing Service responsibilities, management of Complex lands with minimal wildlife value would continue to be a diversion of necessary resources (for example, personnel, equipment) that could be better allocated to manage Complex lands with high wildlife value. Impacts on cultural resources would be neutral, as the staff would continue to survey for and protect cultural resources on an as-needed basis.	*For cultural resources, same as alternative A.* For other considerations, same as alternative A, except: The Complex's ability to divest lands with minimal wildlife value would allow Complex resources to be reallocated to manage lands with high wildlife values. The Complex staff would have greater flexibility to pursue protection of all lands with high wildlife values that occur within the boundaries of the wetland management district.	*Same as alternative B, plus:* Identifying all existing cultural resources on the upland habitats of fee-title lands. This would allow for better preservation and protection of these cultural resources as well as expediting and increasing the efficiency of habitat management activities, thereby benefiting the wildlife and plants that depend on this habitat type.
Restoration—Actions		
Continue burning, spraying, and grazing to improve nesting habitat and haying to remove buildup of vegetative litter and duff on fee-title lands. Continue restoration activities on previously farmed areas dominated by nonnative plants. These areas would be cropped for several years in preparation for the reseeding of desirable plant species. To assist in the grass establishment efforts, herbicides such as glyphosate and imazapic would continue to be used. Continue to remove nonnative trees through mechanical means and prescribed burns.	*Same as alternative A, plus:* Management would primarily focus on restoration with a high diversity of native grass and forb mix. However, where it is not feasible to plant natives, dense nesting cover may be used on a small scale. Target grassland restoration and management to provide habitat for grassland nesting birds (a guild of species representing a broad spectrum native to the area) but efforts would concentrate on waterfowl and migratory species of highest management concern and on those known to nest on the Complex. Lands with no record of farming would be managed by burning, grazing, or haying to encourage native grass and forb growth. Sites that do not respond to the above management treatments would be interseeded with native grass or forb mixes. Purchase equipment for collection of native plant seeds, and construct facilities for cleaning, drying, and storing those seeds.	*Same as alternative B.*

Table 2. Summary of CCP alternatives for the Lake Andes National Wildlife Refuge Complex, South Dakota.

Alternative A—no action	*Alternative B—modified management*	*Alternative C—intensive management*
Restoration—Environmental Consequences		
Uplands throughout the Complex would continue to be restored to their native grass condition, but because of the lack of restoration of native forbs and the slow pace of restoration, the value of these habitats to migratory birds and insects (for example, butterflies) would continue to be inadequate.	*Same as alternative A, except:* Prairie restoration would proceed at a higher rate, and a higher diversity of native plants would be used. In addition to waterfowl, other grassland-nesting bird species would benefit.	*Same as alternative B.*
Monitoring and Research—Actions		
Continue minimal monitoring of habitat conditions and wildlife populations. Continue to allow outside requests to perform habitat and wildlife research.	*Same as alternative A, plus:* Reexamine existing surveys and add surveys as needed to address refuge management issues. Use adaptive management procedures to improve habitat management. Determine and prioritize research needs for the Complex. Approach the research community with these needs.	*Same as alternative B, plus:* Pursue funding to facilitate research on Complex lands.
Monitoring and Research—Environmental Consequences		
Lack of basic knowledge of habitat characteristics, vegetative cover management, invasive species infestation, and wildlife populations present and their use and relationships with the habitats would continue to prevent the staff from being able to develop effective management activities and to use adaptive resource management to improve success. Research under this alternative is reactive, thus research would not address the key management questions on riparian habitats.	Implementation of this alternative would yield improved knowledge on current levels of weed infestation and on management of invasive species, as well as what upland habitat restoration techniques would help to achieve the goals of the CCP. Implementing this alternative would likely improve the Complex staff's understanding of the habitat requirements of grassland birds and assist in developing grassland bird management plans. Nest success information would indicate if predator control efforts are needed to meet production goals. This data and knowledge would allow the staff to better manage habitats and the wildlife that depend on uplands.	*Same as alternative B, plus:* Some universities might perform research, inventory, or monitoring on the Complex's upland habitats.
GOAL for Visitor Services. Provide opportunities for high quality and compatible hunting, fishing, environmental education, environmental interpretation, wildlife photography, and wildlife observation for persons of all abilities and cultural backgrounds by fostering an understanding and appreciation of the Lake Andes National Wildlife Refuge Complex and the missions of the Service and Refuge System.		
Hunting—Actions		
Continue to allow hunting on waterfowl production areas and the Center Unit of Lake Andes refuge.	*Same as alternative A, except:* Add a park ranger to the Complex staff who would investigate, and if feasible and compatible, provide limited, additional big game hunting opportunities (for example, archery or muzzleloader hunting only) on portions of Lake Andes Refuge and Karl E. Mundt Refuge where hunting is not currently allowed. Improve boat access to the Center Unit of Lake Andes Refuge by constructing a	*Same as alternative B.*

Table 2. Summary of CCP alternatives for the Lake Andes National Wildlife Refuge Complex, South Dakota.

Alternative A—no action	*Alternative B—modified management*	*Alternative C—intensive management*
	boat ramp that is ice-resistant and functional over a wide range of water depths. Improve access to hunting for people with disabilities by allowing vehicle access to select areas normally closed to vehicles on a case-by-case basis.	
Hunting—Environmental Consequences		
Hunting use would continue to increase where currently allowed. As use increases the quality of the hunting experience could decrease due to crowding. The staff would accommodate people with disabilities (for example, provide vehicle access to hunting areas normally closed to vehicles) on a case-by-case basis.	*Same as alternative A, except:* The Complex would provide expanded hunting opportunities, which would improve the quality of the hunting experience, and provide a measure of control for wildlife populations not currently manageable through hunting. Opening Karl E. Mundt Refuge to hunting may result in fewer trophy animals available for harvest on neighboring public and private land. Improving access would provide additional hunting opportunities.	*Same as alternative B.*
Fishing—Actions		
Continue to allow fishing on waterfowl production areas and the Center and South Units of Lake Andes Refuge. Continue to support the efforts of CMLRO to restore a fishery on the South Unit of Lake Andes, including a fishing pond on the edge of the town of Lake Andes.	*Same as alternative A, plus:* Improve boat access to the South Unit of Lake Andes Refuge by constructing a boat ramp that is ice-resistant and functional over a wide range of water depths.	*Same as alternative B.*
Fishing—Environmental Consequences		
Although the fisheries of Lake Andes would continue to fluctuate, improvements in water quality should improve the fishery. Boat access for fishing on the South Unit would continue to be poor.	*Same as alternative A, except:* Access for fishing on the South Unit of Lake Andes would improve.	*Same as alternative B.*
Environmental Education and Interpretation—Actions		
Continue to provide environmental education presentations as requested. Continue to provide a modest amount of interpretive media.	*Same as alternative A, except:* Add an outdoor recreation planner to the Complex staff to expand environmental education and interpretation opportunities. This new staff member would plan and initiate an environmental education program with teachers in the surrounding area. Potentially add new interpretive media in the headquarters area, and possibly the Karl Mundt Refuge area would also receive interpretive panels. Complex headquarters would be remodeled and expanded to provide a visitor center and environmental education classroom.	*Same as alternative B, except:* A new headquarters and visitor center would be constructed instead of remodeling the existing headquarters as in alternative B.

Table 2. Summary of CCP alternatives for the Lake Andes National Wildlife Refuge Complex, South Dakota.

Alternative A—no action	*Alternative B—modified management*	*Alternative C—intensive management*
Environmental Education and Interpretation—Environmental Consequences		
The Complex's potential to reconnect people with nature would be unrealized.	Interpretative and environmental education programs would increase understanding and support of Complex programs, as well as be an integral part of the Service's efforts to reconnect children with nature. A visitor center would attract greater numbers of visitors and provide the facilities needed for an effective environmental education program. The Complex's potential to reconnect people with nature would be more fully realized.	*Same as alternative B.*
Wildlife Observation and Photography—Actions		
Continue to provide unlimited opportunities for wildlife observation and photography on all waterfowl production areas, and the Center and South Units of Lake Andes Refuge. Continue to maintain existing foot trails. Continue to allow public access to Owens Bay and the Prairie Ponds for wildlife observation and photography opportunities. The North Unit of Lake Andes Refuge and Karl E. Mundt Refuge would continue to be closed to general public	*Same as alternative A, except:* Provide increased, but limited access for wildlife observation and photography on portions of Karl E. Mundt Refuge and the North Unit of Lake Andes Refuge. Observation and photography blinds would be provided on selected areas of the Complex. Improve accessibility of existing foot trails.	*Same as alternative B, plus:* Develop a self-guiding auto tour route on Lake Andes Refuge. Construct an observation tower on Lake Andes Refuge.
Wildlife Observation and Photography—Environmental Consequences		
Opportunities for wildlife observation and photography would not reach their full potential. Trails for people with disabilities would remain marginally accessible. Public access to portions of the Complex with high potential for wildlife observation and photography would remain closed.	The Complex's potential for wildlife observation and photography would be more fully realized. People with disabilities would have better access to existing foot trails on the Complex.	*Same as alternative B, plus:* The existence of the auto tour route would provide people of all physical abilities opportunities to observe and photograph wildlife.
GOAL for Operations. Provide funding, staffing, infrastructure, protection of cultural resources, partnerships, and a safe working environment to achieve the purposes and objectives of the Lake Andes National Wildlife Refuge Complex.		
Staffing and Funding—Actions		
Budget cuts have led to a 22-percent reduction in permanent staff over the last 10 years. The current staff of the Complex is not adequate to implement alternative A. The restoration of one deputy wildlife refuge manager and the conversion of one career seasonal maintenance worker to full time would be necessary to restore the staff to previous levels and to implement alternative A. Existing positions total 6.7 full-time-equivalents and are as follows: one wildlife refuge manager, one wildlife refuge specialist (wetland management district), one wildlife biologist, one wildlife biol	*Same as alternative A, except:* The following additions to the Complex staff would be added (bringing the Complex staff to 12.0 full-time-equivalents): one deputy wildlife refuge manager, one outdoor recreation planner, one park ranger, one biological technician, and one prescribed fire technician; additionally, one career seasonal maintenance worker position would be converted to a full-time position.	*Same as alternative B, plus:* The following additions to Complex staff would be added (bringing the Complex staff to 14.0 full-time equivalents): one biological technician, one prescribed fire technician, and one maintenance worker.

Table 2. Summary of CCP alternatives for the Lake Andes National Wildlife Refuge Complex, South Dakota.

Alternative A—no action	*Alternative B—modified management*	*Alternative C—intensive management*
ogist (Partners for Fish and Wildlife), one administrative officer, one full-time maintenance worker, and one career seasonal maintenance worker. However, a total of 8.0 full-time equivalents would be needed to implement this alternative.		
Staffing and Funding—Environmental Consequences		
Current funding and staffing is inadequate to properly manage the resources and facilities of the Complex. The grassland habitats that dominate the Complex would continue to require frequent management treatments (for example, burning, grazing, haying) to remain productive for wildlife. Such management would be lacking and habitats would suffer as a result. Wildlife populations that depend on these habitats would continue to be impacted. Lack of adequate staffing would continue to allow the degradation of infrastructure (for example, fences, signs, buildings) throughout the Complex. Inadequate staffing would continue to impede full development of wildlife-dependent recreation throughout the Complex.	Additional staffing would provide the resources to manage and restore more habitats annually. Wildlife populations that depend on these habitats would increase. Additional staffing would also provide the resources to adequately maintain facilities, equipment, and vehicles. Wildlife-dependent recreational opportunities would be expanded and enhanced.	*Same as alternative B, plus:* Habitat restoration would be accelerated, and additional public use facilities would be constructed.
Infrastructure: Equipment, Supplies, Operations and Maintenance—Actions		
Continue current level of maintenance of equipment, vehicles, and real property. No additional heavy equipment would be acquired.	Increase operational and maintenance support for management of wetland, riparian and upland habitats. Expand and remodel the headquarters building to provide more wildlife-dependent recreation opportunities and to support additional employees. Remodel the maintenance shop to correct existing deficiencies and accommodate additional staff and equipment. Construct a seed drying facility. Acquire additional heavy equipment (for example, excavator, combine, soil packer, bulldozer, transport truck and trailer).	*Same as alternative B, except:* Replace the existing headquarters building with a new headquarters and visitor center.
Infrastructure: Equipment, Supplies, Operations and Maintenance—Environmental Consequences		
Some portions of infrastructure (like fences) would remain in poor condition. No additional heavy equipment would be acquired. The efficiency of the Complex maintenance programs would continue to be compromised by a deficient shop building. Infrastructure would continue to deteriorate over time (e.g. fences) and would impact habitat and wildlife management efforts.	Conditions of infrastructure throughout the Complex would improve. Complex employees would work in a safer and healthier environment. Efficiency of Complex operations would be enhanced. Control of invasive plants would be accelerated.	*Same as alternative B, except:* Control of invasive plants would be even more accelerated.

Table 2. Summary of CCP alternatives for the Lake Andes National Wildlife Refuge Complex, South Dakota.

Alternative A—no action	*Alternative B—modified management*	*Alternative C—intensive management*
Partnerships—Actions		
Continue to support existing partnerships with private cooperators, agencies, and organizations. Staff shortages relative to existing workload would continue to limit the pursuit of partnership opportunities that require a large amount of time. Continue to support wildlife conservation on private land through the Partners for Fish and Wildlife program.	*Same as alternative A, except:* Pursue new partnerships to achieve the vision of this CCP. Pursue the creation of a "friends" group to support Complex management.	*Same as alternative B.*
Partnerships—Environmental Consequences		
Complex staff would be unable to take full advantage of partnership opportunities, to the detriment of the habitats and wildlife present in the Complex. Public support for the Complex and its programs is limited. Wildlife conservation on private lands would continue through the Partners for Wildlife program.	*Same as alternative A, except:* Complex staff would take advantage of partnership opportunities to expand wildlife conservation and increase public support for the Complex and its programs.	*Same as alternative B.*