

CHAPTER 3—Alternatives



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The Karl E. Mundt National Wildlife Refuge encompasses a portion of the Missouri National Recreational River.

Alternatives are different approaches to management of the Complex. Alternatives are designed to resolve Complex issues; achieve the purposes, visions, and goals associated with the Complex; help fulfill the mission of the Refuge System; and comply with current laws, regulations, and policies. This chapter describes three management alternatives considered for the Lake Andes National Wildlife Refuge Complex:

- alternative A, current management (no action)
- alternative B, modified management (proposed action)
- alternative C, intensive management

NEPA requires an equal and full analysis of all alternatives considered for implementation.

3.1 Substantive Issues and Alternatives Development

Based on public input from scoping meetings and written comments, as well as guidelines from NEPA, the Improvement Act, and Service Planning Policy, the planning team selected the substantive issues that will be addressed at the Complex:

- restoration of Lake Andes water quality and fishery
- invasive plant control
- monitoring and research

- prairie restoration
- public access and opportunities for wildlife-dependent recreation
- funding, infrastructure, and partnerships

These issues are summarized above in section 2.6, “Planning Issues.” The planning team discussed alternatives for management that will address these substantive issues and meet the goals of the Refuge System. Each alternative described in the following sections addresses each substantive issue somewhat differently.

3.2 Elements Common to All Alternatives

A number of elements are common to all three alternatives:

- addressing water quality and quantity concerns
- potentially using of an array of practices to manage habitats (for example, mechanical, chemical, or biological control methods)
- emphasizing acquiring, monitoring, and enforcing easements
- protecting all known and newly discovered cultural resources
- restoring prairies to native grasses to improve nesting habitat for waterfowl and other migratory birds

3.3 Description of Alternatives

The theme and general management direction for each alternative is described below.

ALTERNATIVE A—CURRENT MANAGEMENT (NO ACTION)

Under alternative A, current management activities conducted by the Service throughout the Complex would not change. The Service would not develop any new management, restoration, or education programs for the Complex. Staff would not modify or expand current habitat and wildlife management practices conducted for the benefit of migratory birds and other wildlife. Staff would perform monitoring and research activities at current levels. Funding and staff levels would not change. Programs would continue in the same direction with the same intensity.

Wetlands Goal

Water Quality. Water quality in Lake Andes is poor. Excessive nutrients from the surrounding watershed and a persistent population of rough fish limit not only the presence of oxygen in the water, but also the presence of aquatic vegetation. Poor water quality significantly degrades the quality of fish and wildlife habitat in the lake. Actions to restore the lake and the surrounding watershed would help the lake achieve its full potential as fish and wildlife habitat.

At present Complex staff is participating in meetings with the Charles Mix County Lake Restoration Organization (CMCLRO) and supporting and guiding its efforts to improve water quality and quantity in Lake Andes. CMCLRO seeks to improve water quality through the following actions:

1. Sediment removal. CMCLRO seeks to remove sediments from Lake Andes that are laden with high levels of nitrogen and phosphorus—nutrients that lead to frequent algae blooms that cloud the water and block sunlight penetration to a degree that many species of aquatic plants cannot grow. When the algae decompose, the oxygen content of the lake water is reduced to a level at which sport fish species and other aquatic animals and plants cannot survive.
2. Supporting soil conservation practices. CMCLRO is supporting ongoing government efforts to clean up the Lake Andes watershed through cost-shared, voluntary soil conservation practices (for example, planting buffer strips to reduce agricultural runoff, fencing livestock out of seasonal drainages, and cost-sharing agricultural waste containment systems).

3. Controlling the rough fish population. CMCLRO intends to remove carp and bullhead species of rough fish that persist in oxygen-poor waters. The feeding behaviors of these fish agitate the water to the degree that sunlight penetration is blocked, thereby reducing aquatic vegetation.

Under alternative A, Complex staff would continue to work with CMCLRO to improve water quality in Lake Andes.

Water Quantity. Water levels in Lake Andes are highly variable. The lake has no water source other than run-off from snow and rain. The basin goes dry on average every 10–20 years. Although periodic drying has both positive and negative effects on fish and wildlife, a reliable source of clean water would present opportunities to manage water levels to provide nationally significant fish and wildlife habitat.

CMCLRO seeks to improve water quantity by developing a reliable source of clean water for Lake Andes. Complex staff is participating in meetings with CMCLRO, supporting and guiding their efforts; this coordination would continue under alternative A. At this time the most likely water source would be Lake Francis Case, which is approximately 8 miles from Lake Andes.

Disease Control. Historically, avian cholera, botulism, and duck virus enteritis (DVE) outbreaks have occurred infrequently on the Complex. The last documented outbreaks occurred in 1984, 1980, and 1973.

Under this alternative, limited monitoring, containment, and clean-up of diseased birds would continue in accordance with the existing “Lake Andes National Wildlife Refuge Complex Wildlife Disease Contingency Plan” (WDCP). Wetlands (especially the Owens Bay Unit of the Lake Andes Refuge) would be monitored during peak migration periods in spring and fall.

Because of the risk to humans from highly pathogenic avian influenza (HPAI), increased emphasis would be placed on bird species known or suspected to be highly susceptible (for example, lesser scaup).

Riparian Goal

Cottonwood Restoration on Karl E. Mundt Refuge. Dams on the Missouri River have significantly reduced the reproduction and survival of cottonwoods on which bald eagles and many species of neotropical migratory birds depend. Cottonwood planting is necessary in order for these species to have suitable habitat on Karl E. Mundt Refuge in the future. Cottonwood restoration on this refuge is currently conducted, and would continue to be conducted, in a sporadic, opportunistic fashion, only as funding and staffing allows. Periodically, cottonwood seedlings would be planted and then fenced for approximately 5 years to protect them from deer and rabbits. There is and would be no formal plan.

Uplands Goal

Avian Nest Predator Control. Red foxes, striped skunks, and raccoons routinely prey on the nests of ground-nesting birds. In areas of limited nesting habitat, predators can suppress a bird population. Funding and staffing shortages preclude predator management on the Complex. Recreational trapping and hunting of mammalian predators would continue to be allowed on waterfowl production areas; however, these activities do not and would not occur to the degree that predator populations are controlled.

Habitat Restoration. Complex uplands are managed for tall, dense cover because it is attractive to nesting ducks. In addition to benefiting waterfowl, such vegetation is also favored by many other grassland birds. Under this alternative, the Complex would continue to restore and enhance the tall- and mixed-grass plant communities to create a mosaic that reflects the habitat requirements for waterfowl and other grassland-nesting birds. Restoration efforts must be compatible with invasive plant control efforts; this generally limits the opportunity to plant forbs. Lands with a cropping history that are infested with invasive plants would be farmed by cooperators for several growing seasons to prepare them for subsequent grassland restoration. Lands without a cropping history (that is, native prairie) would be managed with haying, grazing, and burning to keep them vigorous and productive.

Issues and Areas of Concern Relating to All Habitats

Invasive Plant Control. Canada thistle, musk thistle, leafy spurge, wormwood sage, eastern red cedar, Siberian elm, and Russian olive are the primary invaders of Complex lands. Smooth brome, Kentucky bluegrass, and crested wheatgrass also invade a large percentage of the Complex; however, attempts to control these grasses are secondary. Most control efforts are directed at Canada thistle using grazing, haying, mowing, and biological methods. This species is a pervasive pest partly because control measures are limited and generally require repeated applications. Canada thistle colonizes the wetland margins and then spreads into the uplands. Areas identified for treatment are generally grazed, mowed, or burned prior to chemical application.

Under alternative A, Complex management will continue to control invasive plants on wetlands, uplands, and riparian lands using chemical, mechanical, and biological control methods. Due to funding and staffing shortages, most infestations are currently treated only once every 3 years, which can be problematic because uplands often become re-infested within 3–5 years.

Noxious weed infestations are particularly troublesome for neighboring landowners who are required

by State and local laws to control those species of plants on their lands. Some of these landowners see Complex lands as the source of invasive plants colonizing their lands.

As is currently the practice, prescribed fire would be used primarily as a habitat management treatment to keep grasslands vigorous. Most burning to control of invasive plants would occur when the target plant species reaches the stage when it is most vulnerable; for smooth brome, this would be the “four or five leaf stage.” Most burning would occur during the months of April and May, with the objective of decreasing invasive cool-season grasses (smooth brome and Kentucky bluegrass) in favor of warm-season native grasses.

Habitat Protection. The Service will continue to pursue opportunities to protect wetland and grassland habitats on a willing-seller basis. The mechanisms to conserve valuable wetland habitat will include (but not be limited to) purchasing easements and fee title of lands (land which would then be government-owned). Approximately 3,000 acres of wetland and grassland habitat are protected annually through easement acquisition. Lands that are for sale and next to Complex lands will be inspected for possible purchase. Complex staff would also continue to monitor and enforce wetland and grassland easement provisions and Farmers Home Administration (FmHA) conservation easement provisions in accordance with current policies.

The two units of the Karl E. Mundt Refuge are separated by a tract of private land. Complex staff would continue to pursue a conservation easement on the private tract, as development of this tract would compromise the habitat integrity of the refuge.

A significant issue on the Karl E. Mundt Refuge, which lies approximately 4 miles downstream of the Fort Randall Dam, is riverbank erosion. During periods of high water releases from the dam, erosion is substantial where the bank has not been riprapped (approximately 20 percent of the riverbank is unprotected). Mature cottonwood trees that are used by bald eagles fall into the river when the soil holding them up erodes. The National Park Service, which maintains the Missouri National Recreational River, is opposed to the addition of riprap because of aesthetics, downstream erosion impacts, and the effect it has on attempts to convince riparian landowners to forego riprap. Riverbank protection would remain unchanged under this alternative.

Another issue on the Karl E. Mundt Refuge is that beavers sometimes kill cottonwood trees that are used by bald eagles for roosting and nesting. When chewing activities are particularly acute, a local trapper is permitted to trap beaver near the problem area(s). Where chewing has not progressed to the point where cottonwoods have been completely girdled, individual trees would be wrapped with wire to protect them from beaver.

Visitor Services Goal

Hunting. Hunting would continue on all waterfowl production areas throughout the Complex and on the Center Unit of the Lake Andes Refuge.

Fishing. Fishing would be allowed on all waterfowl production areas throughout the Complex and in the Center and South Units of Lake Andes Refuge (note, however, that most wetlands on the Complex are too shallow to sustain a sport fishery). Stocking of fish would continue to be limited to Schaeffer and Scheffel Waterfowl Production Areas and the Center and South Units of the Lake Andes Refuge.

Complex staff would continue to participate in meetings with CMCLRO and support and guide its efforts to improve water quality and quantity in Lake Andes. Complex staff would also support the group's efforts to restore a sport fishery in the South Unit of Lake Andes and to develop a fishing pond on the edge of the town of Lake Andes.

Environmental Education and Interpretation. Complex staff would continue to provide environmental education and interpretation as requested. Activities would include hosting school groups; conducting refuge tours; providing hunter safety courses; and holding outdoor festivals, fairs, and expos.

Wildlife Observation and Photography. Opportunities for wildlife observation and photography would continue to be provided in a passive manner. Foot trails on Atkins Waterfowl Production Area and the Owens Bay Unit of Lake Andes Refuge would remain open and be maintained.

The Karl E. Mundt Refuge would remain closed to public entry.

All waterfowl production areas on the Complex would remain open to recreational trapping in addition to hunting, fishing, wildlife observation, photography, environmental education, and interpretation.

Operations Goal

Staffing and Funding. Staffing and funding would be limited to the current levels (appendix E), which are inadequate to properly manage the resources and facilities of the Complex.

Infrastructure, Equipment, and Operations and Maintenance. Infrastructure, equipment, and operations and maintenance would be limited to the current levels (appendix E). No additional buildings, heavy equipment, and vehicles would be added, only replaced as needed.

Monitoring and Research. Limited monitoring of habitat conditions and wildlife populations would continue in the wetlands (the 4-square-mile waterfowl survey, breeding shorebird survey, and waterfowl population survey), riparian areas (wintering and nesting bald eagle surveys), and uplands (the breeding mourning

dove survey, Christmas bird count, and breeding shorebird survey). Requests for research within the Complex would be permitted if deemed compatible with the purposes of the units of the Complex.

Cultural Resources. Cultural resources would continue to be protected in accordance with Federal and State laws and regulations, specifically Section 106 of the National Historic Preservation Act of 1966, whenever ground-disturbing activities are planned.

Partnerships. Inadequate funding and staffing would prevent the Complex from pursuing partnerships beyond those made with approximately 80 cooperators for grazing, haying, and farming.

Partnerships addressing wildlife conservation on private lands would continue to be supported through the collaboration between the biologist on station and Partners for Fish and Wildlife. Most of these projects would continue to focus on wetland restoration, grassland restoration, and implementation of grazing systems that are beneficial to ground-nesting birds and other wildlife.

ALTERNATIVE B—MODIFIED MANAGEMENT

This alternative focuses on addressing many of the external and internal comments received during scoping (section 3.1, "Substantive Issues and Alternatives Development"). Under this alternative there would be increased efforts to restore fish and wildlife habitat on Lake Andes; more effective control of invasive plants; more focused monitoring, studies, and research activities; more restoration of native plants in grasslands; expanded opportunities for hunting, fishing, environmental education, interpretation, and wildlife observation and photography; and increased funding for the additional staff, infrastructure, and partnerships necessary to allow the Complex to fulfill the purposes for which the units of the Complex were established by Congress.

Wetlands Goal

Water Quality. Water quality in Lake Andes is poor. Excessive nutrients from the surrounding watershed and a persistent population of rough fish limit not only the presence of oxygen in the water, but also the presence of aquatic vegetation. Poor water quality significantly degrades the quality of fish and wildlife habitat in the lake. Actions to restore the lake and the surrounding watershed would help the lake achieve its full potential as fish and wildlife habitat.

The Complex staff would continue to participate in meetings with CMCLRO and support and guide its efforts to improve water quality and quantity in Lake Andes. CMCLRO seeks to improve water quality through the following actions:

1. Sediment removal. CMCLRO seeks to remove sediments from Lake Andes that are laden with

high levels of nitrogen and phosphorus—nutrients that lead to frequent algae blooms that cloud the water and block sunlight penetration to a degree that many species of aquatic plants cannot grow. When the algae decompose, the oxygen content of the lake water is reduced to a level at which sport fish species and other aquatic animals and plants cannot survive.

2. Supporting soil conservation practices. CMCLRO is supporting ongoing government efforts to clean up the Lake Andes watershed through cost-shared, voluntary soil conservation practices (for example, planting buffer strips to reduce agricultural runoff, fencing livestock out of seasonal drainages, cost-sharing agricultural waste containment systems).
3. Controlling the rough fish population. CMCLRO intends to remove carp and bullhead species of rough fish that persist in oxygen-poor waters. The feeding behaviors of these fish agitate the water to the degree that sunlight penetration is blocked, thereby reducing aquatic vegetation.

Under this alternative, the use of additional fish screens to reduce the immigration of rough fish into Lake Andes would be investigated and implemented if practical. If implemented, fish screens would be placed on all tributaries leading into the lake and under both dikes.

Water Quantity. Water levels in Lake Andes are highly variable. The lake has no water source other than runoff from snow and rain. The basin goes dry on average every 10–20 years. Although periodic drying has both positive and negative effects on fish and wildlife, a reliable source of clean water would present opportunities to manage water levels to provide nationally significant fish and wildlife habitat.

CMCLRO seeks to improve water quantity by developing a reliable source of clean water for Lake Andes. Complex staff is participating in meetings with CMCLRO and supporting and guiding its efforts; this coordination would continue under alternative B. At this time the most likely water source would be Lake Francis Case, which is approximately 8 miles from Lake Andes.

Under this alternative, a water system that would pump water from the Center Unit into the South Unit of Lake Andes would be investigated and implemented if practical. Such a water system would provide greater water depths in the South Unit for sport fishing while providing shallower depths for waterfowl habitat in the Center Unit.

Disease Control. Historically, avian cholera, botulism, and DVE outbreaks have occurred infrequently on the Complex. The last documented outbreaks occurred in 1984, 1980, and 1973.

Under this alternative, limited monitoring, containment, and clean-up of diseased birds would continue



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Although managing habitat for bald eagles on Karl E. Mundt Refuge would occur under all three alternatives, alternatives B and C call for expanded efforts.

in accordance with the existing WDCP. Wetlands (especially the Owens Bay Unit of Lake Andes Refuge) would be monitored during peak migration periods in spring and fall. Under this alternative, additional surveys would be conducted on other Service lands that have high concentrations of bird species known or suspected to be susceptible to HPAI (for example, lesser scaup).

Riparian Goal

Cottonwood Restoration on Karl E. Mundt Refuge. Dams on the Missouri River have significantly reduced reproduction and survival of cottonwoods on which bald eagles and many species of migratory birds depend. Cottonwood planting is necessary in order for these species to have suitable habitat on the Karl E. Mundt Refuge in the future. Restoration of cottonwood-dominated riparian habitats on this refuge is currently conducted in a sporadic, opportunistic fashion, as funding and staffing allows. There is no formal plan directing these restoration efforts. Under this alternative, however, Complex staff would develop and implement a stepdown riparian woodland habitat management plan on Karl E. Mundt Refuge. Cottonwoods and other woodland plants would be established in the riverbottom and, in some cases, in upland areas. When young, these plants would be fenced to protect them from herbivory. Herbaceous plants would be controlled around these seedlings for the first 3–5 five growing seasons to aid establishment, reduce competition, and boost growth.

Uplands Goal

Avian Nest Predator Control. Red foxes, striped skunks, and raccoons routinely prey on the nests of ground-nesting birds. In areas of limited nesting habitat, predators can suppress a bird population. Funding and staffing shortages preclude predator management on the Complex. Recreational trapping and hunting of



Prescribed fire would be used as a management tool under all three alternatives.

mammalian predators is allowed on waterfowl production areas; however, it does not occur to the degree that predator populations are controlled.

To enhance nesting success, waterfowl nest predators—namely skunk, fox, and raccoon—would be removed from selected areas during the nesting period by trapping. The removal of these waterfowl nest predators would not only increase nesting success for waterfowl but would also increase nesting success for other ground-nesting migratory birds. Complex staff would facilitate the implementation of partner operated predator control programs on large blocks of land to increase waterfowl production throughout the district where the block of land averages 40 duck pairs or more per square mile.

Habitat Restoration and Reconstruction. Complex uplands are managed for tall, dense cover because it is attractive to nesting ducks. In addition to benefiting waterfowl, such vegetation is also favored by many other grassland birds. Under this alternative, the Complex would continue to restore and enhance the tall- and mixed-grass plant communities to create a mosaic that reflects the habitat requirements for waterfowl and other grassland-nesting birds. Restoration efforts must be compatible with invasive plant control efforts; this generally limits the opportunity to plant forbs. Lands with a cropping history that are infested with invasive plants would continue to be farmed by cooperators for several growing seasons to prepare them for subsequent grassland restoration. Grazing, burning, and haying would be used to keep grasslands vigorous before and after restoration. Restored grasslands and lands without a cropping history (that is, native prairie) would continue to be managed with haying, grazing, or burning to keep them vigorous and productive. Sites that do not respond to the above management treatments would be inter-seeded with native grasses or forb mix.

Under this alternative, the focus would be on restoration of a high diversity of native grasses and forbs. Approximately 200 acres of upland would be restored annually.

This alternative would call for the purchase of equipment for collection of desirable plant seeds and construction of a building for cleaning, drying, and storing those seeds.

Issues and Areas of Concern Relating to All Habitats

Invasive Plant Control. Canada thistle, musk thistle, leafy spurge, wormwood sage, eastern red cedar, Siberian elm, and Russian olive are the primary invaders of Complex lands. Smooth brome, Kentucky bluegrass, and crested wheatgrass also invade a large percentage of the Complex lands; however, attempts to control these grasses are secondary. Most control efforts are directed at Canada thistle using grazing, haying, mowing, and biological methods. This species is a pervasive pest partly because control measures are limited and generally require repeated applications. Canada thistle colonizes the wetland margins and then spreads into the uplands.

Noxious weed infestations are particularly troublesome for neighboring landowners who are required by State and local laws to control those species of plants on their lands. Some of these landowners see Complex lands as the source of invasive plants colonizing their lands.

Currently areas identified for treatment are generally grazed, mowed, or burned prior to chemical application. Complex management would continue to control invasive plants on wetlands, uplands, and riparian lands using chemical, mechanical, and biological control methods. Due to funding and staffing shortages, most infestations are currently treated once every 3 years, which can be problematic because uplands often become re-infested within 3–5 years. Under alternative B, infestations on Lake Andes Refuge, Karl E. Mundt Refuge, and high priority waterfowl production areas would be treated annually. Remaining infestations would continue to be treated once every 3 years.

Formal monitoring and mapping of infestations of invasive plants on the Complex would be initiated under this alternative. This alternative calls for annual surveys to detect the presence of species of invasive plants that have not been widely established on the Complex, such as saltcedar. Infestations that are detected would be mapped, treated, and retreated annually with the goal of eradication. Additionally, there would be an increased emphasis on control of eastern red cedar, Russian olive, and other invasive tree species.

Prescribed fire would be used primarily as a habitat management treatment to keep grasslands vigorous. Prescribed fires could occur at any time of year depending on management objectives. However, most burning would generally occur in the months of April and May, with the objective of decreasing invasive

cool-season grasses (smooth brome and Kentucky bluegrass) in favor of warm-season native grasses.

Habitat Protection. The Service would continue to pursue opportunities to protect wetland habitats on a willing-seller basis. The mechanisms to conserve valuable wetland habitat would include (but not be limited to) purchasing easements and fee title of lands. Approximately 3,000 acres of wetland and grassland habitat is protected annually through easement acquisition. Lands that are for sale and next to Complex lands would be inspected for possible purchase. The Service would also analyze and pursue the acquisition of land with high wetland and wildlife values even if these lands are not next to Refuge System lands. Under this alternative, Complex staff would contact landowners within the area encompassed by the Lake Andes District whose lands fall within areas identified with a density of 60 duck pairs or more per square mile for possible easement acquisition.

Under this alternative, the Complex staff would analyze and pursue exchange of low priority Refuge System lands that possess marginal wildlife values, including fee title lands and FmHA conservation easements.

Complex staff would also continue to monitor and enforce wetland easement provisions and FmHA conservation easement provisions in accordance with current policies.

The two units of the Karl E. Mundt Refuge are separated by a tract of private land. This alternative would pursue acquisition (if the landowner is willing) of a conservation easement or fee title for the tract of land that lies between the two units of the refuge.

A significant issue on the Karl E. Mundt Refuge, which lies approximately 4 miles downstream from the Fort Randall Dam, is riverbank erosion. During periods of high water releases from the dam, erosion is substantial where the bank has not been riprapped (approximately 20 percent of the riverbank is unprotected). Mature cottonwood trees that are used by bald eagles fall into the river when the soil holding them up erodes. The Missouri National Recreational River (managed by the National Park Service), which runs through the Complex, is opposed to the addition of riprap because of aesthetics and downstream erosion impacts. Under this alternative, methods to prevent streambank erosion on this refuge would be investigated and implemented in cooperation with the Missouri National Recreational River and the U.S. Army Corps of Engineers. The emphasis would be on instream structures such as weirs (which do not create erosion problems downstream) rather than riprap.

Another issue on the Karl E. Mundt Refuge is that beavers sometimes kill cottonwood trees that are used by bald eagles for roosting and nesting on riparian habitats. When chewing activities are particularly acute

a local trapper is permitted to trap beaver near the problem area(s). Where chewing has not progressed to the point where cottonwoods have been completely girdled, individual trees would be wrapped to protect them from beavers. Under this alternative, staff would identify and protect mature cottonwood trees that have high potential for bald eagle nesting and roosting.

Visitor Services Goal

Hunting. Hunting would continue on all waterfowl production areas throughout the Complex and on the Center Unit of Lake Andes Refuge.

Boat access for waterfowl hunters to the Center Unit would be improved through the construction of a boat ramp that is functional at a wide range of water levels and highly resistant to ice damage.

Expansion of hunting accessibility and opportunity through the addition of limited hunts (for example, for hunters with disabilities or hunters with bows or muzzleloaders) would be investigated in cooperation with the State. Complex staff would review areas currently closed to hunting to determine their compatibility for hunting.

Fishing. Fishing would be allowed on all waterfowl production areas throughout the Complex and on the Center and South Units of Lake Andes Refuge (note, however, that most wetlands on the Complex are too shallow to sustain a sport fishery). Stocking of fish is currently limited to Schaeffer and Scheffel Waterfowl Production Areas and the Center and South Units of the Lake Andes Refuge.

Complex staff would continue to participate in meetings with CMCLRO and support and guide its efforts to improve water quality and quantity in Lake Andes. Complex staff would also support the group's efforts to restore a sport fishery in the South Unit of Lake Andes and to develop a fishing pond on the edge of the town of Lake Andes.

Boat access for anglers to the South Unit of Lake Andes would be improved through the construction of a boat ramp that is functional at a wide range of water levels and highly resistant to ice damage.

Environmental Education and Interpretation. Complex staff would continue to provide environmental education and interpretation as requested. Activities would include hosting school groups; conducting refuge tours; providing hunter safety courses; and holding outdoor festivals, fairs, and expos.

This alternative calls for an outdoor recreation planner to be added to the staff (appendix E). Opportunities for environmental education and interpretation would be expanded by drafting and executing an outreach plan for the surrounding area. Teacher workshops would be part of the plan, as would additional interpretive signs, exhibits, and brochures.

The existing headquarters building would be remodeled to provide a visitor center and environmental education classroom.

Wildlife Observation and Photography. Current opportunities for wildlife observation and photography would continue to be provided. Foot trails on Atkins Waterfowl Production Area and the Owens Bay Unit of Lake Andes Refuge would continue to be maintained. The accessibility of existing foot trails would be improved by paving or firming the surface.

All waterfowl production areas on the Complex would remain open to recreational trapping in addition to hunting, fishing, wildlife observation, photography, environmental education, and interpretation.

Limited portions of Karl E. Mundt Refuge and portions of Lake Andes Refuge that are currently closed to the public would be opened for wildlife observation and photography. Observation and photography blinds would be provided in appropriate locations on the Complex.

Operations Goal

Staffing and Funding. Staffing and funding would be significantly expanded to carry out this alternative and accomplish the vision statements and goals developed for this plan.

Infrastructure, Equipment, and Operations and Maintenance. The existing headquarters building would be remodeled and expanded to provide a visitor center and to accommodate additional employees.

The existing maintenance shop and storage buildings would be remodeled and expanded to correct deficiencies and to accommodate additional staff and equipment.

Additional equipment and vehicles would be added to the Complex fleet.

Monitoring and Research. Limited monitoring of habitat conditions and wildlife populations would continue in the wetlands (the 4-square-mile waterfowl survey, breeding shorebird survey, and waterfowl population survey), riparian areas (wintering and nesting bald eagle surveys), and uplands (breeding mourning dove survey, Christmas bird count, and breeding shorebird survey). Monitoring surveys and studies conducted by Complex staff would be expanded to better understand the effects of management treatments on habitats and wildlife populations and to better address refuge management issues. For example, staff might conduct a study to determine the most effective way to restore a high diversity of native grasses and forbs in areas that are infested with invasive plants. New surveys and studies would also be added and may include habitat and invasive plant mapping; migratory bird surveys; and studies of nests, prescribed fire effects, invasive plant control effects, upland restoration projects.



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Research and monitoring efforts would be expanded under alternatives B and C.

University-led research to develop methods for riparian and prairie restoration and weed control on waterfowl production areas and refuges would be encouraged. Requests for research within the Complex would be permitted if deemed compatible with the purposes of the units of the Complex. Research needs for the Complex (for example, identifying more effective strategies to restore smooth brome-dominated grasslands or identifying more effective strategies to restore cottonwoods) would be identified, prioritized, and pursued within the research community. Compared to alternative A, this is a proactive approach to research on the Complex.

Cultural Resources. Cultural resources would continue to be protected in accordance with Federal and State laws and regulations, specifically Section 106 of the National Historic Preservation Act of 1966, whenever ground-disturbing activities are planned.

Partnerships. Besides the existing partnerships, Complex staff would actively seek partnerships with government agencies, organizations, sporting groups, and landowners to explore new avenues to fulfill the visions and goals of this plan.

Partnerships addressing wildlife conservation on private lands would continue to be supported through the collaboration between the biologist on station and Partners for Fish and Wildlife. Most of these projects would continue to focus on wetland restoration, grassland restoration, and implementation of grazing systems that are beneficial to ground-nesting birds and other wildlife.

The creation of a “friends” group (a group that would advocate for the Complex with political, financial, or volunteer support) would be pursued for greater support of Complex management.

ALTERNATIVE C—INTENSIVE MANAGEMENT

Like alternative B, this alternative addresses comments received during scoping. However it goes one step further and focuses on a more intensive approach to wildlife and public use management.

Wetlands Goal

Water Quality. Water quality in Lake Andes is poor. Excessive nutrients from the surrounding watershed and a persistent population of rough fish limit not only the presence of oxygen in the water, but also the presence of aquatic vegetation. Poor water quality significantly degrades the quality of fish and wildlife habitat in the lake. Actions to restore the lake and the surrounding watershed would help the lake achieve its full potential as fish and wildlife habitat.

The Complex staff would continue to participate in meetings with CMCLRO and support and guide its efforts to improve water quality and quantity in Lake Andes.

CMCLRO seeks to improve water quality through the following actions:

1. Sediment removal. CMCLRO seeks to remove sediments from Lake Andes that are laden with high levels of nitrogen and phosphorus—nutrients that lead to frequent algae blooms that cloud the water and block sunlight penetration to a degree that many species of aquatic plants cannot grow. When the algae decompose, the oxygen content of the lake water is reduced to a level at which sport fish species and other aquatic animals and plants cannot survive.
2. Supporting soil conservation practices. CMCLRO is supporting ongoing government efforts to clean up the Lake Andes watershed through cost-shared, voluntary soil conservation practices (for example, planting buffer strips to reduce agricultural runoff, fencing livestock out of seasonal drainages, cost-sharing agricultural waste containment systems).
3. Controlling the rough fish population. CMCLRO intends to remove carp and bullhead species of rough fish that persist in oxygen-poor waters. The feeding behaviors of these fish agitate the water to the degree that sunlight penetration is blocked, thereby reducing aquatic vegetation.

The use of additional fish screens to reduce the immigration of rough fish into Lake Andes would be investigated and implemented if practical. Fish screens would be placed on all tributaries leading into the lake and under both dikes.

Under this alternative, Complex staff would seek partnerships with landowners in the Lake Andes watershed to facilitate actions that would improve water quality in Lake Andes. Examples include using plant buffer strips or excluding livestock from drainages to reduce sediment and nutrient runoff into Lake Andes. These actions would be the same types of soil conservation actions that agencies like the Natural Resources Conservation Service are already facilitating; however, this alternative would enhance the existing effort and use the Partners for Fish and Wildlife Program.

Water Quantity. Water levels in Lake Andes are highly variable. The lake has no water source other than runoff from snow and rain. The basin goes dry on average every 10–20 years. Although periodic drying has both positive and negative effects on fish and wildlife, a reliable source of clean water would present opportunities to manage water levels to provide nationally significant fish and wildlife habitat.

CMCLRO seeks to improve water quantity by developing a reliable source of clean water for Lake Andes. Complex staff would continue to participate in meetings with CMCLRO, and support and guide its efforts. At this time the most likely source would be Lake Francis Case, which is approximately 8 miles from Lake Andes.

A water system that would pump water from the Center Unit into the South Unit of Lake Andes would be investigated and implemented if practical. Such a water system would provide greater water depths in the South Unit for sport fishing while providing shallower depths for waterfowl habitat in the Center Unit.

Disease Control. Historically, avian cholera, botulism, and DVE outbreaks have occurred infrequently on the Complex. The last documented outbreaks occurred in 1984, 1980, and 1973.

Monitoring, containment, and clean-up of diseased birds would continue in accordance with the existing WDCP. Wetlands (especially the Owens Bay Unit of the Lake Andes Refuge) would be monitored during peak migration periods in spring and fall.

Mortality surveys along pre-established routes would be conducted during migration and for wintering populations. Because of the risk to humans from HPAI, increased emphasis would be placed on bird species known or suspected to be highly susceptible (for example, lesser scaup).

Under this alternative, live birds (by trapping) and dead birds (by hunter check stations) would be actively sampled. Oropharyngeal and cloacal swabs would be used to determine presence or absence of disease.

Riparian Goal

Cottonwood Restoration on Karl E. Mundt Refuge. Dams on the Missouri River have significantly reduced reproduction and survival of cottonwoods on which bald eagles and many species of migratory birds depend. Cottonwood planting is necessary in order for these species to have suitable habitat on the Karl E. Mundt Refuge in the future. Restoration of cottonwood-dominated riparian habitats on this refuge is currently conducted in a sporadic, opportunistic fashion, as funding and staffing allows. There is no formal plan directing these restoration efforts.

Under this alternative, the Complex staff would develop and implement a stepdown riparian woodland habitat management plan for Karl E. Mundt Refuge.

Cottonwoods and other woodland plants would be established in the riverbottom and, in some cases, in upland areas. When young, these plants would be fenced to protect them from herbivory. Herbaceous plants would be controlled around these seedlings for the first three to five growing seasons to aid establishment, reduce competition, and boost growth.

Complex staff would work with the U.S. Army Corps of Engineers to provide river flows conducive to cottonwood restoration.

Uplands Goal

Avian Nest Predator Control. Red foxes, striped skunks, and raccoons routinely prey on the nests of ground-nesting birds. In areas of limited nesting habitat, predators can suppress a bird population. Funding and staffing shortages preclude predator management on the Complex. Recreational trapping and hunting of mammalian predators is allowed on waterfowl production areas; however, they do not occur to the degree that predator populations are controlled.

Under this alternative the staff would actively pursue partner-driven predator control throughout the Complex. To enhance nesting success, waterfowl nest predators—skunks, foxes, and raccoons—would be removed from selected areas during the nesting period by trapping. The removal of these waterfowl nest predators would not only increase nesting success for waterfowl but would also increase nesting success for other ground-nesting migratory birds. Complex staff would facilitate the implementation of predator control programs on large blocks of land that average 40 duck pairs or more per square mile to increase waterfowl production throughout the district.

Habitat Restoration. Complex uplands are managed for tall, dense cover because it is attractive to nesting ducks. In addition to benefiting waterfowl, such vegetation is also favored by many other grassland birds. Under this alternative, the Complex would continue to restore and enhance the tall- and mixed-grass plant communities to create a mosaic that reflects the habitat requirements for waterfowl and other grassland-nesting birds. Restoration efforts must be compatible with invasive plant control efforts; this generally limits the opportunity to plant forbs. Lands with a cropping history that are infested with invasive plants would continue to be farmed by cooperators for several growing seasons to prepare them for subsequent grassland restoration. Grazing, burning, and haying would be used to keep grasslands vigorous before and after restoration. Restored grasslands and lands without a cropping history (that is, native prairie) would continue to be managed with haying, grazing, or burning to keep them vigorous and productive.

Under this alternative, the focus would be on restoration of a high diversity of native grasses and

forbs. Approximately 300 acres of upland would be restored annually.

This alternative would call for the purchase of equipment for collection of desirable plant seeds and construction of a building for cleaning, drying, and storing those seeds.

Issues and Areas of Concern Relating to All Habitats

Invasive Plant Control. Canada thistle, musk thistle, leafy spurge, wormwood sage, eastern red cedar, Siberian elm, and Russian olive are the primary invaders of Complex lands. Smooth brome, Kentucky bluegrass and crested wheatgrass also invade a large percentage of the Complex lands; however, attempts to control these grasses are secondary. Most control efforts are directed at Canada thistle using grazing, haying, mowing, and biological methods. This species is a pervasive pest partly because control measures are limited and generally require repeated applications. Canada thistle colonizes the wetland margins and then spreads into the uplands.

Noxious weed infestations are particularly troublesome for neighboring landowners who are required by State and local laws to control those species of plants on their lands. Some of these landowners see Complex lands as the source of invasive plants colonizing their lands.

Areas identified for treatment are generally grazed, mowed, or burned prior to chemical application. Complex management will continue to control invasive plants on wetlands, uplands and riparian lands using chemical, mechanical, and biological control methods. Due to funding and staffing shortages, most infestations are currently treated once every 3 years, which can be problematic because uplands often become re-infested within 3–5 years. Under alternative C, infestations on Lake Andes Refuge, Karl E. Mundt Refuge, and high priority waterfowl production areas would be treated twice annually. Remaining infestations would continue to be treated once every 3 years.

Formal monitoring and mapping of invasive plant infestations on the Complex would be initiated under this alternative. This alternative calls for annual surveys to detect the presence of invasive plants that are not widely established on the Complex, such as saltcedar. All infestations found would be mapped, treated, and re-treated annually with the goal of eradication. Additionally, there would be an increased emphasis on control of eastern red cedar, Russian olive, and other invasive tree species.

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

Prescribed fire would be used primarily as a habitat management treatment to keep grasslands vigorous.

Prescribed fires could occur at any time of year depending on management objectives. However, most burning would generally occur in the months of April and May, with the objective of decreasing invasive cool-season grasses (smooth brome and Kentucky bluegrass) in favor of warm-season native grasses.

Habitat Protection. The Service would continue to pursue opportunities to protect wetland habitats on a willing-seller basis. The mechanisms to conserve valuable upland habitat would include (but not be limited to) purchasing easements and fee title of lands. Approximately 3,000 acres of wetland and grassland habitat is protected through easement acquisition annually. Under this alternative, lands that are for sale and next to Complex lands would be inspected for possible purchase. Complex staff would also analyze and pursue the acquisition of land with high wildlife values even if these lands are not next to Refuge System lands. Complex staff would also pursue grassland easement acquisition from landowners within the area encompassed by the Lake Andes District whose lands fall within the areas identified with a density of 60 duck pairs or more per square mile.

Complex staff would analyze and pursue exchange of low priority Refuge System lands that possess marginal wildlife values, including fee title lands and FmHA conservation easements.

The Complex staff would also continue to monitor and enforce wetland easement provisions and FmHA conservation easement provisions in accordance with current policies.

The two units of the Karl E. Mundt Refuge are separated by a tract of private land. The habitat integrity of the refuge would suffer if this tract of private land were developed. Rather than pursuing a conservation easement, this alternative would pursue acquisition (if the landowner is willing) of fee title to the tract of land that lies between the two units of the Karl E. Mundt Refuge.

A significant issue on the Karl E. Mundt Refuge, which lies approximately 4 miles downstream of the Fort Randall Dam, is riverbank erosion. During periods of high water releases from the dam, erosion is substantial where the bank has not been riprapped (approximately 20 percent of the riverbank is unprotected). Mature cottonwood trees that are used by bald eagles fall into the river when the soil holding them up erodes. The National Park Service, which maintains the Missouri National Recreational River, is opposed to the addition of riprapp because of aesthetics, downstream erosion impacts, and the effect it has on attempts to convince riparian landowners to forego riprapp. Methods to prevent streambank erosion on this refuge would be investigated and implemented in cooperation with the National Park Service and the U.S. Army Corps of Engineers. The emphasis would be on

instream structures such as weirs (which do not create erosion problems downstream) rather than riprapp.

Another issue on the Karl E. Mundt Refuge is that beavers sometimes kill cottonwood trees that are used by bald eagles for roosting and nesting on riparian habitats. When chewing activities are particularly acute a local trapper is permitted to trap beaver near the problem area(s). Under this alternative, staff would identify mature cottonwood trees and protect them with a basal wrap that prevents herbivory.

Visitor Services Goal

Hunting. Hunting would continue on all waterfowl production areas throughout the Complex and on the Center Unit of the Lake Andes Refuge.

Boat access for waterfowl hunters to the Center Unit would be improved through the construction of a boat ramp that is functional at a wide range of water levels and highly resistant to ice damage.

Expansion of hunting accessibility and opportunity through the addition of limited hunts (for example, for hunters with disabilities or hunters with bows or muzzleloaders) would be investigated in cooperation with the State. Complex staff would review areas currently closed to hunting to determine their compatibility for hunting.

Fishing. Fishing would be allowed on all waterfowl production areas throughout the Complex and on the Center and South Units of Lake Andes Refuge (note, however, that most wetlands on the Complex are too shallow to sustain a sport fishery). Stocking of fish would be limited to Schaeffer and Scheffel Waterfowl Production Areas and the Center and South Units of Lake Andes Refuge.

Complex staff would continue to participate in meetings with CMCLRO and support and guide its efforts to improve water quality and quantity in Lake Andes. Complex staff would also support the group's efforts to restore a sport fishery in the South Unit of Lake Andes and to develop a fishing pond on the edge of the town of Lake Andes.



Additional interpretive signs at the Complex would be created under alternatives B and C.

Boat access for anglers to the South Unit of Lake Andes Refuge would be improved through the construction of a boat ramp that is functional at a wide range of water levels and highly resistant to ice damage.

Environmental Education and Interpretation. Complex staff would continue to provide environmental education and interpretation as requested. Activities would include hosting school groups; conducting refuge tours; providing hunter safety courses; and holding outdoor festivals, fairs, and expos.

Under this alternative, an outreach plan would be drafted and executed to expand opportunities for environmental education and interpretation. Teacher workshops would be part of the plan, as would creating additional interpretive signs, exhibits, and brochures.

A new visitor center would be constructed at the Complex headquarters. The visitor center would include a classroom, facilities to support teachers and students, and interpretive exhibits. An outdoor recreation planner would be added to the Complex staff to support this facility (appendix E).

Wildlife Observation and Photography. Current opportunities for wildlife observation and photography would continue to be provided. Foot trails on Atkins Waterfowl Production Area and the Owens Bay Unit of Lake Andes Refuge would continue to be maintained. The accessibility of existing foot trails would be improved by paving or firming the surface.

All waterfowl production areas on the Complex would remain open to recreational trapping in addition to hunting, fishing, wildlife observation, photography, environmental education, and interpretation.

Limited portions of Karl E. Mundt Refuge and portions of Lake Andes Refuge that are currently closed to the public would be opened for wildlife observation and photography. Observation and photography blinds would be provided in appropriate locations on the Complex.

To provide more opportunity for wildlife observation and photography, an observation tower would be constructed and a self-guiding auto tour route would be developed for the Lake Andes Refuge.

Operations Goal

Staffing and Funding. Staffing would be expanded beyond alternative A, and funding would be expanded beyond alternatives A and B to carry out this alternative and accomplish the visions developed for this plan.

Infrastructure, Equipment, and Operations and Maintenance. Instead of remodeling the existing headquarters building, a new visitor center would be constructed. A seed drying facility would be constructed.

Additional equipment and vehicles would be added to the Complex fleet. Furthermore, a greater level of operations and maintenance activities would be required.

Monitoring and Research. Current monitoring of wetland habitat conditions and wildlife populations would continue (the 4-square-mile waterfowl survey, breeding shorebird survey, and waterfowl population survey). Wetland surveys and studies would be expanded to better understand the effects of management treatments on habitats and wildlife populations. In addition to existing riparian and upland surveys, monitoring surveys and studies conducted by Complex staff would be expanded to better understand the effects of management treatments on habitats and wildlife populations. For example, staff might conduct a study to determine the most effective way to restore a high diversity of native grasses and forbs in areas that are infested with invasive plants.

Requests for research within the Complex would be permitted if deemed compatible with the purposes of the units of the Complex. Research needs for the Complex (for example, identifying more effective strategies to restore cottonwoods or identifying more effective strategies to restore smooth brome-dominated grasslands) would be identified, prioritized, and pursued within the research community. Under this alternative, Complex staff would pursue funding and research opportunities (for example, native prairie restoration projects) with universities on habitat management and new and effective surveying methodologies and actively seek funding to facilitate research on Service-owned lands relevant to management of the Complex. This is a more proactive approach to research on the Complex compared to alternative B.

Cultural Resources. Cultural resources would continue to be protected in accordance with Federal and State laws and regulations whenever ground-disturbing activities are planned. In addition, a comprehensive cultural resources survey of Service-owned wetlands throughout the Complex would be conducted. 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. Besides the existing partnerships, Complex staff would actively seek new partnerships with government agencies, organizations, sporting groups, and landowners to explore new avenues to fulfill the visions and goals of this plan.

Partnerships addressing wildlife conservation on private lands would continue to be supported through the collaboration between the biologist on station and Partners for Fish and Wildlife. Most of these projects would continue to focus on wetland restoration, grassland restoration, and implementation of grazing systems that are beneficial to ground-nesting birds and other wildlife.

