

## 6 Implementation of the Proposed Action





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## 6.1 Introduction

Once the preferred management alternative has been selected and finalized, the CCP has been approved, and the Service has notified the public of its decision, the implementation phase of the CCP begins. If alternative B is selected, the objectives and strategies presented below would be implemented over the next 15 years. The CCP will serve as the primary management document for the refuge until it is formally revised. The Service will implement the final CCP with assistance from partner agencies, organizations, and the public.

### *Overview of Selection of an Alternative*

It is the responsibility of the planning team to recommend a Proposed Action that best achieves planning unit purposes, vision, and goals; helps fulfill the System mission; maintains and, where appropriate, restores the ecological integrity of each refuge and the System; addresses the significant issues and mandates; and is consistent with principles of sound fish and wildlife management.

### *Alternative Description*

Alternative B is the preferred alternative for the CCP for Lacreek NWR and WMD. Through integrated restoration, the refuge would strive to restore ecological processes where appropriate

and achieve habitat conditions that require reduced management over time. This would be accomplished while recognizing the role of the refuge in the overall landscape and community and the capabilities of refuge staff and resources to complete the proposed management actions during the next 15 years. An emphasis on monitoring the effects of habitat management practices and use of the research results to direct ongoing restoration would be a priority. Current levels of priority public uses and activities would increase.

Refuge staff would continue to manage the WMD through monitoring and enforcement of easements.

## 6.2 Goals, Objectives and Rationale, and Strategies

The objectives and strategies below describe how management of the refuge would be carried out to meet the overall goals for the refuge.

### *Uplands Goal*

Restore and enhance the mixed grass plant community to create a mosaic that reflects the habitat requirements for grassland birds of management concern.

In the uplands, greater than 20 percent of the habitats in each category (tall, medium, and short) will be restored. Less than 5 percent will be in native fire-tolerant shrubs.

***Upland Objective A (tall):*** In 5 to 10 years, increase floristic quality assessment C score by greater than 10 percent in patches greater than or equal to 125 acres, with vegetation measuring greater than 16 inches in height, as measured during the nesting season (May to July 15) within these patches, and greater than 164 feet from trees greater than 10 feet in height.

***Upland Objective B (medium):*** In 5 to 10 years, increase floristic quality assessment C score by greater than 10 percent in patches greater than or equal to 125 acres, with vegetation measuring between 6 to 16 inches in height, as measured during the nesting season (May to July 15) within these patches, and greater than 164 feet from trees greater than 10 feet in height.

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**Table 4. Habitat requirements for selected grassland birds**

<i>Species</i>	<i>Vegetation Height (inches)</i>	<i>Litter (inches)</i>	<i>Patch Size (acres)</i>	<i>Distance from Trees (feet)</i>
Bobolink	10 to 18	1.3 to 3.6	100	150
Burrowing owl	Less than 5	Minimal	10	Greater than 328
Dickcissel	8 to 40	0.6	25	Prevent woody encroachment
Long-billed curlew	Less than 12	Minimal	104	Avoids areas with high density trees and shrubs
Grasshopper sparrow	8 to 24	Not available	20	164
Sharp-tailed grouse	6 to 16	Use areas that are idle for several years	150	Greater than 164
Short-eared owl	12 to 24	2-8 yrs. of residual cover	183	Not available
Upland sandpiper	1 to 24	1	250	328

*Source:* Grant 1965; Wiens 1973; Clark 1975; Duebbert and Lokemeon 1977; Redmond et al. 1981; Johnsgard 1983; Prose 1987; Renken 1987; Messmer 1990; Haug et al. 1993; Herkert et al. 1993; Pampush and Anthony 1993; Helzer 1996; Hughes 1996; Madden 1996; Connelly et al. 1998; Clayton and Shemutz 1999; Helzer and Jelinski 1999; Dugger and Dugger 2002; Laubhan et al. 2005.

**Upland Objective C (short):** In 5 to 10 years, increase floristic quality assessment C score by greater than 10 percent in patches greater than or equal to 247 acres, with vegetation measuring less than 6 inches in height, as measured during the nesting season (May to July 15) within these patches, and greater than 328 feet from trees greater than 10 feet in height.

**Strategies:**

1. Seed 100 to 300 acres/year of formerly cropped or exotic grass dominated uplands totaling 2,000 to 3,000 acres to more than 100 species of native grasses, sedges, and forbs.
2. Within designated grassland patches greater than or equal to 124 acres, remove trees greater than 16 feet in height and all non-native trees.
3. Interseed 100 to 300 acres/year of existing grasslands, totaling 1,500 to 3,000 acres, to more than 100 species of native grasses, sedges, and forbs.
4. Conduct 200 to 1,500 acres of prescribed burning in upland habitats each year to encourage/promote increased FQA C score and plant structure.
5. Conduct 200 to 1,500 acres of prescribed grazing in upland habitats each year to encourage/promote increased FQA C score and plant structure.
6. Continue use of IPM strategies to reduce noxious weeds and other invasive species.

**Rationale:**

The decline of grassland nesting birds has been attributed to habitat loss and conversion, fragmentation, and the disruption of ecological factors such as fire and grazing that created a mosaic of habitat types across the landscape. As a result, many grassland bird species are now considered species of biological concern (Service 2002). Managing natural areas for these bird species involves providing the nesting habitat requirements and food resources essential for production and survival. These requirements include large, treeless patches that contain within them diversity in vegetation structure (Renken and Dinsmore 1987; Johnson and Temple 1990; Volkert 1992; Helzer and Jelinski 1999; DeJong 2001; Herkert et al. 2003; Davis 2004; Fritcher et al. 2004). Through fire, grazing, tree removal, and grassland restoration, habitat for many grassland nesting birds will be provided, but efforts will concentrate on managing for those birds that are of management concern.

Several federal, state, and private “birds of concern lists” were reviewed. These lists are created based on population status and habitat conditions for bird species in certain biological regions. Some birds, such as the long-billed curlew appear on as many as eight different lists. Species that are on many different lists are of the highest management concern and those species that were confirmed to nest on the refuge were used as the focus for habitat objectives in the CCP. Once those birds

were identified, a literature search was conducted to determine the specific habitat requirements for each species.

Requirements such as vegetation height, patch size, and distance from trees were used to create science-based objectives for the CCP (table 4). First, the nesting and foraging habitat requirements were identified and compared. Birds were grouped based on similar requirements. For example, dickcissels, short-eared owls, grasshopper sparrows, and bobolinks nest in patches with a grass/forb mix where vegetation is moderate to tall and where woody edges are at a minimum (Birkenholz 1972; Wiens 1973; Rotenberry and Wiens 1980; Ryan 1986; and Frawley 1989). A vegetation height somewhere in the middle of this range (8 to 30 inches) was assumed to suit the needs of all the birds in this group, and greater than 16 inches was chosen as identified in Objective A (tall). The next requirement that was examined was patch size. Again, a range of acres was determined. It was assumed that an acreage somewhere in the middle (125 acres) could accommodate the birds in the “tall” group, and be provided on the refuge through management actions. The final requirement identified was distance from trees. Trees on a grassland landscape can affect grassland obligates by fragmenting habitat and providing roost sites for avian predators. Trees also create corridors for mammalian predators such as skunks and raccoons (Bakker 2003). In the upland objectives, it was assumed that anything greater than 10 feet was a tree and anything above this height would provide places for grassland bird predators.

Upland Objective B was developed just as A, using sharp-tailed grouse determine specifics (i.e., vegetation heights, number of acres, and distance from trees). Sharp-tailed grouse nesting requirements include large grassland patches where native grasses and forbs are dominant, of short to moderate heights, and far from trees (Johnsgard 1983; Gregg 1987; Prose 1987; Hanowski et al. 2000). As food and cover are reduced in open habitats throughout the summer, woody vegetation becomes increasingly important because it provides cover and high-energy food resources such as berries (Johnsgard 1983; Prose 1987; Connelly et al. 1998). This is an important consideration for managing sharp-tailed grouse that winter on the refuge.

Finally, species such as long-billed curlew, burrowing owl, and upland sandpiper were used to develop Objective C. These birds require short grass/forb mix (less than 6 inches) patches free from woody vegetation and adjacent to grasslands with moderate vegetation heights for foraging (Redmond and Jenni 1986; Pampush and Anthony 1993; Benedict et al. 1996; Thompson and Anderson 1988; Dechant et al. 1999b; Clayton and Schmutz

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1999; Herkert et al. 1993; Bowen and Kruse 1993). However, in this objective, the greatest acreage requirement (247 acres) and distance from trees (382 feet) was chosen based on the habitat needs of the upland sandpiper. The largest figures were chosen because it was assumed these quantities (acres and feet) could be easily achieved through grazing and prescribed fire.

### **Methods:**

To determine whether management actions are providing a diverse native plant community on the refuge, staff will use Floristic Quality Assessment (FQA) methodology to determine plant species diversity and integrity. FQA was developed by Swink and Wilhelm (1979, 1994) to measure the floristic quality of a natural area. It has been used to determine the effectiveness of restoration efforts, monitor natural areas, and determine the floristic intactness of an area in Wisconsin, Illinois, and the Dakotas (Taft et al 1997; USGS 2001; Bernthal 2003). Aspects such as tolerance of a plant species to disturbance and fidelity to specific habitat integrity are used to assign each native plant a coefficient of conservatism (C). The coefficient for each species is determined by its conservatism relative to other species in the area.

Once an area has been surveyed, a mean C value is calculated and the higher C value the higher the quality of a natural area (C = 0 to 10). Given the assumption that the floristic quality of an area is correlated to species diversity (Wilhelm and Ladd 1988), it can be said that a high C score is directly related to high native plant diversity. Thus an area with a high C score should also provide the diversity in vegetation structure needed by grassland nesting birds, provided the patches are large enough. That is when sites are compared to those with relatively higher C scores will display a greater diversity in plant structure than a corresponding area with low C scores. To test this assumption, measures of vegetation structure will

be taken during the FQA. By talking to scientists who have used the FQA method in the Northern Great Plains and Midwest, it was determined that an increase of greater than 10 percent within a 5- to 10-year period was feasible with persistent grassland restoration efforts on the refuge.

Increasing native plant species diversity in formerly cropped areas or in degraded grasslands has received significant attention, particularly in the tallgrass prairie portions of the Great Plains (Steinauer et al. 2003). Wide varieties of techniques have been used to harvest and process seed, prepare a seedbed, complete the seeding, and manage the seeding. Similar techniques can be adapted for use in the mixed-grass prairie and utilized for high diversity seeding and management at the refuge. Local seed sources will be utilized to collect over 100 species of native grasses, forbs, and sedges to include in these high diversity seedings. Follow-up management of prescribed burning, grazing, mowing, and haying will be used to help the Service achieve goals and objectives.

## **Sandhills Goal**

Preserve and maintain the ecological integrity of indigenous flora and fauna of the sandhills portion of the refuge.

**Sandhills Objective A:** Maintain the composition of the sandhills in greater than 90 percent native grasses and forbs to meet the needs of the lark sparrow and sharp-tailed grouse. Plant composition will consist of approximately 60 to 90 percent grasses (i.e., blue and hairy grama grass, sand lovegrass, needle and thread, little and big bluestem, prairie sandreed, Junegrass, sand bluestem, switchgrass, and Indian grass), 5 to 15 percent forbs/woody vegetation (*Puccoon spp.*, *Penstemon spp.*, sand cherry, yucca, prickly poppy, and *Liatris spp.*) and 5 to 10 percent bare ground.

**Sandhills Objective B:** Eradicate invasive plant species, such as leafy spurge, from the sandhills within 15 years.

## **Strategies:**

1. Conduct annual monitoring to detect invasive species.
2. Utilize IPMs (i.e., biological, mechanical, chemical, and cultural techniques).
3. Conduct annual vegetation monitoring to determine if objectives are being met.
4. Investigate potential for introduction of blowout penstemon (*Penstemon haydenii*)

## **Rationale:**

The sandhills prairie is distinctive because of

the particular combination of plant communities found there. Typical short-, mixed-, and tall-grass species are all located in the sandhills because differences in topography and available moisture create conditions that allow each to persist (Kaul 1990). Plant species that have a marked ability to conserve water often occur on dune tops where surface water and organic matter is limited. While cool-season grasses and plants that use water less efficiently tend to be located in the interdunal valleys. Pool (1914) recognized six communities in the sandhills: four upland communities and a wet meadow and marsh community. All these communities are found within the sandhills portion of the refuge, and each will be used to define the ecological integrity of indigenous flora and fauna to be maintained on the refuge.

**The Bunchgrass Community:** Plant species in this community consist of little bluestem, junegrass, needle and thread, prairie sandreed, and switchgrass, blue grama, lovegrass, and ricegrass, sages, milkweeds, penstemon, puccoon, cactus, aster, and pea plant. Some low shrubs such as sand cherry and wild rose also occur.

**Sand Muhly Community:** The species of this community are characteristic of places with dry and unstable slopes that are undergoing succession following disturbances such as fire and blowouts. Common species are sand muhly, sand bluestem, needle-and-thread, prairie sandreed, hairy grama, puccoon, and yucca.

**The Blowout Community:** Few plants occur in this community because of aridity and instability of the sand. Species include blowout grass, prairie sandreed, sand muhly, ricegrass, sand lovegrass, and lemon scurf-pea. Blowout penstemon, although not on the refuge, is found in this community type.

**The Meadow Community:** Sandhill meadows occur in level areas between dunes where water is readily available. Grass species commonly found here are slender and western wheatgrass, needle and thread grass, porcupine grass, switchgrass, Indiangrass, and junegrass.

**Woody Vegetation:** Trees and shrubs are abundant near permanent water and areas on the sides and bottoms of north-facing slopes (Schmidt 1986). Species include plains cottonwood, green ash, cedar, wild plum, chokecherry, buffaloberry, and dogwood and provide habitat for lark sparrow, Bell's vireo, and sharp-tailed grouse.

Lark sparrow and sharp-tailed grouse habitat requirements were identified and used to develop Sandhills Objective A. The lark sparrow appears on two North American Bird Conservation Initiative lists for region 19 (breeding and wintering) and is found on Lacreek NWR. Finkbeiner and Johnson (2002) found it exclusively occurred in the sandhills portion of the refuge, perhaps due

to the open areas interspersed with native grass, forbs, and yucca. Lark sparrows are found in areas with a mix of native grass, forbs, small trees and shrubs, and bare ground (Bock and Webb 1984; Howe et al. 1985; Fannes and Lingle 1995; Martin and Parrish 2000; Lusk et al. 2003). Lusk et al. (2003) recommended management that focused on creating abundant structural cover with moderate levels of litter accumulation and bare ground. There was more variation in structural cover among successful nests than unsuccessful ones, and successful nests had nearly twice as much litter cover. Additionally, nests placed near structural cover may provide thermal cover and protection from predation (Lusk et al. 2003).

As mentioned previously, grassland habitats are essential breeding areas for sharp-tailed grouse, and woody areas are equally important for overwinter survival. The refuge is an important breeding and wintering area in Bennett County. By maintaining the integrity of the sandhills, these habitat requirements will be provided in order to sustain the population that occurs on the refuge.

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There are 2 to 3 acres of leafy spurge in the sandhills portion of the refuge. Leafy spurge is sprayed each year and new patches are monitored and mapped when detected. Leafy spurge has been sprayed for three consecutive years beginning in 2002; the number of acres infested remains constant. Leafy spurge is perhaps the greatest threat to habitat in the sandhills. It has demonstrated an ability to invade native grasslands in portions of the Great Plains and significantly degrade wildlife habitat.

### **Wet Meadows Goal**

Restore and enhance the wet meadow plant community using a diversity of native species to create a habitat mosaic that meets the requirements for birds of management concern dependent on the wet meadow community. As part

of the plant community, native fire-tolerant shrubs, such as indigo bush, dogwood, and native willow, will be allowed to persist.

### **Objectives**

In wet meadow habitats, more than 20 percent of the habitats in each category (tall, medium, and short) will be restored. Between 0 and 10 percent will be in the riparian shrub community.

**Wet Meadow Objective A (tall):** In 5 to 10 years, increase floristic quality assessment C score by greater than 10 percent in patches greater than 25 acres with vegetation measuring greater than 24 inches in height, as measured during the nesting season (May to July 15).

**Wet Meadow Objective B (medium):** In 5 to 10 years, increase floristic quality assessment C score by greater than 10 percent in patches greater than 25 acres with vegetation measuring from 12 to 24 inches in height, as measured during the nesting season (May to July 15).

**Wet Meadow Objective C (short):** In 5 to 10 years, increase floristic quality assessment C score by greater than 10 percent in patches greater than 25 acres with vegetation measuring less than 12 inches in height, as measured during the nesting season (May to July 15).

**Wet Meadow Objective D (shrubby component):** Maintain 0 to 10 percent of wet meadow habitat dominated (canopy cover greater than 75 percent) by native shrubs.

**Wet Meadow Objective E:** Investigate techniques and complete a feasibility study by 2009 for restoration of the hydrology of Lake Creek.

### **Strategies:**

1. By 2016, interseed 30 to 150 acres annually, totaling 300 to 1,500 acres of wet meadow that has been historically sprayed with herbicides.
2. Conduct 200 to 1,500 acres of prescribed burning in wet meadow habitats each year to encourage/promote increased FQA C scores and plant structure.
3. Conduct 200 to 1,500 acres of prescribed grazing in wet meadow habitats each year to encourage/promote increased FQA C scores and plant structure.
4. Utilize prescribed burning and prescribed grazing on an adaptive management basis.
5. Utilize IPM to achieve acceptable levels of control for noxious weeds.
6. Encourage beaver dam construction in areas with no management conflict.

## Rationale:

Wet meadows are characterized by ecotones between emergent wetland and perennial uplands. The soils are moist to saturated with standing water present for only brief to moderate periods during the growing season. Vegetation includes a wide variety of herbaceous species, from sedges and rushes to forbs and grasses. Woody vegetation, if present, accounts for less than 10 percent of the total area covered. Wet meadow habitat on the refuge occurs at the perimeter of wetland areas, along riparian corridors, and at springs emerging from the sandhills. Vegetation includes prairie cordgrass, Canada bluejoint, switchgrass, foxtail barley, barnyard grass, wooly sedge, slough sedge, Nebraska sedge, golden doc, mint, golden rod,

heights were then incorporated into Objectives A through D. For Objective A, Virginia rail, sora, and American bittern were grouped into the “tall” category. These birds are common in wetlands where the soils are moist to shallow, the vegetation is dense and tall (24 to 51 inches) with very little (5 percent to 30 percent) open water habitat. These marsh birds prefer areas with a high diversity of wetland vegetation such as cattail, bulrush, cordgrass, and wildrice.

To develop Objective B, northern harriers and short-eared owls were used to determine the appropriate vegetation heights and number of acres. These raptors are often associated with wet meadow areas because they require large tracts (greater than 247 acres) of tall, dense vegetation adjacent to upland areas interspersed with stands of shrubs. These areas should be idle for 2 to 5 years to allow the accumulation of litter and the persistence of small shrubby species such as snowberry, a key species associated with harrier nesting locations (Duebbert and Lokemoen 1977; Kantrud and Higgins 1992; Murphy 1993).

Objective C was developed by looking at the habitat requirements for a group of shorebirds. Grazed and burned areas adjacent to wetlands can provide the habitat requirements of shorebirds such as long-billed curlew, Wilson’s phalarope, and marbled godwit. These species utilize shorter (less than 12 inches) grassland areas adjacent to seasonal, semi-permanent wetlands that contain native vegetation such as green needlegrass, western wheatgrass, and inland saltgrass (Dechant et al. 2000, 2001, 2003; Duggar and Duggar 2002).

Finally, Objective D was determined by examining the needs of two species that require riparian corridors and woody draws: Bell’s vireo and willow flycatcher. Bell’s vireo declined at a rate of 2.4 percent between 1966 and 1987 and is currently listed on the U.S. Fish and Wildlife Service Birds of Conservation Concern (BCC) list, the North American Bird Conservation Initiative list for regions 17 and 19, and on the National Audubon Society Watch List. Bell’s vireo nests in relatively open, low, dense, shrubby habitats throughout its range (Overmire 1963; Brown 1993; Martin 1996; Swanson 1999). Wild plum thickets were found to be especially important nesting areas in western South Dakota. Martin (1996) found that 77 percent of all nests occurred in these areas. The remaining nests were located in buckbrush, dogwood, and chokecherry bushes. Willow flycatcher is on the National Audubon Society Watch List and is a bird strongly associated with the presence and abundance of willow throughout its range (Taylor 1986; Sedwick and Knopf 1992; and Sanders and Edge 1998).

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Nuttall’s sunflower, wild licorice, spike rush, Baltic rush, blue vervain, stinging nettle, sandbar willow, red-osier dogwood, and false indigo.

This habitat type provides nesting and foraging requirements for marshbirds, raptors (e.g., harriers and short-eared owls), some shorebirds, and passerines. Virginia rail, sora, and American bittern are common in wetlands where the soils are moist to shallow, the vegetation is dense and tall (24 to 51 inches) with very little (5 percent to 30 percent) open water habitat. These marsh birds prefer areas with a high diversity of wetland vegetation such as cattail, bulrush, cordgrass, and wildrice.

Wet meadows provide nesting and foraging requirements for marshbirds, raptors (e.g., harriers and short-eared owls), some shorebirds, and passerines. The objectives for this habitat type were developed in much the same way the upland objectives were: by creating a list of birds that was used to focus management; identifying specific numbers for vegetation height, patch sizes, and the role of trees based on scientific literature; grouping birds with similar habitat requirements; and then determining what number would accommodate all birds in the group. These specific acres and

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## Developed Wetlands Goal

In managed wetlands, mimic natural wet/dry cycle with an emphasis on seed production, submerged aquatic vegetation, and invertebrate production.

### Definitions:

For the purposes of this goal and associated objectives, the definitions below for water regimes from Cowardin et al (1998) were modified within the context of the refuge's managed wetlands. Natural basins fluctuate due to groundwater levels and surface runoff. Water levels within managed wetlands can generally be manipulated, with some management constraints.

**Semi-permanently flooded.** Surface water persists throughout the growing season in most years.

**Seasonally flooded.** Surface water is present for extended periods, especially early in the growing season. Surface water may again be present after the growing season in the fall and winter. When surface water is absent, the water table is often near the surface.

**Temporarily flooded.** Surface water is present for brief periods during the growing season. Plants that grow both in uplands and wetlands are characteristic of the temporarily flooded regime.

**Developed Wetland Objective A (temporary water regime):** From 2006-2021, manage 25 to 50 percent of managed wetland acres with a temporary water regime; greater than 50 percent of the unit area will be dominated by desirable plant species (see appendix G).

**Developed Wetland Objective B (seasonal water regime):** From 2006-2021, manage 25 to 50 percent of managed wetland acres with a seasonal water regime; greater than 50 percent of the unit area will be dominated by desirable plant species (see appendix G).

**Developed Wetland Objective C (semi-permanent regime):** From 2006-2021, manage 25 to 50 percent of managed wetland acres with a semi permanent water regime; greater than 50 percent of the unit area will be dominated by desirable plant species (see appendix G).

### Strategies:

1. Surface water will be diverted to or released from managed wetland units to provide the mix of temporary, seasonal, and semi-permanent water regimes outlined in objectives.
2. Conduct 200 to 1,500 acres of prescribed burning in developed wetlands to reduce plant litter depths, encourage germination and growth of desirable

species, and improve effectiveness of grazing and IPM in this habitat.

3. Conduct 200 to 1,500 acres of prescribed grazing in developed wetlands each year to reduce plant litter depths, encourage germination and growth of desirable plant species, injure aggressive perennial wetland plant root systems, and create openings in wetland vegetation.

4. Utilize IPM to achieve acceptable levels of control for noxious weeds.

### Rationale:

Wetland birds are a diverse group of species that can have broadly contrasting habitat requirements. Species such as trumpeter swan, American coot, and American white pelican use deeper (31 to 144 inches) semi-permanent water to meet their natural history requirements. Canada geese and redheads can utilize deeper water as well, but often obtain food resources in shallower (1 to 12 inches) more seasonal water. Seasonal wetlands are essential for dabbling ducks such as blue-winged teal, mallards, and northern pintails because these wetlands provide optimum foraging depth for these species and typically produce more abundant seed and aquatic invertebrate resources (Frederickson and Reid 1988). Seasonal wetlands often contain proportionately more waterfowl pairs than other wetland classes (Ruwaldt et al 1979). Finally, Wilson's phalarope, godwit, willet, and long-billed curlew use mostly seasonal or temporary wetlands that measure 1 to 7 inches deep.

On the refuge, requirements of all these birds can be met by managing for different water regimes in the various units. Semi-permanent, seasonal, and temporary wetland habitats can all be provided on the refuge through the manipulation of water levels. Water control structures (WCS) allow staff to mimic the wet-dry cycle of the Plains. The manipulation of water levels to mimic wet/dry hydrologic cycles is one tool used by wetland managers to influence vegetative productivity, composition, and structure (Kadlec 1962; Frederickson and Taylor 1982). The continuance of static water levels can create anaerobic conditions that limit decomposition and nutrient cycling (Brinson et al. 1981). High, static water levels can also adversely influence the growth of Submergent Aquatic Vegetation (SAV) by limiting light penetration and allowing water temperatures to remain cool. Proper water level manipulations can create hemi-marsh habitats that can provide open water areas that may contain SAV and shallow areas that may provide emergent food resources and cover for many wetland-dependent species (Weller and Frederickson 1974; Murkin et al. 1997).

Refuge staff have utilized water level manipulations to increase wetland plant diversity

and nutrient cycling, and promote the growth of SAV. Wetlands that were once dominated by cattail and bulrush in emergent zones, are now interspersed with species such as arrowhead, beggarticks, and wild rice (*Zizania aquatica*). Arrowhead is carbohydrate-rich and especially important to swans in the winter and spring. Beggarticks contains high amounts of protein (Paullin 1973; Squires 1991; Eaggars and Reed 1997). Additionally, the establishment of species such as waterweed and sago pondweed has occurred in open water areas after drawdowns, both important food resources for trumpeter swans (Shea 1979; Hughlett et al. 1984; Mitchell 1994).

A secondary effect of increasing wetland plant diversity is the assemblage of invertebrates (Frederickson and Reid 1988). Invertebrate groupings are often influenced by the species of wetland vegetation present. For instance, the structure of macrophytes present can influence the species and number of invertebrates available, because a plant species that is more complex has more surface area available for invertebrates than a species that has a simple leaf structure such as wild celery (Frederickson and Reid 1988). This is important because invertebrates are crucial for providing protein needed for egg, muscle, and feather development, and having high densities and diversity of invertebrates can provide for many types of waterbirds.

Water level manipulations are believed to have added benefits of controlling rough fish populations and snapping turtles. Rough fish, primarily carp, can thrive under static high water management. The carp attain population levels great enough to remove most desirable emergent and submerged aquatic vegetation and significantly increase turbidity levels. This factor can severely limit food resources for wetland-dependent migratory birds. Snapping turtles also thrive in similar environments. The stable water levels, especially during overwinter periods, can increase survival of snapping turtles. These long-lived predators can reach unusually high population numbers under these conditions, and may have a significant impact on brood survival for trumpeter swans, Canada geese, ducks, and other waterbirds. Varying water levels may kill snapping turtles overwintering in bottom sediments.

## **Prairie Dogs Goal**

Maintain a viable population of black-tailed prairie dogs within the boundary of the refuge.

**Prairie Dog Objective A:** Upon approval of a refuge-specific prairie dog management plan, support a minimum of 300 acres of occupied black-tailed prairie dog towns within the biologically and socially compatible zone identified in appendix E,

over the next 15 years.

## **Strategies:**

1. Fully implement an approved refuge black-tailed prairie dog management plan.
2. Within the socially incompatible zone, control will be considered for use as part of mixed grass prairie restoration efforts.
3. Within the biological/social compatible zone, prairie restoration will utilize herbicide, interseeding, burning, grazing, and other habitat restoration techniques.
4. Conduct grazing, mowing and prescribed burning activities adjacent to black-tailed prairie dog towns in socially compatible zones when the occupied area falls below 300 acres.
5. Work cooperatively with Bennett County Weed Board and the State of South Dakota on management of black-tailed prairie dogs on the refuge.
6. If black-tailed prairie dogs are extirpated within the boundaries of the refuge, and do not re-establish passively within 3 years, planning for translocation will be initiated.
7. Establish buffer zones for prairie dog towns that are located along the exterior boundaries of the refuge adjacent to private range and hay land or private residences. Coordinate with adjacent landowners on control efforts.

## **Rationale:**

Black-tailed prairie dogs are an integral part of the wildlife community and it is appropriate to maintain a viable population on the refuge. Many wildlife species associate with or depend upon prairie dogs during some portion of their life cycle. Over 167 vertebrate species have been documented using prairie dog towns (Campbell and Clark 1981; Clarke et al. 1982; Knowles 1994; Reading et al. 1989; Sharps and Uresk 1991). Some species feed on prairie dogs, but others utilize the burrow systems or the unique habitat to fulfill their needs. Vacant burrows are used by cottontail rabbits, several species of small rodents, tiger salamanders, prairie rattlesnakes, bull snakes, and by burrowing owls. Most active towns on the refuge have had successful nesting by burrowing owls. As the size and number of prairie dog towns have increased, so has the documented sightings of burrowing owls on the refuge. Many other passerine species, such as meadowlark, grasshopper sparrow, lark bunting, McCown's longspur, and horned lark, prefer the sparsely vegetated habitat created on prairie dog towns due to the greater visibility of seeds and insects (Agnew et al. 1986). In addition to their importance to other wildlife species, prairie



*Prairie dog*

dogs provide an opportunity for wildlife observers and photographers. Management should focus on maintaining a large enough acreage to maintain prairie dogs and associated species while still allowing for prairie restoration and other grassland management objectives.

During the CCP scoping process, management of prairie dogs on the refuge received considerable attention. Neighboring landowners and local government such as the Bennett County Weed and Pest Board and the Bennett County Conservation District were concerned that towns established along the refuge boundary were causing prairie dogs to spread onto adjacent private lands, where they are undesirable. Control of prairie dogs on private land is difficult as these areas are quickly re-colonized from refuge lands.

A second issue concerning prairie dog management relates to prairie restoration efforts. Large expanses of exotic grasses and other invasive species occur in the refuge's uplands. A large seed bank of these undesirable species exists and must be removed with tillage and herbicides. Rapid expansion and dispersal of prairie dogs have been noted after discing or herbicide applications for noxious weed control. Prairie dogs also expand into newly seeded fields and repeated prescribed burning and mowing may be needed to aid in establishment of prairie species. The ability to manage prairie dogs on the refuge is needed to aid with an aggressive prairie restoration effort.

A refuge-specific prairie dog management plan has been drafted that designates a portion of the refuge in which prairie dogs will be allowed to expand and contract without direct control efforts. A large portion of the refuge is considered to be unsuited to prairie dog occupation based on soils and hydrology. The remainder of the refuge will provide for a buffer adjacent to private hay and rangeland or residences and control will be authorized in these areas. Prairie dogs also may be controlled to facilitate grassland restoration efforts.

## ***Trumpeter Swan Goal***

Contribute to a long-term viable population of wild, free ranging trumpeter swans in the High Plains Flock, as outlined in the High Plains Flock Management Plan (Central Flyway Swan subcommittee).

***Trumpeter Swan Objective A:*** From October to March, when less than 10 percent of wetland habitat remains open, and greater than 25 swans concentrate on the trout ponds, restrict access by the visiting public and staff within 164 feet of trout ponds.

***Trumpeter Swan Objective B:*** From April through September, restrict access by the visiting public and staff within 820 feet of occupied trumpeter swan nesting territories.

***Trumpeter Swan Objective C:*** Investigate lead concentrations on refuge wetlands occupied by swans by 2009. Eliminate known lead contributors (i.e., fishing sinkers) by 2009.

***Trumpeter Swan Objective D:*** Continue to monitor the High Plains Flock by conducting population surveys in the fall and summarize results in an annual report for public review.

***Trumpeter Swan Objective E:*** Complete new management plan for High Plains Flock coordinated through the Central Flyway by 2006.

### **Strategies:**

1. Implement regulations restricting use of lead sinkers for fishing on the refuge.
2. Educate public about impacts of lead on swans and waterfowl through the use of signs, brochures, and other outreach activities.
3. Monitor swan behavior starting in March 2006, and every March through the life of the plan to determine possible nesting territories.
4. Attend Central Flyway Committee and Trumpeter Swan Society Meetings to disperse information, maintain network, and coordinate on management of this flock.
5. Conduct annual fall survey and coordinate with Nebraska Game and Parks Commission on publication of results.
6. Pursue research with partners to identify lead concentrations, inventory wintering habitats, or other research topics needed for management of this flock.

### **Rationale:**

Trumpeter swans are sensitive to disturbance. This can cause nest abandonment, movement

from foraging areas, and ultimately result in poor body condition and lowered reproductive success (Holton 1982; Lockman et al. 1987; Henson and Grant 1991). However, the types of disturbance do affect the reaction of the birds. Henson and Grant (1991) found that aircraft and passing road traffic alerted birds but did not cause females to leave the nest. Additionally, the study found that swans are sensitive to noise and the visible presence of stopped vehicles, pedestrians, and researchers. The study recommended posting wetlands where swans nest to limit disturbance and restrict the use of airboats by staff during nesting periods.

Limiting disturbance of winter foraging areas is also important. Activities disrupting foraging or causing excessive energy use may cause fatality or loss of reproductive potential because the female prelaying nutrition is lowered (Gale et al. 1987; Mitchell 1994). Approximately 100 to 200 swans winter on the refuge, and limiting disturbance at key foraging areas where swans concentrate might increase the probability of survival and reproduction. Trumpeter swans will concentrate at the trout ponds when temperatures are extremely cold for an extended period. This area may be disturbed by the public and access should be restricted during these periods. The loop trail that crosses the dam of trout pond #2 and a buffer of approximately 164 feet around these ponds would be signed as closed to the public during these periods. The trail leading onto private land to the south would remain open. Conflicts with fishermen will be negligible at this time as ice around the shore prevents fishing at this time.

Swans are particularly susceptible to lead poisoning which may affect swans as young as three weeks old (Mitchell 1994). Lead deposits in the High Plains are generally thought to be the result of shot and fishing sinkers. According to a study done by Pelizza (2001), elevated levels of lead were found in 50 percent of all swans tested from the refuge. Additionally, 12 swans died on the refuge as a result of lead poisoning from 1979 to 1994. Although lead has been found in swans that use the refuge, the source of the lead is unknown. Lead shot had been banned for waterfowl hunting, but there may be residual lead in the environment.

Hunting clubs from Nebraska frequently hunted the Lacreek area in the early 1900s and it was noted as favorite hunting spot (Farrar 1994). More research is needed to determine how much lead is in the environment at the refuge, so that it may be removed. Also, use of lead sinkers for fishing must be eliminated in order to keep the area from being further contaminated.

## **American White Pelicans Goal**

Maintain and protect the nesting colony on two islands in Pool 9 over the long term.

**American White Pelican Objective A:** Minimize disturbance from April 15 to August 15 within 1,312 to 2,625 feet of both islands. Critical period for young is hatching to day 16 (late April to early July).

**American White Pelican Objective B:** By March 20 each year, reduce 80 percent of herbaceous vegetation on both islands to 4 inches or less.

### **Strategies:**

1. Prescribed burn or mow the vegetation on the islands by March 1.
2. Use all effective, legal, and the most humane control for predators on and adjacent to islands from May 15 to July 30 each year. Increase efforts when Pool 9 water levels are drawn down.
3. Implement a limited coyote hunt on Pool 9 during late winter period.
4. Keep trail and overlook a minimum of 1,312 feet from islands.
5. Reduce disturbance from April 15 to August 15 by suspending the use of the refuge airboat near islands.
6. Conduct drawdowns only once every 3 to 5 years.

### **Rationale:**

American white pelicans are most sensitive to disturbance during courtship to brooding periods



*Trumpeter Swans*

(Jonhson and Sloan 1976; Bunnell et al. 1981; Doran et al. 2004; Knopf 2004). Interference of the colony by humans and predators during this time can cause displacement of birds, abandonment of nests, trampling of eggs and young, and exposure of young to temperature stress and mammal and avian predators (Johnson and Sloan 1976; Bunnell et al. 1981; Doran et al. 2004; Knopf 2004). Young are extremely vulnerable from hatching to day 16 because they have the inability to thermoregulate (Abraham and Evans 1999). Brooding by adults up until this time helps young maintain temperatures and reduces the chances of mortality due to exposure. To increase the probability of successful production, Doran et al. (2004) recommended a 1,312 to 2,625 foot buffer zone around the nesting island that is free from disturbance from March to August. After the brooding period has ended, adults will leave the colony for extended foraging trips as far as 75 miles away from nesting island (Findholt and Anderson 1995). The absence of adults for extended periods makes young vulnerable to mammalian predators, especially coyotes, and avian predators until they have fledged in August (Bunnell et al. 1981; Knopf 2004).

Pelicans are colonial nesters that nest on islands in freshwater lakes and rivers (Doran et al. 2004) and prefer non-vegetated islands with a sand or soil surface on at least part of the island (Stepney 1986; Knopf 2004). Two nesting islands are on the refuge: one with trees (north island), and one without (south island). Nesting once occurred on both islands; however, in recent years only the north island has been used. It may be that the pelicans are no longer using the south island because the vegetation has grown above the desired height. In spring 2005, the south island was burned to reduce vegetation height with the intention of promoting nesting. Although no nesting occurred on the island, pelicans once again made use of the island as a loafing area soon after their arrival.

The loss of all young and dispersal of most adults that occurred in 2005 is believed to have been a result of predation and disturbance by coyotes. It appears that coyotes swim to the islands to feed on the eggs and young. Visitors have reported seeing coyotes on the island or swimming to and from it. Tracks, young with bite marks on the neck, and broken egg shells also have been noted. If this disturbance is allowed to continue, total abandonment of the site for nesting is likely. Control measures will be implemented to prevent this from occurring and to eliminate the predation and disturbance by coyotes.

Finally, water level fluctuations may be associated with reproductive output. During years when water levels are lower, access to nesting colonies by mammalian predators increases, and this disturbance may cause the loss of young and abandonment of nesting colonies by adults. If

abandonment occurs early in the growing season, vegetation may quickly overtake the area making it less attractive to nesting in subsequent years. Alternatively, the newly exposed surface can create additional nesting habitat and lower water levels can concentrate prey resources (Knopf 2004). A periodic drop in water levels is not thought to affect the long-term reproductive output of the species (Evans 1972; Knopf 1976; Doran et al. 2004). A return to higher water levels in ensuing years restores breeding habitat by keeping islands free of vegetation and reducing access to mammalian predators; thus, pelicans generally recolonize the areas. However, annual drawdowns repeatedly allow mammalian predator's access to nesting colonies and this disturbance may cause permanent abandonment of nesting sites.

## ***Threatened and Endangered Species Goal***

Protect, where appropriate restore, and manage habitats to support all threatened or endangered species that may occur on the refuge.

### ***Threatened and Endangered Species Objective***

**A:** Continue to evaluate the effects of all refuge management activities that may impact threatened or endangered species likely to occur on the refuge. When appropriate, conduct Section 7 Intra-service consultation with Ecological Services.

### ***Threatened and Endangered Species Objective***

**B:** Within 10 years of approval of this CCP, complete transplanting a minimum of 300 blowout penstemon in one blowout on the refuge.

## **Strategies:**

1. Conduct Intra-service consultation with South Dakota/Nebraska Ecological Services.
2. Consult with State of South Dakota on transplanting.
3. Pursue grant funding coordinated with the University of Nebraska to secure transplants.
4. Communicate with neighbors about transplants.

## **Rationale:**

The blowout penstemon is a federally listed endangered species found only in the Nebraska Sandhills. Extensive surveys were conducted in the sandhills of South Dakota to document this species; however, it was never detected (Stubbendieck, pers. comm. 2005). Consultations with Dr. Jim Stubbendieck of the University of Nebraska-Lincoln indicate that suitable habitat is available in limited quantities on the refuge. Any additional populations established outside of the existing populations in Nebraska would benefit the

long-term survival of this species.

Past efforts in the Nebraska Sandhills have included both seeding and transplanting plants grown from seed into active blowouts. The seeding efforts have had limited success while the transplants have fared much better. Based on past efforts, starting a site with transplants and then supplementing the site for several years with additional transplants is the best strategy. This increases the odds that this relatively short-lived perennial has at least one favorable year to produce seed in order to sustain itself over the long term. Due to the limited availability of transplants, perpetually protected sites, such as the refuge, are the first candidates for transplants.

Coordination with the State of South Dakota will be pursued prior to moving a federally listed species across state lines. Listed plant species are not protected on private land under the ESA; therefore, in the unlikely event that this species becomes established on private lands due to the transplanting on the refuge, neighboring landowners will not be affected. They will continue to be able to conduct weed control, grazing, haying, seeding, and all other activities that may occur in or adjacent to a blowout.

### ***Predator Management Goal***

Conduct predator management activities in developed wetlands and Pelican Islands to increase nest success of migratory birds and species of management concern such as American white pelicans.

***Predator Management Objective A:*** Within 1 year of approval of the CCP, initiate management of coyotes and other predators prior to and during the nesting season, on and adjacent to the two Pelican Islands in Pool 9.

***Predator Management Objective B:*** Within 1 year of approval of the CCP, initiate control of striped skunks and raccoons within the developed wetland units, using the most humane methods available.

### **Strategies:**

1. Conduct trapping activities using live traps and cubby sets along dikes and check daily during inspection of water control structures.
2. Hire a contractor to seasonally conduct predator management activities in managed wetlands and Pelican Islands.
3. Open hunting season for coyotes in Pool 9 to remove individual animals frequenting islands and cause an aversion in remaining coyotes for the area.
4. Conduct special hunts of coyotes and other

predators on islands prior to and during the nesting season.

5. Investigate and utilize other predator control techniques to cause an aversion to the nesting islands.

### **Rationale:**

Predator populations in the Great Plains have been directly affected by extensive habitat changes. Some predator species common and widely distributed before European settlement vanished from all or most of the region (e.g., swift fox and gray wolf), whereas populations of other species that were scarce and narrowly distributed expanded greatly (e.g., raccoon). The elimination of the gray wolf had a profound impact on mesopredators, especially the other canids (i.e., red fox and coyote). Wolves are highly territorial and intolerant of other canids. Thus, fox and coyote abundance was limited and somewhat controlled by wolves. However, after the extermination of gray wolves from the prairies, fox and coyote populations grew.

In areas where habitat is limited (i.e., fragmented) and predator populations are high, nest success of waterfowl is potentially less than optimum. Cowardin et al. (1998) reported that mallard nest success averaged only 8 percent in central North Dakota during 1977-80 and concluded that this rate was insufficient to maintain the local breeding population without immigration. Klett et al. (1988) also concluded that nest success was too low for population stability of mallard, gadwall, blue-winged teal, northern shoveler, and northern pintail in North Dakota, South Dakota, and Minnesota. Researchers have also concluded that breeding populations of these species were not self-sustaining in many years. Predators mainly destroy duck eggs but some species also take ducklings and incubating hens. Many other migratory bird species, including long-billed curlew, marbled godwit, upland sandpiper, and trumpeter swan, are also negatively affected by egg predation by raccoons and striped skunks during the nesting season.

American white pelicans are colonial nesters that typically nest on islands surrounded by open water. It is believed that islands are selected due to the protection from predators provided. Coyotes are known predators on eggs and young of white pelicans. They have recently been documented as preying on young pelicans and their eggs and are believed to have caused the total abandonment of nesting and subsequent loss of all young in 2005. Individual coyotes are likely to continue to swim to the islands after learning this behavior. Removing individual animals and causing an aversion of remaining coyotes for these islands will help to

prevent abandonment of nesting on these islands in future years.

Currently, coyotes are frequently observed on the refuge and are one of the most common predators detected during annual scent post surveys, but red fox are rarely seen on the refuge. Recent research in the Northern Great Plains indicates that coyotes have a significant influence on the population of other nest and egg predators, especially red fox. Where coyotes are found in low numbers, red fox tend to fill the vacated predatory niche. The removal of large numbers of coyotes could result in an increasing occurrence of red fox on the refuge. This would be counterproductive for increasing the nest success and hatchling survival of waterfowl. Therefore, coyotes would not be one of the target predators for removal, except on and adjacent to the Pelican Islands.

### **Research Goal**

Use sound science, monitoring, and applied research to advance the understanding of natural resources and management within the Lake Creek Valley, sandhills and surrounding grasslands.

**Research Objective A:** Initiate one research project every 2 years with an emphasis on grassland restoration, wetland management, prairie dog management, or other topics of interest to refuge staff.

### **Strategies:**

1. Fund and build a bunkhouse to support research, and provide support resources for conducting research activities.
2. Secure two additional travel trailers for use by researchers.
3. Develop a refuge-specific list of research to be conducted on the refuge that would assist the Service with adaptive management.
4. Increase networking with universities and colleges to foster possible research projects and support that is available at the refuge.

### **Rationale:**

The foundation of sound management should be a thorough knowledge of the biotic and abiotic factors affecting the plant and animal communities on the refuge and surrounding landscape. Refuge staff will be conducting significant management and restoration activities that will affect the plant and animal communities. There is much yet to be learned from this to guide future management on and off the refuge. The lack of housing currently limits research opportunities. By providing housing, staff will be able to attract researchers to aid with achieving this goal.



*Coyote*

USFWS



*Cotton Tailed Rabbit*

USFWS, Tom Koerner

### **Hunting Goal**

Provide quality hunting opportunities that are compatible with purposes and other uses on the refuge.

**Hunting Objective A:** Within 4 years of approval of the CCP, expand youth hunting opportunities to include at least one additional hunt, in coordination with the State of South Dakota.

**Hunting Objective B:** Within 5 years of approval of the CCP, explore opening additional species for hunting (e.g., cottontail rabbit, mourning dove, Hungarian partridge, youth waterfowl, coyote, and turkey) outside of LWRRA, where compatible.

**Hunting Objective C:** Within 2 years of approval of the CCP, pursue closing of hunting from primary traveled road ditches adjacent to the refuge (see figure 6, public use map, alternative B).

**Hunting Objective D:** Within 2 years of approval of the CCP, adjust the boundary of the area open to

deer hunting to include a small unit referred to as Unit 6S-1.

### Strategies:

1. In partnership with the State of South Dakota, draft the refuge's step-down hunting management plan.
2. When compatible, on request, provide special use permits for physically challenged hunters.
3. Complete a redesign and printing of the refuge's hunting and fishing brochure.
4. Update the refuge website at least quarterly.

### Rationale:

Hunting is one of the priority public uses allowed on the refuge. When determined to be compatible with refuge purposes, this is one of six priority uses. The presence of wintering trumpeter swans has historically created a need to provide significant portions of the refuge that are closed to hunting. This strategy has been very effective at providing staging and wintering habitat for up to 250 trumpeter swans at a time. The portions of the refuge open to hunting of sharp-tailed grouse, ring-necked pheasant, and deer are used relatively little by trumpeter swan.

Several requests were made to increase the areas of the refuge open to ring-necked pheasant, sharp-tailed grouse, and waterfowl hunting. The sandhills and the Brown Ranch portions of the refuge were specifically mentioned. The quality of the muzzle load hunt was a significant factor in originally designating a portion of the refuge open only to deer hunting (Kraft, pers. comm. 2004). In addition, having portions of the refuge closed to all hunting serves to provide a "refuge" for many other species of wildlife. This helps maintain the quality of other priority wildlife-dependent recreational activities such as wildlife observation, wildlife photography, and environmental education and interpretation.

A large population of Canada geese typically winters on the refuge, as spring flows provide open water and surrounding private croplands supply food resources. This has created a predictable concentration of geese and has become a very popular hunt on adjacent private lands. Three sections of county road have been identified as a potential safety concern adjacent to the refuge. These sections of road receive the majority of vehicle traffic and also the majority of pass shooting from the road ditches. A rule change by the South Dakota Game, Fish, and Parks Commission would be required to restrict hunting from both sides of the road ditches in these sections. Pass shooting would still be

permitted around the remainder of the refuge boundary.

Goose hunters have been allowed to shoot at geese outside of the refuge boundary, provided that they are unarmed when entering portions of the refuge that are closed to waterfowl hunting to retrieve geese. At times, a significant amount of disturbance results as hunters enter the refuge and attempt to find and retrieve geese. Hunters will still legally be allowed to pass shoot at geese outside of the refuge boundary, but will not be allowed to shoot over refuge property or enter onto portions of the refuge closed to waterfowl hunting to retrieve geese under the preferred alternative.

Currently, the refuge participates in the youth pheasant hunt. In coordination with the South Dakota Game, Fish, and Parks, additional opportunities for youth only hunts on the refuge will be explored. Allowing hunting of cottontail rabbits, mourning dove, partridge, and turkey in areas open to ring-necked pheasant and sharp-tailed grouse will also be explored and coordinated with the South Dakota Game, Fish, and Parks.

### Fishing Goal

Provide quality sport fishing opportunities that are compatible with refuge purposes and other uses on the refuge.

**Fishing Objective A:** Within 2 years of approval of the CCP, annually sponsor at least one youth fishing activity at the refuge or at a site within the local community.



USFWS, Tom Koerner

Waterfowl on trout ponds

**Fishing Objective B:** Within 3 years of approval of the CCP, implement an educational campaign that results in at least 75 percent of the fishermen understanding the hazards of lead sinkers to trumpeter swans and the need to eliminate use on the refuge.

**Fishing Objective C:** Within 3 years of approval of the CCP, implement a regulation prohibiting the use of lead fishing sinkers on all refuge waters outside of the LWRRA.

### **Strategies:**

1. In partnership with the State of South Dakota, revise and rewrite a refuge sport fishing plan.
2. Provide signage, brochures, news releases, and information on the refuge's website explaining need for lead sinker ban.
3. In partnership with the State of South Dakota, support trout stocking in trout ponds and other game fish stocking in LWRRA to support a recreational fishery.
4. Allow annual Batesland Fire Department ice fishing tournament at LWRRA by issuance of a special use permit. Consider other requests on a case-by-case basis.
5. Sponsor a youth fishing day on the refuge or support other local fishing day efforts such as at Cottonwood Wildlife Management Area in Merriman.
6. Complete a redesign and printing of the refuge's hunting and fishing brochure.
7. Update the refuge's website at least quarterly.

### **Rationale:**

Sport fishing is one of the priority public uses for the System. Where compatible, this public use should be considered. Current and proposed wetland management for all areas of the refuge, except the trout ponds and the LWRRA, will support a very limited recreational fishery. The trout ponds and the LWRRA have deeper and more stable water levels to support a recreational fishery. These sites are locally important, due to the lack of public fishing opportunities in western South Dakota. Past management has centered on periodic stocking of sport fish and has provided recreational opportunities for fishermen. Stocking operations on the LWRRA has been halted until any modifications to the dam are complete. Once this is completed, stocking sport fish into the LWRRA may again be considered.

The trout ponds are seasonally important to trumpeter swans and other waterfowl. During periods of extreme cold, the springs feeding

the trout ponds help to keep some open water available. Fishing on the trout ponds is difficult at this time because the ice is not safe enough to walk on. A seasonal closure on the trout ponds would have little to no impact on recreational fishing opportunities, but would prevent disturbance during this critical period. The ban on use of lead fishing sinkers is needed to prevent ingestion of lead by trumpeter swans and other waterfowl. Canada geese and trumpeter swans have been found dead on the refuge and were determined to have been killed by ingestion of lead. Lead sinkers are the only known contributor of lead to the environment that is still allowed on the refuge. Non-toxic sinkers are now readily available to fishermen at a reasonable cost. Their use will eliminate a known source of lead.

### **Wildlife Observation and Wildlife Photography Goal**

Within 3 years of completions of the CCP, provide quality opportunities for wildlife observation and wildlife photography, where compatible with purposes and other uses throughout the refuge.

#### **Wildlife Observation and Wildlife Photography Objective A:**

Within 5 years of completion of the CCP, design, sign, and construct a minimum of three walking trails on the refuge that allow visitors to experience a range of refuge habitats (i.e., Pelican Islands, Wetland Loop, and Sandhills).

#### **Wildlife Observation and Wildlife Photography Objective B:**

Within 5 years of approval of the CCP, construct an accessible portion of the Pelican Islands Trail that leads to an accessible observation platform within view of the islands.

### **Strategies:**

1. Provide adequate signage to direct visitors and enhance the recreational experience.
2. Complete a design and printing of a refuge wildlife observation brochure.
3. Consider making a seasonal blind available for public use near a reliable sharp-tailed grouse lek.
4. Make personal contacts with neighboring federal, state, and tribal governments to inform and educate about opportunities for wildlife observation on the refuge.
5. Maintain current signage directing visitors to the refuge. Add additional directional signs.
6. Increase distribution of refuge brochures
7. Work with Bennett County Road Department to improve the condition of main access to the refuge.

8. Maintain wildlife observation and wildlife photography as the primary public uses on the auto tour loop south of the refuge headquarters.
9. Update the refuge's website at least quarterly.

### **Rationale:**

Wildlife observation and wildlife photography are two of the priority public uses on the refuge. Where compatible, these public uses should be allowed. The relatively low visitation and abundant wildlife provide frequent opportunities for wildlife observation and wildlife photography. The wide open spaces provide excellent opportunities for viewing mixed grass prairie, wetlands, and sandhills in one location. Currently, these public uses are allowed on the entire refuge. Many new or first time visitors are reluctant to explore the refuge off of the designated tour route. Development of a refuge wildlife observation guide, combined with development of three walking trails, will help new visitors to the refuge experience a range of habitats and wildlife.

### ***Environmental Education and Interpretation Goal***

Provide and actively support opportunities for environmental education and interpretation that are compatible with purposes and other uses on the refuge.

#### ***Environmental Education and Interpretation***

**Objective A:** Update interpretive messages presented throughout the refuge to reflect habitat based decision making within 6 years of approval of the CCP.

#### ***Environmental Education and Interpretation***

**Objective B:** Upon approval of the CCP, sponsor/ conduct a minimum of two theme related educational or interpretive events each year.

#### ***Environmental Education and Interpretation***

**Objective C:** Actively work with local educators to incorporate wildlife and habitat based studies into curriculum and utilize refuge resources to support this with a minimum of five environmental education programs, within 4 years of completing the CCP.

#### ***Environmental Education and Interpretation***

**Objective D:** Within 5 years of approval of the CCP, in partnership with the South Dakota Highway Department, seek funds to complete a pull out and informational kiosk along Highway 73, to interpret refuge resources and opportunities for refuge visitors.

### **Strategies:**

1. Complete design and construction of updated visitor contact station.

2. Complete a redesign and printing of the refuge's general brochure.

3. Complete a redesign and printing of the refuge's auto tour route brochure and installation of updated signage.

4. Seek funding to complete pull out along Highway 73 in cooperation with South Dakota Department of Transportation.

5. Conduct visits with local educators to inform and encourage use of refuge as an outdoor classroom.

6. Update the refuge's website at least quarterly.

### **Rationale:**

Environmental education and interpretation are two of the priority public uses for the refuge, and should be supported where compatible. Tremendous opportunities exist for educating and informing the local community and refuge visitors about refuge resources. Improvement of signage, designated trails, and brochures available to the public will significantly improve the quality of visits to the refuge.

### ***Non-Wildlife-Dependent Public Use Goal***

Provide limited non-wildlife-dependent uses where compatible and supported by refuge resources, and when they further the Fish and Wildlife Service's or the refuge's mission and goals.

#### ***Non-Wildlife-Dependent Public Use Objective A:***

Allow the non-wildlife-dependent uses of camping, picnicking, and swimming only on the LWRRA.

#### ***Non-Wildlife-Dependent Public Use Objective B:***

Consider other compatible, non-wildlife-dependent uses where conflicts are minimized with other refuge uses.

### **Strategies:**

1. Permit the harvesting of native berries and fruits throughout the refuge.

2. Permit the harvesting of limited quantities of native plant materials, for non-commercial use through the issuance of special use permits.

3. Update Lacreek NWR website at least quarterly.

### **Rationale:**

All of the non-wildlife-dependent public use on the refuge occurs on the LWRRA. The title to the LWRRA was accepted with encumbrances providing for hunting, fishing, boating, camping, and picnicking attached. The intent of the LWRRA was clearly for providing recreational

opportunities, as indicated by establishing authority: “for public recreation on...developments adjacent to conservation areas in existence” (16 USC 460K-K4). This factor separates regulations for and management of the LWRRA from the remainder of the refuge.

The major consideration for this unit is the availability of resources to administer these recreational uses. Currently, management centers on operation and maintenance of the dam, road, and facilities. Increased law enforcement patrols are required to reduce vandalism and provide for safe and quality recreational opportunities for visitors. The existing partnership with the State of South Dakota helps provide for fisheries management.

Other non-wildlife-dependent uses are evaluated to determine if they are compatible with refuge purposes and establishing authority. The low visitation encountered on the refuge often allows for public uses that at higher use levels would likely be considered incompatible. Activities such as berry picking for personal use or harvest of chokecherry branches for use by Native Americans may be allowed and contribute to local support of the refuge.

**Cultural Resources Goal**

Upon approval of the CCP, identify, value, and preserve the cultural resources and history of the refuge and WMD to connect refuge staff, visitors, and community to the area’s past.

**Cultural Resources Objective A:** By 2012, identify cultural resources and protect them from degradation.

**Strategies:**

1. Conduct routine law enforcement patrols to protect undocumented resources from theft and vandalism.
2. Continue to conduct site-specific surveys for lands and facilities that may be disturbed by refuge management activities.

3. Conduct a refuge wide survey to determine the presence of cultural resources on the refuge, upon securing funding.
4. Continue to follow established procedures for all private lands projects to ensure protection of cultural resources.
5. Continue to protect structures built by the CCC.
6. Complete a design and printing of a refuge historical brochure.

**Rationale:**

Federal laws and policies mandate the identification and protection of cultural resources.

**Staffing and Resources Goal**

Ensure that minimum staffing and resources are available to facilitate achievement of the Service’s and refuge’s goals and objectives.

**Strategies:**

1. Continue to advocate for minimum staffing as outlined in the refuge’s minimum staff chart.
2. Replace two existing refuge houses with single-family dwellings upon securing funding.
3. Construct a bunkhouse upon securing funding.

**Rationale:**

Lacreek NWR requires an extensive amount of management to reach stated goals and objectives. A large infrastructure of dikes and diversions are used to manage wetland habitats. Many upland acres are being restored to native grasses and forbs, with thousands of acres to complete. Invasive species require aggressive management. The use of prescribed fire and grazing is needed to manage upland and wetland habitats. A public use program requires maintenance of buildings and roads, interpretation for school groups, and a law enforcement program. All of this activity requires

**Table 5. Current and proposed staff, Lacreek NWR.**

<i>Staff</i>	<i>Current Positions</i>	<i>Proposed Positions</i>
Management	Refuge Complex Project Leader, GS-12 Refuge Operations Specialist, GS-11 (unfunded)	None
Biological	Refuge Complex Biologist, GS-11 Private Lands Biologist, GS-11 Habitat Biologist, GS-11 (unfunded) Biological Technician, GS-6 (unfunded)	None
Administrative	Administrative Support Assistant, GS-7	None
Maintenance	Maintenance Worker WG-6 Engineering Equipment Operator, WG-8	None
Fire Management	Prescribed Fire Specialist, GS-9	None



Shapins Associates

View of Lacreek NWR from above

staff, equipment, and resources to complete. The minimum staffing level is designed to provide basic maintenance, operations, and administration support for the refuge.

### **Capitol Improvements Goal**

Ensure that all refuge facilities and structures meet accepted agency and industry standards.

**Capitol Improvements Objective A:** Complete any required modifications to the Little White River Dam, based upon either final designs completed in 2005 or a re-evaluation of the hazard classification, by 2009.

### **Strategies:**

1. Complete a re-evaluation of the hazard classification for the LWRRA.
2. Consider modification of the Standard Operation Procedure to lower hazard classification.
3. Consider modification of the dam to lower hazard classification.

### **Rationale:**

The Little White River Dam has been classified as a “Significant Hazard Dam”. This classification is based on potential impacts to downstream structures. A final design has been completed for modification of the existing dam to facilitate passage of the probable maximum flood event without breaching the dam. Upon completion, a probable maximum flood event would still impact downstream structures; however, the dam would remain intact. The final design includes construction of a secondary emergency spillway, reworking the existing emergency spillway, replacement of the outlet works, and raising the dam 1 foot to add more freeboard. The project would not increase the storage capacity of the reservoir, nor would it improve the fisheries. Initial

estimates for completion of this work were set at \$5,000,000.

The original dam was constructed in 1937 and has undergone only minor modifications in 68 years. In 2001, the emergency spillway was modified and armored with sheet pile and large riprap to address head cutting that had occurred downstream of the spillway. A comparison of the as-built topographic survey and a 1985 topographic survey completed by the South Dakota Game, Fish and Parks indicates that over 70 percent of the storage capacity behind the dam had silted in. It is unknown how much additional siltation has occurred in the last 20 years; however, additional storage has been lost. The significant cost for an aging dam has been considered.

Currently, the dam facilitates filling of several of the refuge’s wetland units with surface water. Wildlife use of the site includes use by waterfowl and other waterbirds during spring and fall migrations, use by pelicans, herons, and egrets in the summer, and year round use by beaver, muskrats, pheasants, and other resident species. A marginal fishery exists with largemouth bass, northern pike, black crappie, saugeye, and carp. The site also continues to provide recreational opportunities to the residents of Bennett County not provided at other sites. Camping, boating, fishing, and picnicking are common uses at the site.

The service is currently evaluating the hazard classification for the dam. Pending an outcome that determines the hazard classification should remain as Significant, modifications to the dam will be made according to the final designs completed in 2005. Pending an outcome that determines a downgrading of the hazard classification is warranted, the need for completion of the modifications will be revisited.

### **Partnerships Goal**

A wide range of partners, including non-governmental organizations and federal, state, tribal, and local entities, join with Lacreek NWR to support research and management, promote awareness, and foster appreciation for the Lake Creek Valley, Nebraska Sandhills, and surrounding grasslands.

**Partnerships Objective A:** Upon approval of the CCP, the refuge will continue to participate in partnerships that promote sound wildlife management or contribute to the Fish and Wildlife Services or Lacreek NWR’s mission.

**Partnerships Objective B:** Upon approval of the CCP, refuge staff will continue to support an active private lands program that facilitates achievement of the Service’s and refuge’s goals and objectives.

**Strategies:**

1. Attend Bennett County Weed Board Meetings to exchange information.
2. Attend Bennett County Commissioners meeting annually.
3. Attend Bennett, Todd, and other County Conservation District Board Meetings.
4. Hold Open House, Appreciation Day, or other similar event annually for refuge's neighbors and friends.

**Rationale:**

The refuge is part of the larger landscape and community. Activities that occur on the refuge have the potential to affect neighbors and the surrounding community and vice versa. Establishing open lines of communication will help build support for the refuge and provide an avenue for discussion. The Service recognizes that partnerships are vital to the Service mission. The Partners for Fish and Wildlife Program clearly follows this belief. The landowner steps forward and voluntarily makes their land available for the establishment and improvement of wildlife habitat. The Conservation District helps to administer funding and coordinates with the landowner. Other agencies such as South Dakota Game, Fish, and Parks, Ducks Unlimited, Inc., or the Natural Resources Conservation Service contribute financial and/or technical assistance to the project. The Service contributes technical and financial

assistance and often acts as the primary contact to see the project through completion with the landowner.

Refuge staff will continue to seek out new opportunities and foster existing relationships to help with achieving mutually beneficial goals and objectives.

**6.3 Personnel**

Current staffing at the refuge consists of seven permanent FTEs. Three additional unfunded positions remain on the staffing chart for the refuge. No additional staff is proposed to fully implement the CCP. Staffing and funding are requested for the 15-year period of the CCP.

**6.4 Funding**

Projects required to implement the CCP are funded through two separate systems. Actions, projects, and maintenance needs for the refuge are displayed from the Refuge Operating Needs System (RONS) and the Maintenance Management System (MMS). RONS identifies staffing needed to carry out projects above the existing base budget. MMS documents the refuge's needs regarding equipment, buildings and the repair and replacement of facilities. Appendix H identifies the RONS and appendix I identifies the MMS requirements for the refuge.

**Table 6. Step-down management plans for Lacreek NWR**

<i>Plan/Proposal</i>	<i>Completed Plan, Year Approved</i>	<i>New or Revised Plan, Completion Year</i>
Black-tailed Prairie Dog Management Plan	-	2005
Disease Management Plan	2004	2010
Fire Management Plan	2001	2006
Habitat Management Plan	-	2010
Hazardous Waste Management Plan	2002	2012
Integrated Pest Management Plan	2004	2014
Lacreek (High Plains) Flock Trumpeter Swan Management Plan	1982	2006
Occupant Emergency Plan	-	2010
Predator Management Plan	1994	2006
Prescribed Burning (Annual)	2005	2006
Spill Prevention Control and Countermeasures Plan	-	2007
Refuge Safety Plan	2001	2010
Visitor Services Plan	1980	2012
Water Management Plan	2005	2006
Wildlife Inventory and Monitoring Plan	2004	2010

## 6.5 Step-Down Management Plans

This CCP is intended as a broad umbrella plan that provides general concepts and specific wildlife, habitat, endangered species, public use, and partnership objectives over the next 15 years.

The purpose of step-down management plans is to provide greater detail to managers and employees who will implement the strategies described in the CCP. Step-down management plans provide greater detail for implementing specific actions authorized by the CCP. Table 6 presents those plans needed for Lacreek NWR, their current status, and next revision date.

## 6.6 Monitoring and Evaluation

Adaptive management is a flexible approach to long-term management of biotic resources. It allows for management to be shaped and directed over time by the results of ongoing monitoring activities and other information discovered (see figure 8). More specifically, adaptive management is a process by which projects are implemented within a framework of scientifically driven experiments to test the predictions and assumptions outlined within a plan. On-the-ground observations of responses to management

by habitats and wildlife are also factored in. Analysis of results helps managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions. Changes and adjustments to management and operations are considered utilizing the best information that is currently available.

## 6.7 Plan Amendment and Revision

This CCP will be reviewed annually to determine the need for revision. A revision will occur if and when significant information becomes available, such as a change in ecological conditions. The final CCP will be augmented by detailed step-down management plans to address the completion of specific strategies in support of the CCP goals and objectives. Revisions to the CCP and the step-down management plans will be subject to public review and NEPA compliance. At a minimum, this plan will be evaluated every 5 years and revised after 15 years.

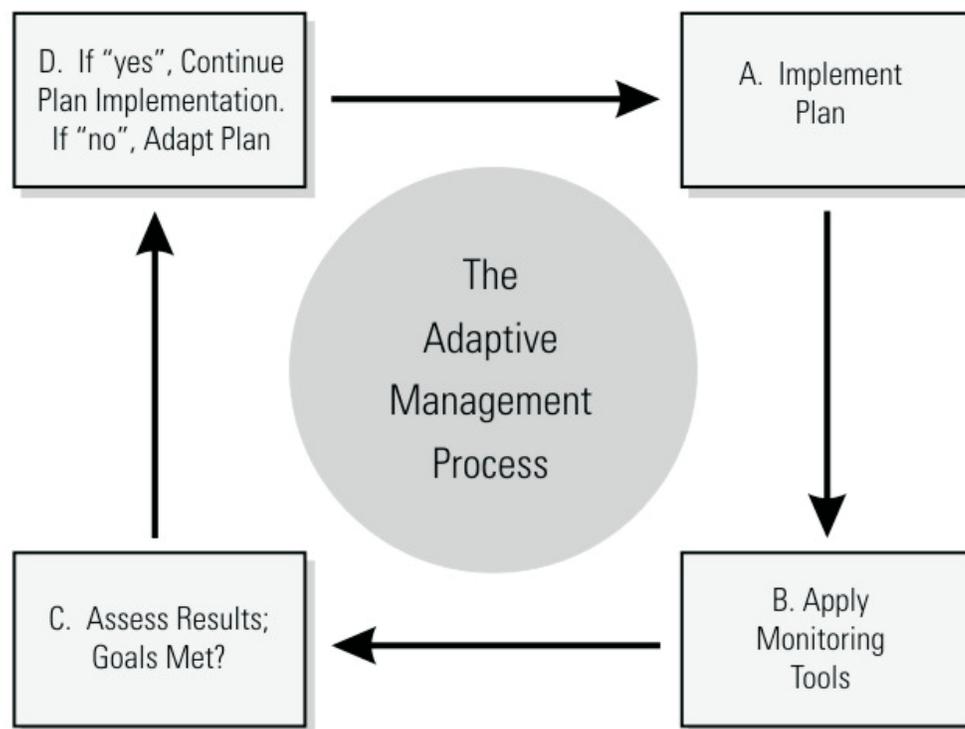


Figure 9. Adaptive management

