

Comprehensive Conservation Plan

*Lacreek National Wildlife Refuge and
Lacreek Wetland Management District*

February 2006

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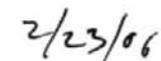
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Comprehensive Conservation Plan Approval

*Lacreek National Wildlife Refuge and
Lacreek Wetland Management District*

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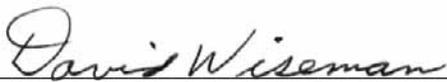


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Acronyms and Abbreviations Used in this CCP

BMPs	best management practices
CCP	comprehensive conservation plan
CD	compatibility determination
Corps	U.S. Army Corps of Engineers
EA	environmental assessment
EO	executive order
FMP	fire management plans
FONSI	finding of no significant impact
FTE	full-time equivalent
FQA	floristic quality assessment
FQI	floristic quality index
Improvement Act	National Wildlife Refuge System Improvement Act of 1997
IPM	integrated pest management
LWRRRA	Little White River Recreation Area
NAWMP	North American Waterfowl Management Plan
NEPA	National Environmental Policy Act of 1969
Non-wildlife-dependent recreational uses	Personal watercraft, camping, swimming, horseback riding, volleyball, basketball, tournament fishing, power and speed boating
NWR	national wildlife refuge
Refuge System	National Wildlife Refuge System
SAV	submergent aquatic vegetation
SDGFP	South Dakota Game, Fish and Parks Department
Service	U.S. Fish and Wildlife Service
SWAP	Small Wetlands Acquisition Program
USFWS	U.S. Fish and Wildlife Service
Wildlife-dependent recreational uses	Hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation
WMA	wildlife management area
WMD	wetland management district
WPA	waterfowl production area

Summary

The Refuge and Its Purpose

Lacreek National Wildlife Refuge (NWR) was established in 1935 by President Franklin D. Roosevelt through Executive Order No. 7160. The order establishes Lacreek NWR “...as a refuge and breeding ground for migratory birds and other wildlife.” The refuge lies in the Lake Creek Valley on the northern edge of the Nebraska Sandhills and includes 16,410 acres of native sandhills, sub-irrigated meadows, impounded fresh water marshes, and tall- and mixed-grass prairie uplands.

The refuge serves as an important staging area for many species of waterfowl, sandhill cranes, shorebirds, and Neotropical migrants. Spring flows entering the refuge help to provide critical wintering habitat for the high plains trumpeter swan flock. These open waters during the winter also attract large concentrations of Canada geese and mallards. The refuge’s grasslands support long-billed curlews, marbled godwits, grasshopper sparrows, bobolinks, and other grassland bird species of concern. Bald eagles, a threatened species, are commonly observed on the refuge, and the endangered whooping crane has been documented using refuge wetlands during migration.

Unique habitats are provided in black-tailed prairie dog towns, which support high numbers of burrowing owls and host other species of concern, such as ferruginous hawks. The refuge provides a variety of habitats for resident wildlife and supports local concentrations of white-tailed and mule deer, sharp-tailed grouse, and ring-necked pheasants during the fall and winter.

The wetland management district (Lacreek Wetland Management District) was started as part of the Small Wetlands Acquisition Program in the 1950s to save wetlands from various threats, particularly draining. The passage of Public Law 85-585 in August of 1958 amended the Migratory Bird Hunting and Conservation Stamp Act (Duck Stamp Act) of 1934, allowing for the acquisition of waterfowl production areas and easements for waterfowl management rights (easements).

Refuge Vision and Goals

The vision for the refuge is based on the establishing purposes of the refuge, resource conditions and potential, and the issues. The goals help the refuge staff achieve the vision.



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Refuge Vision

Lacreek National Wildlife Refuge's wetland resources create a sanctuary within the semi-arid Great Plains landscape. The refuge provides a great diversity of uses for wildlife and humans alike. Refuge stewards manage hydrology to reflect natural conditions and restore native plant communities of the Lake Creek Valley and the adjacent sandhills for migratory birds and other native wildlife. Visitors learn about grasslands, wetlands, and sandhill ecosystems and enjoy wildlife-dependent recreation. Ongoing cooperation with partners and the public fosters appreciation and builds support for the refuge's biological and cultural assets.

Refuge Goals

Goal 1. Wildlife and Habitat Management:

Conserve, restore, and enhance the native biological diversity of the Lake Creek Valley and Nebraska Sandhills for migratory birds and other wetland and grassland-dependent species.

Goal 2. Research and Science:

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



Kingfisher

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Goal 3. Public Use:

Provide opportunities for quality wildlife-dependent recreation and promote awareness of Lacreek NWR's resources and the mission of the Refuge System.

Goal 4. Cultural Resources:

Identify, value, and preserve the cultural resources and history of Lacreek NWR to connect refuge staff, visitors, and the community to the area's past.

Goal 5. Refuge Operations:

Secure and demonstrate effective use of funding, staffing, and partnerships for the benefit of all resources in support of the Refuge System mission.

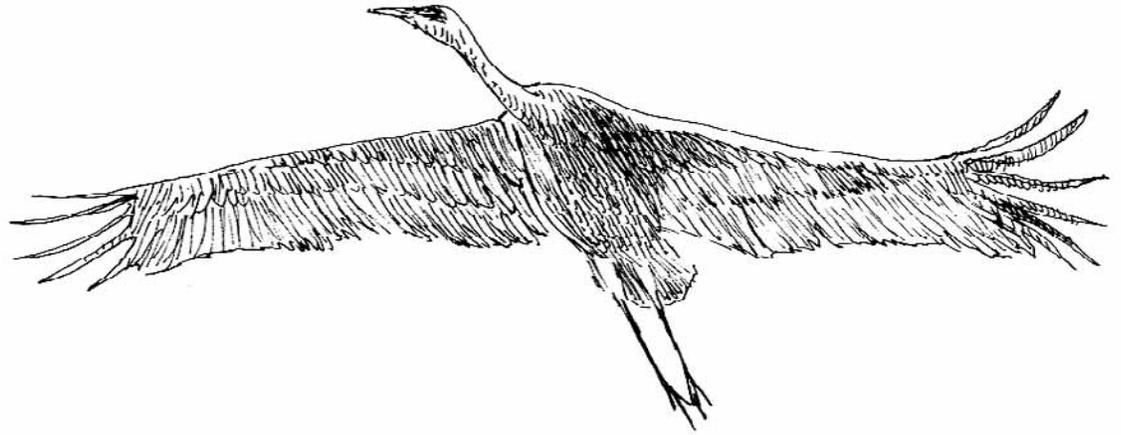
Goal 6. Partnerships:

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

Outcome of the Plan

Through an integrated restoration approach, the refuge will strive to restore ecological processes and achieve habitat conditions that require reduced management over time while recognizing the place of the refuge in the overall landscape and community. An emphasis on monitoring the effects of habitat management practices and use of the research results to direct ongoing restoration will be a priority. Current levels of priority public uses and activity will increase. The staff will continue to manage the wetland management district (WMD) through monitoring and enforcement of easements.

1 Introduction



1 Introduction

The U.S. Fish and Wildlife Service (Service) has developed this CCP to provide a foundation for the management and use of the Lacreek National Wildlife Refuge Complex, which includes not only the refuge but also the wetland management district (WMD). The plan is intended to serve as a working guide for management programs and actions over the next 15 years.

The plan was developed in compliance with the National Wildlife Refuge System Improvement Act of 1997 and Part 602 (National Wildlife Refuge System Planning) of the Fish and Wildlife Service Manual. The actions described within this plan also meet the requirements of the National Environmental Policy Act of 1969 (NEPA) (see appendix B). Compliance with NEPA is being achieved through the involvement of the public and the inclusion of an integrated environmental assessment (EA).

When fully implemented, this plan will strive to achieve the program vision and the purposes of the refuge. Fish and wildlife and their habitats are the first priority in refuge management, and public use (wildlife-dependent recreation) is allowed and encouraged as long as permission is granted by the manager and it is compatible with, or does not detract from, a refuge's purpose(s).

The plan has been prepared by a planning team composed of representatives from various Service programs, including the refuge staff and the South Dakota Game, Fish and Parks Department (SDGFP).

Purpose and Need for Plan

The purpose of this CCP is to identify the role that Lacreek National Wildlife Refuge Complex will play in support of the mission of the National Wildlife Refuge System (Refuge System), and to provide long-term guidance to management programs and activities. The plan is needed:

- To provide a clear statement of direction for the future management of the program;
- To provide landowners, neighbors, visitors, and government officials with an understanding of the U.S. Fish and Wildlife Service's management actions on and around these refuges;
- To ensure that the Service's management actions are consistent with the mandates of the National Wildlife Refuge System Improvement Act of 1997;
- To ensure that the management of these refuges is consistent with federal, state, and county plans; and
- To provide a basis for the development of budget requests for the program's operational, maintenance, and capital improvement needs.



Canada Geese Taking Flight

Tom Koerner/USFWS

Perhaps the greatest need of the Service is to build relationships with landowners and communicate with the general public and other partners in efforts to carry out the mission of the Refuge System. Sustaining our nation's fish and wildlife resources is a task that can be accomplished only through the combined efforts of governments, businesses, and private citizens.

The U.S. Fish and Wildlife Service and the National Wildlife Refuge System

The U.S. Fish and Wildlife Service

“The mission of the U.S. Fish and Wildlife Service, working with others, is to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people.”

Over 100 years ago, America's fish and wildlife resources were declining at an alarming rate. Concerned citizens, scientists, and hunting and angling groups joined together to restore and sustain our national wildlife heritage. This was the genesis of the U.S. Fish and Wildlife Service.

Today, the Service enforces federal wildlife laws, manages migratory bird populations, restores nationally significant fisheries, conserves and restores vital wildlife habitat, protects and recovers endangered species, and helps other governments with conservation efforts. It also administers a federal aid program that distributes hundreds of millions of dollars to states for fish and wildlife restoration, boating access, hunter education, and related programs across America.

The Service manages the National Wildlife Refuge System, thousands of waterfowl production areas (WPA), and other special management areas. It also operates 66 national fish hatcheries and 78 ecological services field stations.

Service Activities in South Dakota

Service activities in South Dakota contribute to the state's economy, ecosystems, and education programs. Lacreek NWR contributes to the economic benefits of hunting, fishing, wildlife observation, and wildlife photography in South Dakota. A report titled, *Banking on Nature 2004: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation*, evaluated the impacts of refuges to local economies. Based on figures from 2004, Lacreek NWR is estimated to have generated \$84,500 in local economic effects from refuge recreation visits. The majority of effects were associated with expenditures by

non-resident visitors. The refuge budget also contributes a stimulus to the local economy with a significant portion of payroll, maintenance, and operation expenditures spent locally.

The refuge employs 7 full-time equivalent (FTE) employees, with a current budget of \$741,700 and has an annual visitation of 16,400. This includes funds for the fire program and the Partners for Fish and Wildlife Program. In addition, 150 volunteer hours are contributed to the refuge operations.

In general, the South Dakota Federal Aid – Sport Fish and Wildlife Restoration program is a source of federal excise taxes paid by hunters, anglers, and boaters on fishing and hunting equipment. The monies generated from this tax have economic benefits to South Dakota. In 1998, the economic impact of angler expenditures was \$206 million and hunters contributed \$176 million to the overall economy (Source: http://mountain-prairie.fws.gov/reference/briefing_book_nd_2000.pdf).

The National Wildlife Refuge System

In 1903, President Theodore Roosevelt designated the 5.5-acre Pelican Island in Florida as the nation's first wildlife refuge for the protection of brown pelicans and other native nesting birds. This was the first time the federal government set aside land for the sake of wildlife. This small but significant designation was the beginning of the System. One hundred years later, this System has become the largest collection of lands in the world specifically managed for wildlife, encompassing over 96 million acres within 544 refuges and over 3,000 small areas for waterfowl breeding and nesting. Today, there is at least one refuge in every state in the nation including Puerto Rico and the U.S. Virgin Islands.

In 1997, a clear mission was established for the System through the passage of the Improvement Act. That mission is:

“... to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

The Improvement Act further states that each refuge shall be managed:

- To fulfill the mission of the System;
- To fulfill the individual purposes of each refuge;
- To consider the needs of fish and wildlife first;

- To fulfill the requirement of developing a CCP for each unit of the System, and fully involve the public in the preparation of these plans;
- To maintain the biological integrity, diversity, and environmental health of the System;
- To recognize that wildlife-dependent recreational activities including hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation, are legitimate and priority public uses; and
- To retain the authority of refuge managers to determine compatible public uses.

In addition to the overall mission for the System, the wildlife and habitat vision for each national wildlife refuge stresses the following principles:

- Wildlife comes first.
- Ecosystems, biodiversity, and wilderness are vital concepts in refuge management.
- Refuges must be healthy.
- Growth of refuges must be strategic.
- The System serves as a model for habitat management with broad participation from others.

Following passage of the Improvement Act, the Service immediately began efforts to carry out the direction of the new legislation, including the preparation of CCPs for all refuges. The development of these plans is now ongoing nationally. Consistent with the Improvement Act, all refuge CCPs are being prepared in conjunction with public involvement, and each refuge is required to complete its own CCP within the 15-year schedule (by 2012).



Waterfowl Viewed from the Auto Tour Loop

Tom Koerner/USFWS

People and the National Wildlife Refuge System

Our fish and wildlife heritage contributes to the quality of our lives and is an integral part of our nation's greatness. Wildlife and wild places have always given people special opportunities to have fun, relax, and appreciate our natural world.

Whether through bird watching, fishing, hunting, wildlife photography, or other wildlife pursuits, wildlife recreation also contributes millions of dollars to local economies. In 2002, approximately 35.5 million people visited a national wildlife refuge, mostly to observe wildlife in their natural habitats. Visitors are most often accommodated through nature trails, auto tours, interpretive programs, and hunting and fishing opportunities. Significant economic benefits are being generated to the local communities that surround the refuges. Economists have reported that national wildlife refuge visitors contribute more than \$792 million annually to local economies.

Ecosystem Descriptions and Threats

Central Flyway

Lacreek NWR is located in the Central Flyway, which is one of four administrative flyways in North America (see figure 1, USFWS ecosystem map). The states and provinces included are: Montana, Wyoming, Colorado, New Mexico, Texas, Oklahoma, Kansas, Nebraska, South Dakota, North Dakota, Alberta, and Saskatchewan. The Central Flyway Council is made up of federal, state, and provincial representatives from the United States and Canada who meet regularly to coordinate population surveys, regulate and set hunting seasons, and plan for management of the migratory bird resource. Lacreek NWR designates a staff member to represent region 6 on the swan subcommittee of the Central Flyway Council.

In 1986, Canada, the United States, and Mexico united to form the North American Waterfowl Management Plan (NAWMP), designed to restore diminishing continental waterfowl populations to the levels of the 1970s.

The NAWMP brought together federal and state agencies, private conservation organizations, business and private landowners, national corporations and individuals of the three countries into "Joint Ventures." Joint Ventures are regionally based, self-directed partnerships that carry out science-based conservation through a wide array of community participation. Joint Ventures strive:

- To build partnerships for conservation where participation is voluntary and programs are non-regulatory;
- To work on public and private lands to protect, restore and enhance critical habitats for waterfowl, shorebirds, waterbirds, and land birds; and
- To build a scientific foundation through improvement of databases, scientific technologies and monitoring that help partners target conservation efforts to where they will do the most good and make the best use of resources.

Northern Great Plains Joint Venture

Lacreek NWR is found in the newest Joint Venture, the Northern Great Plains Joint Venture. It is bounded on the north and east by the Prairie Pothole Joint Venture and on the west by the Intermountain West Joint Venture.

The Northern Great Plains Joint Venture area is arid to semi-arid and mostly unglaciated. Relatively few natural wetlands exist. Land use in the area is primarily livestock production and numerous man-made wetlands have been created for livestock and wildlife. This area of short- and mixed-grass prairie has been dramatically altered in the last 100 years, due primarily to human intervention. Once common native grasslands are seriously threatened and many bird species are declining. Maintaining and protecting existing wetlands and grasslands, as well as creation and enhancement of wetlands, will be a major focus for the Northern Great Plains Joint Venture. Lacreek NWR contributes to and participates in the Northern Great Plains Joint Venture through its active Partners for Fish and Wildlife Program, management of the WMDs easements, and management and restoration of the refuges resources.



Tom Koerner/USFWS

Lacreek NWR Headquarters

Missouri River Main Stem Ecosystem Plan

The Service has adopted watersheds as the basic building blocks for implementing ecosystem conservation. Lacreek NWR is found in the Missouri River Main Stem Ecosystem. This vast area covers all of North and South Dakota and small portions of Nebraska, Wyoming, and Montana. The major threats identified for this ecosystem include conversion of prairie to cropland, overgrazing, invasive species, and aggressive prairie dog control. Lacreek NWR contributes to the accomplishment of goals and objectives for this ecosystem through its Partners for Fish and Wildlife Program and the partnerships that exist at the refuge and throughout the WMD.

Key legislation and policies can be found in appendix B.

National and Regional Mandates

The administration of the Refuge System is guided by a variety of international treaties, federal laws, and Presidential Executive Orders. Management options under each refuge's establishing authority and the Refuge System Improvement Act of 1997 (the legal and policy guidance for the operation of national wildlife refuges) are contained in the documents and acts listed in appendix B.

The Improvement Act amends the Refuge System Administration Act by providing a unifying mission for the System, a new process for determining compatible public uses on refuges, and a requirement that each refuge will be managed under a CCP. The Improvement Act states that wildlife conservation is the priority of System lands and that the Secretary of the Interior will ensure that the biological integrity, diversity and environmental health of refuge lands are maintained. Each refuge must be managed to fulfill the System's mission and the specific purposes for which it was established. The Improvement Act requires the Service to monitor the status and trends of fish, wildlife, and plants in each refuge. A list of other laws and executive orders that may affect the CCP or the Service's implementation of the CCP is provided in appendix B. Service policies providing guidance on planning and the day-to-day management of a refuge are contained within the Refuge System Manual and the Service Manual.

The Planning Process

This CCP for Lacreek NWR and Lacreek WMD are intended to comply with the Improvement Act and NEPA and their implementing regulations. The Service issued a final refuge planning policy in

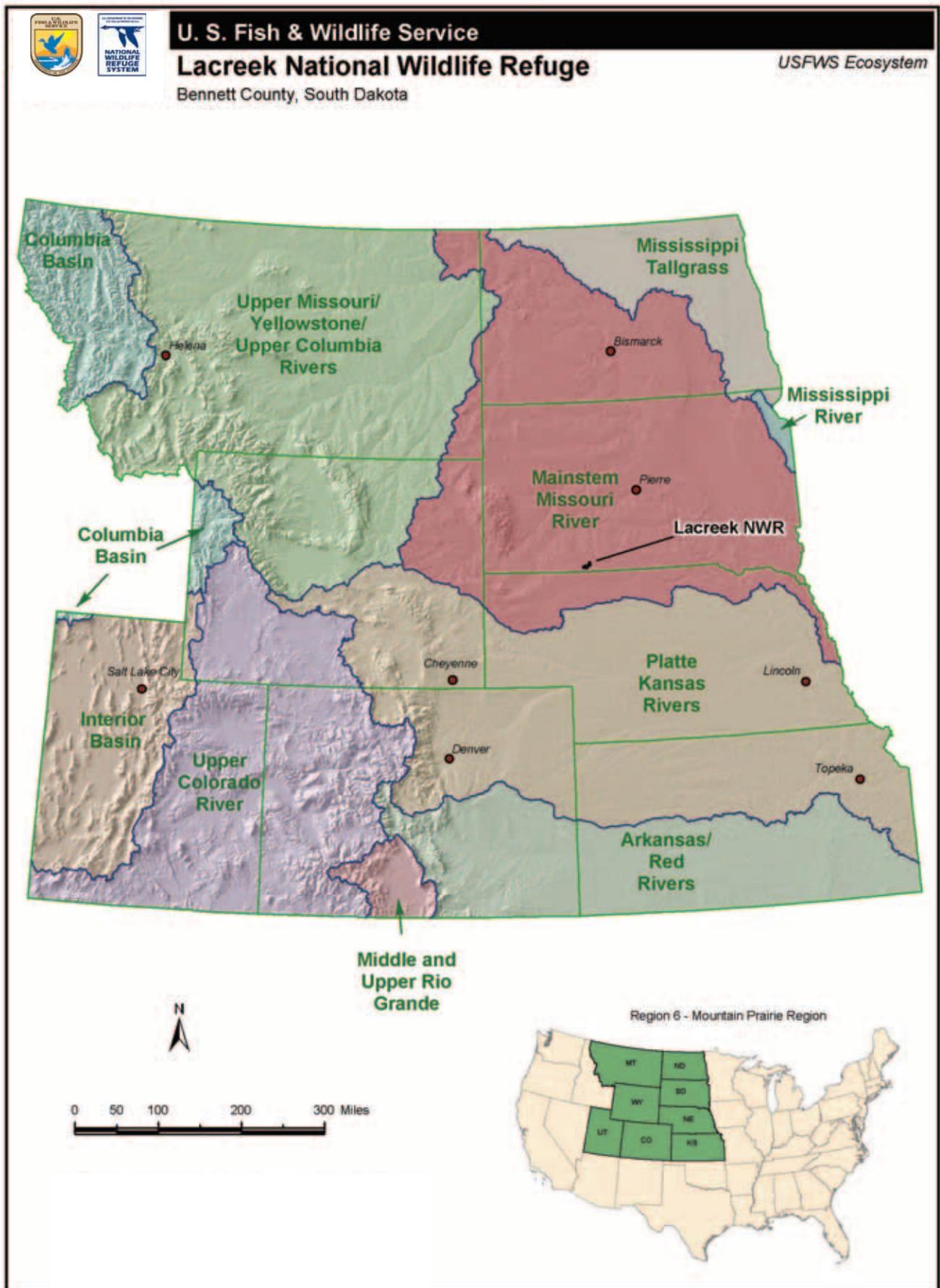


Figure 1. USFWS ecosystem map

2000 that established requirements and guidance for Refuge System planning, including CCPs and step-down management plans, ensuring that planning efforts comply with the provisions of the Improvement Act. The planning policy identified several steps of the CCP and EA process (see figure 2):

- Form a planning team and conduct pre-planning;
- Initiate public involvement and scoping;
- Draft vision statement and goals;
- Develop and analyze alternatives, including proposed action;
- Prepare draft CCP and EA;
- Prepare and adopt final CCP and EA and issue a finding of no significant impact (FONSI) or determine if an environmental impact statement is needed;

- Implement plan, monitor and evaluate; and
- Review (every 5 years) and revise (every 15 years) plan.

The Service began the pre-planning process in September 2004 (see appendix C). A planning team comprised of Service personnel from the refuge and the SDGFP (appendix D), was developed shortly after the initial kickoff meeting. Draft issues and qualities lists were developed.

A notice of intent was published in the Federal Register on November 30, 2004. Notification of a public open house was distributed through media press releases.

Over the course of pre-planning and scoping, the planning team collected available information about the resources of the refuge and the surrounding areas. This information is summarized under “Chapter 3, Refuge Resources and Description”.

This CCP provides long-term guidance for management decisions; sets forth goals, objectives, and strategies needed to accomplish refuge purposes; and identifies the Service’s best estimate of future needs. This CCP details program

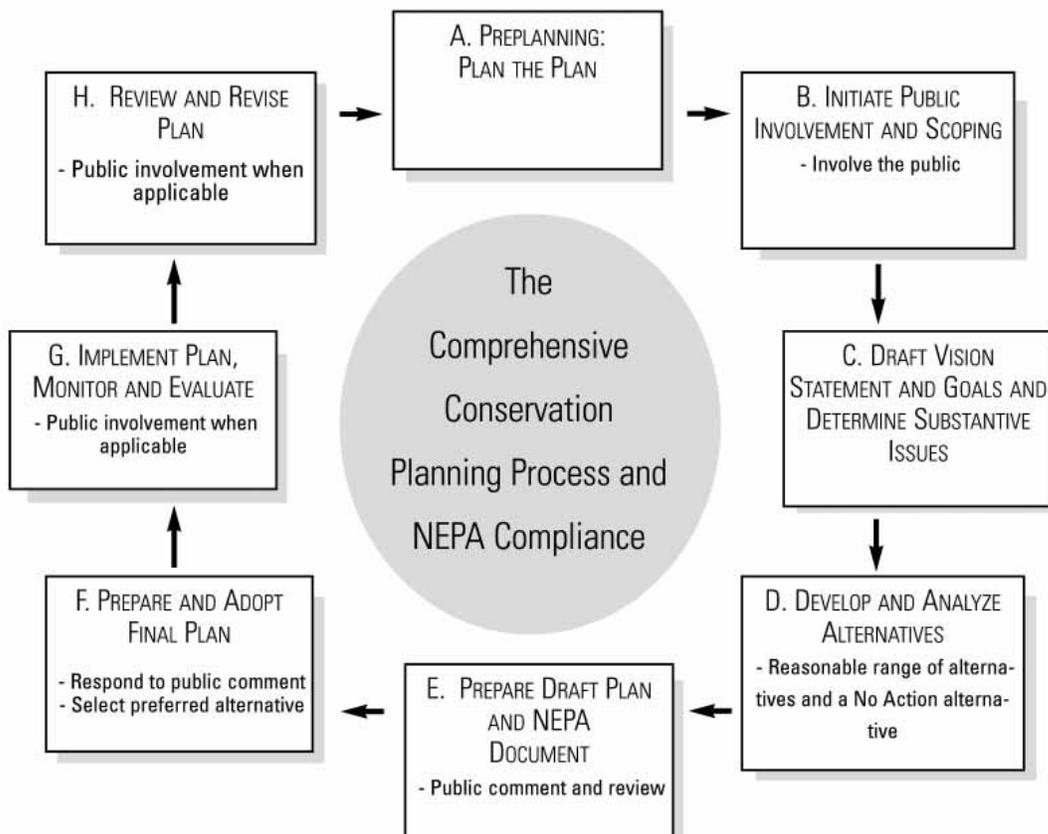
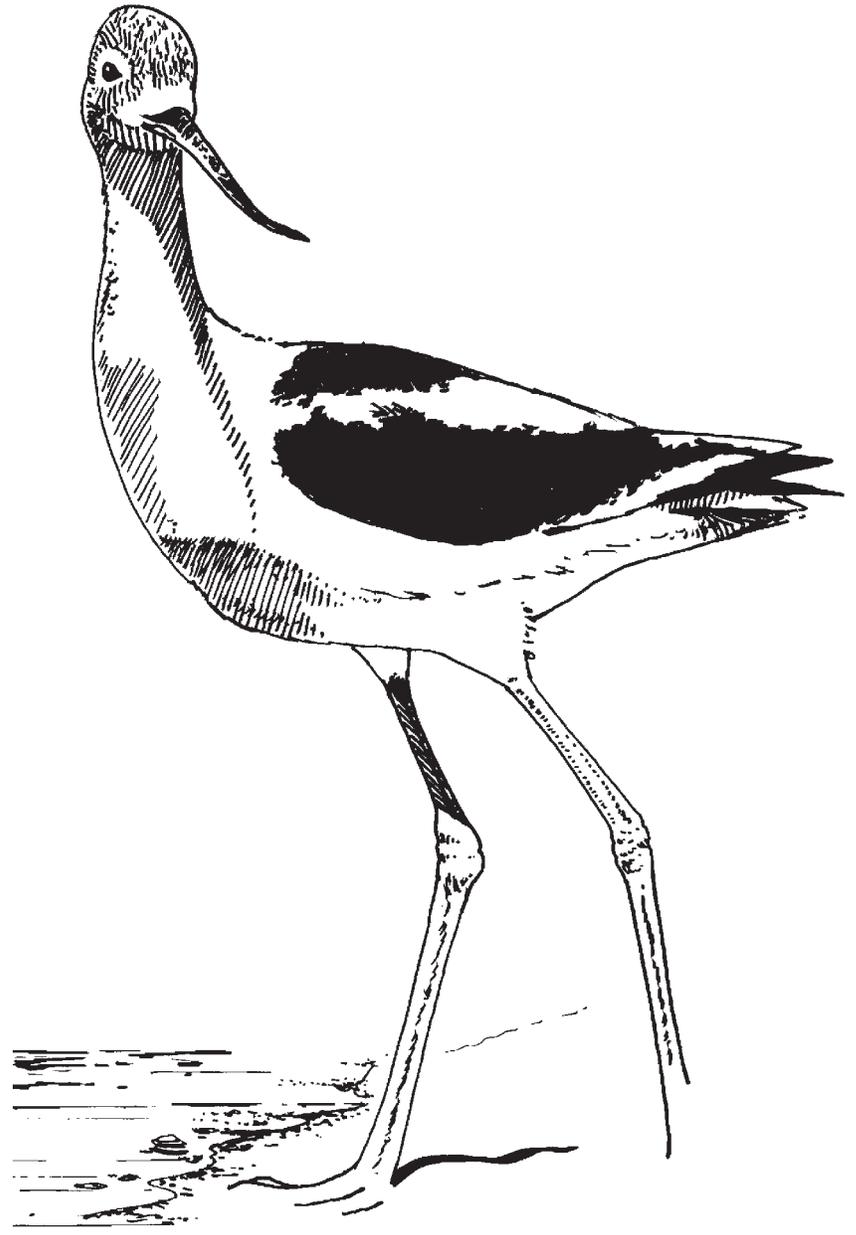


Figure 2. The steps in the CCP process

planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. This CCP does not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

The Service has made compatibility determinations for Lacreek NWR (appendix A).

2 Lacreek National Wildlife Refuge and Lacreek Wetland Management District Background



2 Lacreek National Wildlife Refuge and Lacreek Wetland Management District Background

Establishment, Acquisition, and Management History

Lacreek National Wildlife Refuge was established on August 26, 1935 by President Franklin D Roosevelt through Executive Order No. 7160:

“... as a refuge and breeding ground for migratory birds and other wildlife.”

The refuge lies in the Lake Creek Valley on the northern edge of the Nebraska Sandhills and includes 16,410 acres of native sandhills, sub-irrigated meadows, impounded fresh water marshes, tall- and mixed-grass prairie uplands, reseeded grasslands, and trees and shelterbelts (see figure 3, location map). The refuge serves as an important staging area for migrating Canada geese, other waterfowl, sandhill cranes, shorebirds, and Neotropical migrants. Providing critical migrational and wintering habitat for the high plains trumpeter swan flock is a primary goal. Unique habitats are provided in black-tailed prairie dog towns that support high numbers of burrowing owls and host ferruginous hawks, a species of concern. The refuge provides a variety of habitats for resident wildlife and supports concentrations of white-tailed and mule deer, sharp-tailed grouse,

and ring-necked pheasants during the fall and winter.

The majority of the refuge was acquired shortly after refuge establishment. Several inholdings within the approved refuge boundary were never acquired. The refuge will be interested in acquiring these inholdings, should a future opportunity arise to purchase from a willing landowner. At the time of establishment it was the only managed NWR west of the Missouri River in South Dakota. Today Lacreek is one of two refuges west of the Missouri River in South Dakota.

The WMD was started as part of the Small Wetlands Acquisition Program (SWAP) in the 1950s to save wetlands from various threats, particularly draining. The passage of Public Law 85-585 in August of 1958 amended the Migratory Bird Hunting and Conservation Stamp Act (Duck Stamp Act) of 1934, allowing for the acquisition of waterfowl production areas (WPAs) and easements for waterfowl management rights (easements).

The WMD contains eight perpetual easements totaling 3,443 acres. The easement restrictions vary; however, they generally prohibit wetland drainage, grassland conversion, development, and they require a special use permit for vegetative manipulation. The lands remain in private ownership. No fee title lands are currently owned



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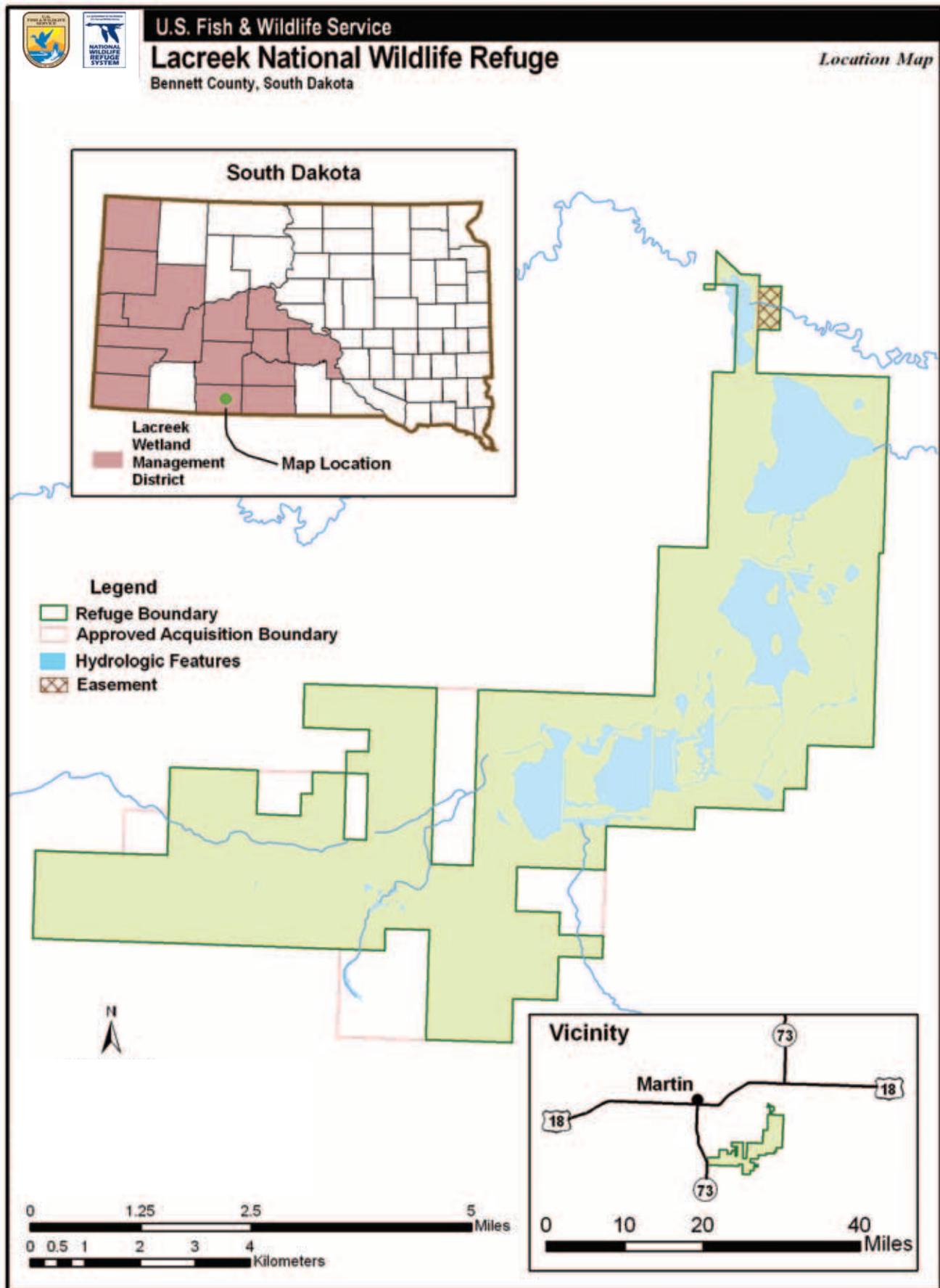


Figure 3. Location map

by the Service in the WMD. There is no active easement or fee title acquisition program in the WMD.

Refuge and Wetland Management District Purposes

The purposes for the refuges and wetland management district are as follows:

Executive Order, August 26, 1935 “...as a refuge and breeding ground for migratory birds and other wildlife...”

Migratory Bird Conservation Act “...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.”

The 223 acre Little White River Recreation Area was donated to and accepted by the Service on May 20, 1980 under the authority of the Refuge Recreation Act

Refuge Recreation Act (16 USC 460K-K4) “...for public recreation on...developments adjacent to conservation areas in existence.”

Lacreek Wetland Management District

Migratory Bird Hunting Stamp Act 16 U.S.C. 718(c) “...as Waterfowl Production Areas subject to all provisions of the Migratory Bird Conservation Act ...except the inviolate sanctuary provisions...”

Migratory Bird Conservation Act 16 U.S.C. 715d “...for any other management purposes, for migratory birds.”

Consolidated Farm and Rural Development Act 7 U.S.C. 1924 “... for conservation purposes.”

Vision and Goals

Vision

Lacreek National Wildlife Refuge’s wetland resources create a sanctuary within the semi-arid Great Plains landscape. The refuge provides a great diversity of uses for wildlife and humans alike. Refuge stewards manage hydrology to reflect natural conditions and restore native plant communities of the Lake Creek Valley and the adjacent sandhills for migratory birds and other native wildlife. Visitors learn about grasslands, wetlands, and sandhill ecosystems and enjoy wildlife-dependent recreation. Ongoing cooperation



Trumpeter Swans

Tom Koerner/USFWS

with partners and the public fosters appreciation and builds support for the refuge’s biological and cultural assets.

Goals

Goal 1. Wildlife and Habitat Management:

Conserve, restore, and enhance the native biological diversity of the Lake Creek Valley and Nebraska Sandhills for migratory birds and other wetland- and grassland-dependent species.

Goal 2. Research and Science:

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

Goal 3. Public Use:

Provide opportunities for quality wildlife-dependent recreation and promote awareness of the refuge’s resources and the mission of the System.

Goal 4. Cultural Resources:

Identify, value, and preserve the cultural resources and history of Lacreek NWR to connect refuge staff, visitors, and the community to the area’s past.

Goal 5. Refuge Operations:

Secure and demonstrate effective use of funding, staffing, and partnerships for the benefit of all resources in support of the System mission.

Goal 6. Partnerships:

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

Special Values

The planning team and public identified special values and qualities that make most of these refuges valuable for wildlife and the American people. The Lacreek NWR has the following attributes:

- The refuge lies at an intersection of different grassland types. Sandhills prairie, tall-grass prairie, and mixed-grass prairie can all be found here.
- Water in an otherwise arid landscape is a wildlife magnet. The presence of reliable springs with high quality water was the reason for establishment of the refuge and continues today.
- Many species of both eastern and western birds, small mammals, and other wildlife overlap ranges here. For example, both eastern and western meadowlarks can be found on the refuge.
- Lacreek NWR played a key role in the restoration of the High Plains Flock of trumpeter swans and continues to be one of the primary fall staging and wintering sites for this flock.
- Visitors can still find wide-open spaces that remain relatively undisturbed. Visitors may often feel as if they had the place to themselves.

Wildlife is abundant and highly visible because of habitat types and relatively low disturbance levels.

Planning Issues

This section describes issues regarding the refuge that were identified during public scoping.

Habitat Management

Lacreek NWR's primary purpose is to provide optimal habitat conditions for the needs of a suite of migratory and resident wildlife found on the refuge. To achieve goals and objectives set for the refuge's habitat, aggressive management must be completed. Nearly all uplands north of Lake Creek were previously farmed and the native vegetation lost. Many of the refuge's wetlands are located behind or below earthen dams that can be used to either create deep and stable water levels or to mimic natural wet and dry cycles. There is a gap between public perception of disturbance and

the understanding of how managed disturbance mimics natural disturbance and creates healthier ecosystems.

Black-tailed Prairie Dog Management

In July 1998, the National Wildlife Federation petitioned the Service to list the black-tailed prairie dog as threatened under the Endangered Species Act. In the fall of 1999, a moratorium of all black-tailed prairie dog control on Service lands was issued by the Regional Director. In February 2000, the Service concluded that this species warranted listing, but was precluded from being listed due to other higher priority species concerns and resource constraints. In August 2004, an updated evaluation of the best available scientific information led the Service to determine that the black-tailed prairie dog should be removed as a candidate for listing.

In March 2005, the South Dakota legislature passed Senate Bill 216. This measure sets forth conditions under which prairie dogs will be considered pests by the state. It also outlines a formalized complaint process by which private landowners may file complaints against adjacent landowners. If the adjacent private landowner does not comply with controlling a one mile buffer or mutually agreed to buffer, then the County Weed Board may be authorized to enter onto private lands to control prairie dogs and bill the landowner for that work. The state Department of Agriculture will attempt to negotiate control measures on federal and tribal lands where formal complaints are received from adjacent private landowners.

During this same 1999-2005 period, a severe drought hit western South Dakota. A cessation of all control activities on federal lands combined with the drought caused a rapid increase in



Prairie Dog

Tom Koerner/USFWS

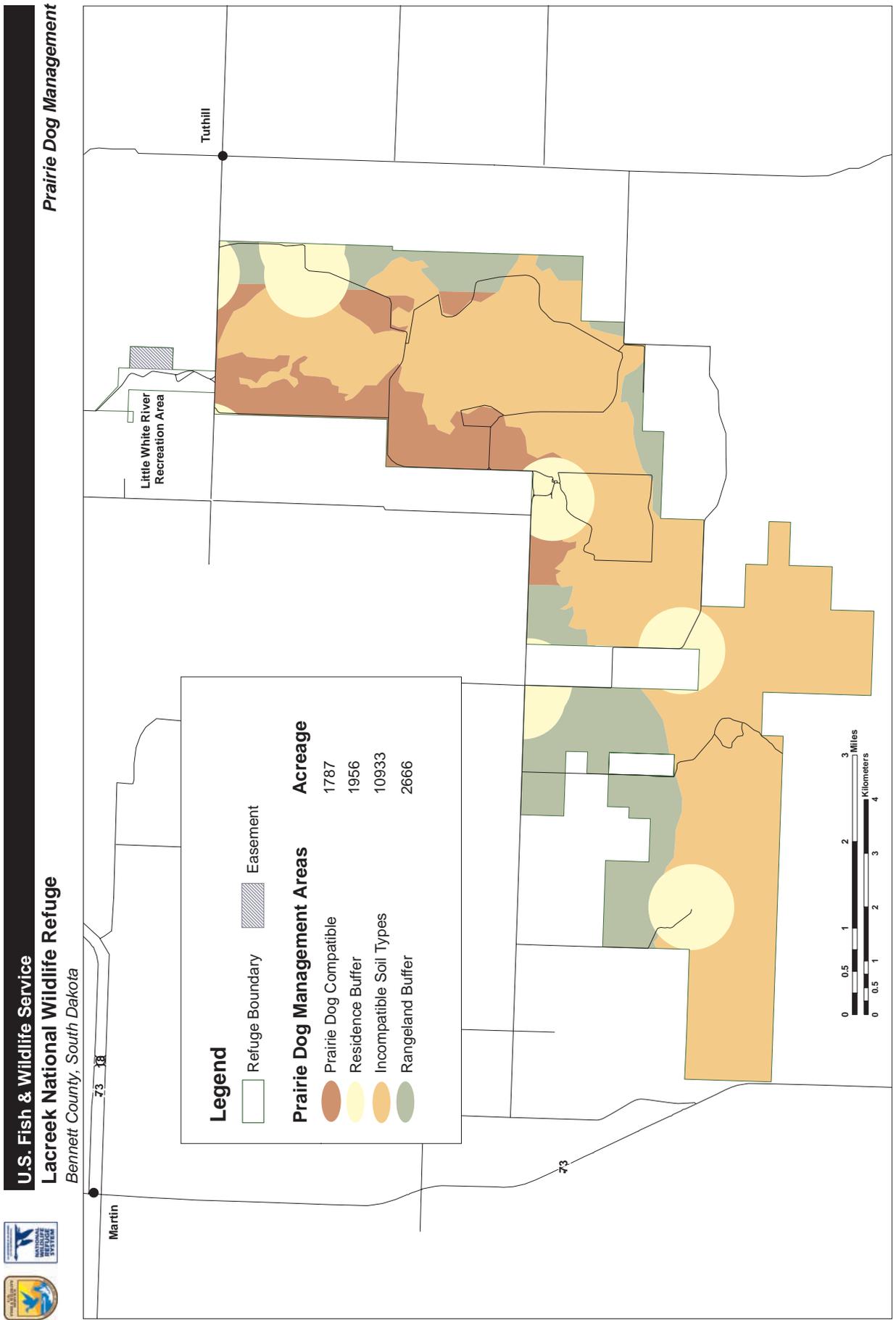


Figure 4. Prairie dog management

total acres occupied by black-tailed prairie dogs in southwestern South Dakota. The number of occupied acres on Lacreek NWR showed a similar trend, and increased an estimated 343 percent from 1997 to 2004. The number of individual prairie dog towns increased from three in 1997 to 10 in 2004.

Prairie restoration includes control of noxious weeds such as Canada thistle, and replacement of non-native planted species that tend to form single-species stands of vegetation (such as crested wheatgrass and smooth brome). Restoration is best accomplished by farming for 3 to 5 years, and then reseeding with a diverse seed mix including native grass collected locally, sedge, and forb seeds. Under current regulations prairie dogs cannot be disturbed by plowing. Therefore, this effective prairie restoration technique can no longer be used on the refuge.

Prairie dogs located on the refuge have expanded onto adjacent private lands where they are not wanted. Control on private lands has proven futile in these situations, as prairie dogs quickly re-occupy controlled sites. A step down black-tailed prairie dog management plan is in appendix E.

Noxious Weed Control

Noxious weeds, especially Canada thistle, have the ability to degrade wildlife habitat and to spread into adjacent private lands. This has been a significant issue on the refuge for many years. A large portion of the refuge's resources are directed at control of Canada thistle and other invasive species. Integrated pest management (IPM) strategies currently used include prescribed burning, grazing, mowing, herbicides, insects, interseeding, and farming in combination to provide control.

New invasive species—such as salt cedar or purple loosestrife—establishing on the refuge is a constant threat. Generally, an immediate control response to new invasive species is most effective in the long term.

Water Rights and the Use of Water for Wetland Management

Contested water rights on the Brown Ranch portion of the refuge have been a significant issue for the refuge during the last 20 years. During a coordinated resources management effort, the Service agreed to withdraw its application for diversion of water from Lake Creek to flood irrigate portions of the refuge north of Lake Creek. The CRM process was not successful in resolving water issues with refuge neighbors. Following a protracted hearing before the South Dakota Water Management Board, a water right was granted for

installation and maintenance of Diversion 4A for the primary purpose to act as a physical barrier for carp. Adjacent landowners and Bennett County officials involved in this dispute are concerned that the Service may attempt to reapply for this water right to divert water from Lake Creek.

Public Use

Hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation are all uses currently allowed on the refuge. Limited public lands available for public recreation in the area make this an issue of interest. There is demand for increased and improved recreational fishing opportunities on the refuge.

Little White River Recreation Area

The Little White River Recreation Area (LWRRA) was accepted as a donation in fee title under the Refuge Recreation Act. The recreational fishery and opportunities for swimming and boating are currently impaired by high sediment loads. Many local residents are interested in determining if improvements are possible.

A second issue concerning the LWRRA is the proposed Phase III Project. The proposed project includes excavation of a secondary emergency spillway, replacement of the primary emergency spillway, replacement of the outlet works, and raising the elevation of the dam by one foot. The operating level of the pool would not be increased due to the 1 foot of additional freeboard. Once completed, a probable maximum flood event would pass without overtopping the dam.

Species of Concern

Pelicans. Lacreek NWR hosts the largest nesting colony of American white pelicans in South Dakota. Lacreek's nesting colony has fluctuated from year to year, but has had continued use since the 1940s. Management of water levels in refuge pools, particularly Pool 9, could impact this nesting colony by allowing predators such as coyotes easier access to the islands. When Pool 9 is drawn down, a land bridge forms, allowing coyotes and other predators to walk to the islands. Emergent vegetation may also begin to grow around the islands with successive drawdowns, making the site less attractive to pelicans. During the 2005 nesting season, all adult pelicans abandoned the island and all young died. On several occasions, refuge visitors observed a coyote on the island that had swam from the shore. It is not known if a single coyote or numerous coyotes learned this behavior of swimming to the island. The abandonment and

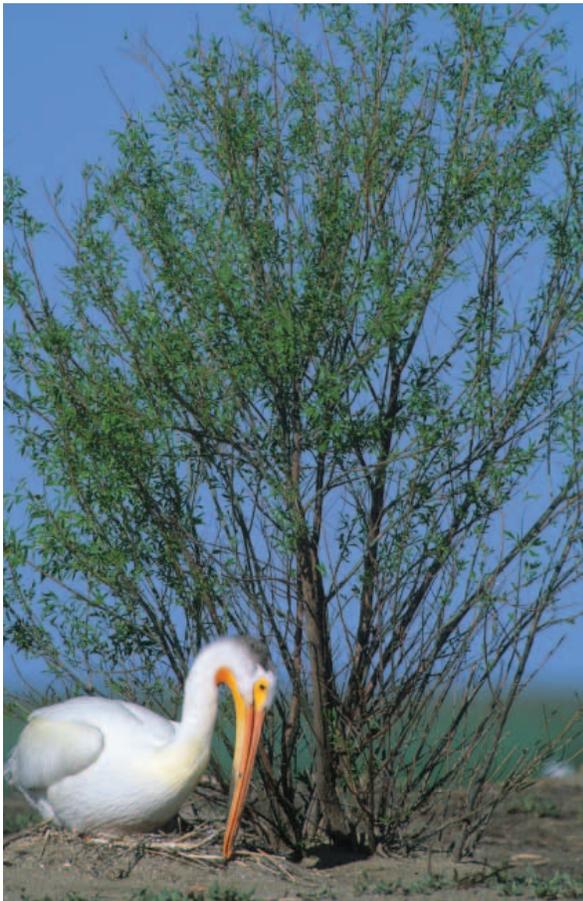
subsequent loss of all young pelicans has occurred at several other nesting colonies in recent years, and coyote predation was also speculated as a cause in these cases.

Swans. Lacreek NWR played a key role in the restoration of the High Plains Flock of trumpeter swans to the Central Flyway. Today, a significant portion of this flock returns to Lacreek each fall. The swans winter on spring-fed streams in the sandhills to the south. The refuge will continue to play a key role as a fall staging and wintering area.

Federally Listed Threatened and Endangered Species. The Biological Integrity, Diversity, and Environmental Health Policy (published January 16, 2001, effective April 16, 2001) (<http://policy.fws.gov/library/01fr3809.pdf>) guides System personnel in implementing the clause of the Improvement Act that directs the Secretary of the Interior to ensure that the Service maintain the “biological integrity, diversity, and environmental health” of the System. This policy further guides the Service to consider restoring lost or severely degraded components of the system “where appropriate and in concert with refuge purposes and the System mission.”

The Lacreek NWR staff reviewed all threatened and endangered species with historical ranges on or near the refuge to determine if additional actions could be taken to restore or enhance habitat for endangered species. Only the blowout penstemon (*Penstemon haydenii*) was determined to be appropriate for restoration actions.

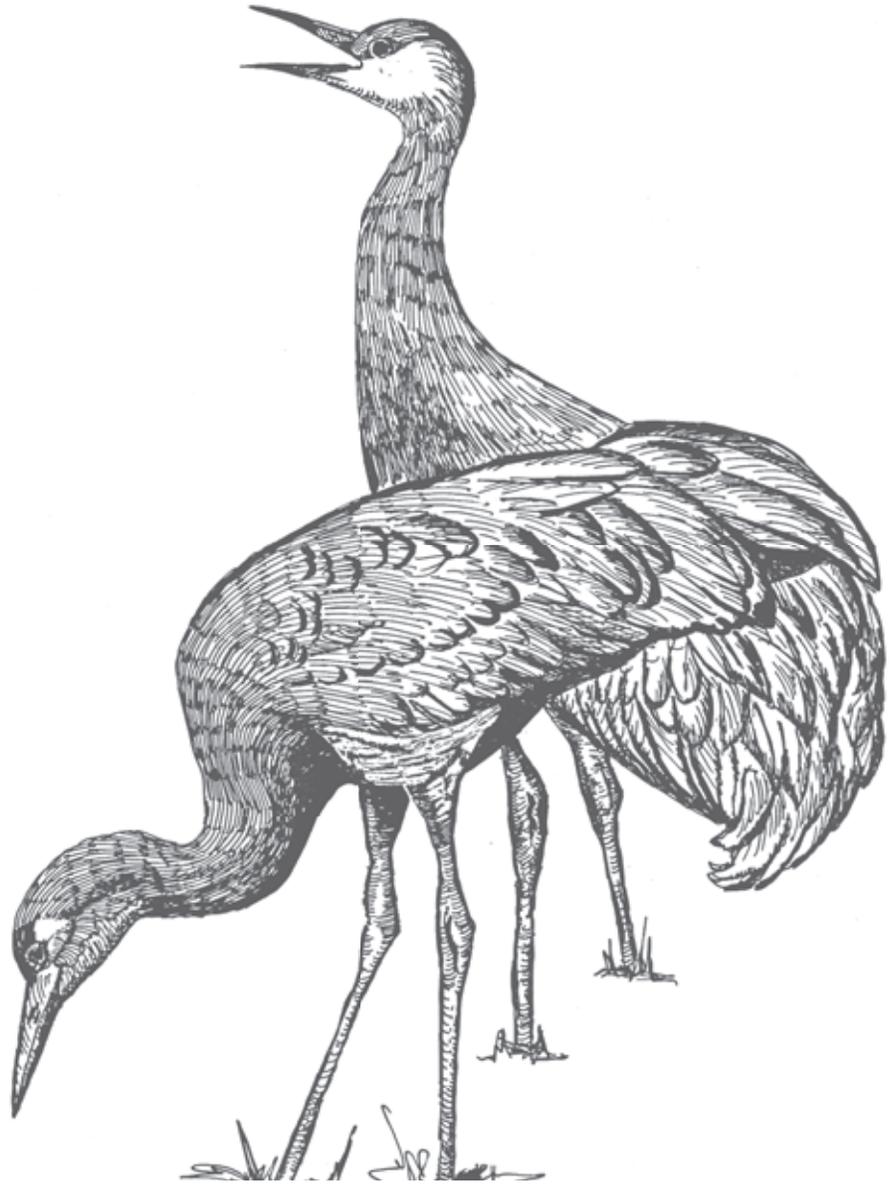
Predators. The predator community on Lacreek NWR is diverse, ranging from coyotes and short-tailed weasels to bald eagles and kestrels. This array of predators helps maintain the “biological integrity, diversity, and environmental health” of the refuge. Several species, including striped skunks and raccoons, are found at higher than historical levels due to modifications of habitat. These species can impact migratory bird populations and reduce the likelihood of reaching goals and objectives outlined for the refuge, primarily by depredating the nests of an array of grassland-nesting bird species.



American White Pelican

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3 Refuge Resources and Description



3 Refuge Resources and Description

Lacreek NWR is located about 12 miles southeast of Martin in Bennett County in southwestern South Dakota. The refuge lies in the shallow Lake Creek Valley on the northern edge of the Nebraska Sandhills and includes native sandhills, sub-irrigated meadows, impounded fresh water marshes, and tall- and mixed-prairie uplands. The refuge occurs in a region characterized by the transition between eastern and western plant and animal species. Wildlife on the refuge includes aquatic and marsh dwelling species, as well as species typical of the prairie. This chapter describes the refuge's environmental resources that may be affected by the implementation of the CCP.

The refuge is in a semi-arid area characterized by cold winters and hot summers. Temperature fluctuates both seasonally and daily. Summer temperatures climb above 100°F, while winter temperatures may drop to -30°F with wind chills as low as -60°F. Annual rainfall is 17 inches, of which 80 percent occurs from April to September. Average snowfall is 32 inches.

Geology and Soils

The geologic materials underlying the refuge consist of clays and silts of the Chadron Formation and siltstones and sandstones of the Brule Formation, deposited during the Lower Tertiary

and overlain with materials of the Arikaree and Ogallala Formations deposited during the Upper Tertiary (Whitehead 1996). The materials of the Arikaree and Ogallala Formations were deposited primarily by streams, but the presence of volcanic ash indicates that some material was deposited as the result of wind (Perisho 1912).

The sandhills were of late Pleistocene age and were formed by wind-deposited sands. The surface on which the sand dunes were formed rises nearly 2,000 feet over the 250-mile east-west extension of the sandhills.

Three major soil associations are present on the refuge. The Valentine Association is an extension of the Nebraska Sandhills, and consists of hills with ridges ranging from 29 to 75 feet high. This association is made up of excessively drained, deep sandy soils. These soils are very permeable; a large percentage of runoff percolates into the groundwater. These soils also are very erosive, causing large "blowouts" to form when vegetation and its soil binding root systems are removed.

The Keith-Rosebud Association is an area of nearly level to gently sloping tablelands and consists of well drained, deep silty soils. These soils are suitable for farming, and the majority of these soils were farmed prior to establishment of the refuge.

The Mosher-Minature Loup Association is found on bottoms, terraces, upland valley bottoms, and basins that have a fluctuating water table. These



Soil Erosion

Tom Koerner/USFWS



Tom Koerner/USFWS

Wetland

associations consist of nearly level, somewhat poorly drained, deep loamy soils and saline soils with a clay pan. The shallow water table supports vegetation more typical of tall-grass prairie. In areas of saline soils with a claypan, saltgrass and foxtail barley are the predominant vegetation.

Water Resources

Surface Water

Several spring-fed creeks emerge from the Nebraska Sandhills and provide a constant supply of clear water for the refuge. Lake Creek is the major spring-fed stream after which the refuge is named (see figure 5, habitat map). Average stream flows on Lake Creek range from a low of 9.2 cfs in 1981 to a high of 41.2 cfs in 1997. The long-term average is about 20 cfs. A series of dikes with control structures impound these waters and create 5,400 acres of wetlands in 13 water management units.

Groundwater

The majority of deep groundwater in Bennett County occurs in geologic materials of Oligocene, Miocene, and Holocene/Pleistocene age; however, some aquifers also exist at greater depths in Cretaceous and Paleozoic materials (Whitehead 1996). Some domestic wells exist in the deeper aquifers, but there has been little development of deep groundwater for irrigation in the vicinity of the refuge.

Groundwater is also present in the alluvial aquifer associated with Lake Creek, and in the sandhills to the south of the refuge. The sandhills act like a huge sponge, soaking up the limited amount of precipitation that falls and slowly releasing it back to surface water features. The sandhills are largely

responsible for maintaining Lake Creek as a perennial stream. The alluvial aquifer is expressed by the springs, small wetlands, and wet meadows near Lake Creek and Cedar Creek. This aquifer is critical to the maintenance of subirrigation on the refuge and surrounding properties. This subirrigated area has historically been the most productive area for grass hay.

Wetlands

Wetlands on Lacreek NWR occur primarily within the floodplain of Lake Creek. Given that the majority of groundwater at Lacreek NWR in this area discharges by movement to lakes and streams, leakage to shallower aquifers, and to springs (Whitehead 1996), surface hydrology of wetlands on the NWR is influenced by a combination of surface water and groundwater inputs. Several small, spring-fed creeks and major creeks (i.e., Lake Creek, Cedar Creek, Elm Creek) contributing water to the NWR exhibit perennial flows even though evaporation far exceeds precipitation annually. Data from the USGS gauging station on Lake Creek above the refuge indicate daily flows exceeded 20 cfs and 10 cfs about 50 percent and 95 percent of days, respectively, during the periods 1963-1979 and 1997-2003. Further, groundwater discharge from aquifers has been documented as contributing more than 50 percent of flows in the Little White River and Minnechaduzza Creek, which are in relatively close proximity to the refuge (Carter 1998). This suggests that the influence of groundwater on the surface hydrology of wetlands on the NWR may be substantial, particularly during the late spring and summer when evapotranspiration rates are greatest.

Water Rights

The following section is a summary of water rights associated with the refuge:

- U.S. Water Right 2-2, priority date October 16, 1934, for all unappropriated waters of Lacreek (Lake Creek) and tributaries in Bennett County to be used on the refuge by means of dams 7, 8, 9, and 10. A maximum amount of 23,710 acre-feet (11,008 acre-feet of storage and 12,702 acre-feet of seasonal use) of water use is permitted.
- U.S. Water Right 3-2, priority date December 13, 1935, authorizes storage of water in the LWRRA reservoir and the diversion of water from the Little White River to Pools 9 and 10. U.S. 3-2 was supplemented with the purchase of water license 253-2, priority date May 27, 1940, for all of the unappropriated waters of

the Little White River from its confluence with Lake Creek to the Town of White River. A maximum of 1,827 acre-feet of storage with 843 acre-feet of seasonal use is authorized for use in supplementing Pools 9 and 10.

- Water Right 2147-2 to appropriate and impound up to 167.5 acre-feet in the DU sub-impoundment in Pool 9 with a priority date of November 1, 1990.
- Water Right 2192-2, priority 1991, authorizes 1444.7 acre-feet with 4.44 cfs from six springs originating along the edge of the sandhills to create 235 acres of marshes, sloughs and wet meadows for waterfowl propagation and enhancement of wildlife habitat.
- Water Right 1921-2, priority May 20, 1933 for 4.45 cfs from Cedar Creek to be stored in a dam on Cedar Creek with a capacity of 30 acre-feet, and to irrigate 362 acres.
- South Dakota Reissued Water Permit 2300-2 authorizes reconstruction and maintenance of a control structure to impound 0.75 acre-feet of water to prevent carp from traveling upstream of the structure, in order to protect the state-listed threatened pearl dace. This permit has a priority date of February 1, 1994.

Vegetation Communities

Wetlands and Associated Vegetative Communities

Wetlands on the refuge (see figure 5) are managed to provide both resting cover and food resources for migratory birds. Flows from springs through the winter months keep portions of some units open and provide resting and feeding sites for trumpeter swans, Canada geese, mallards, and a small number of other migratory bird species. Throughout the rest of the year, wetlands serve as production and maintenance habitat for waterfowl, other migratory birds, and resident wildlife.

Substantial emergent and submergent vegetation occurs in wetlands at the refuge. Sago pondweed, coontail, and duckweed occur in the deeper, more permanently flooded zones, while cattail, bulrush, wild rice, burreed, and arrowhead grow in more shallowly flooded areas that may go dry due to a drawdown. The perimeter of these units may be dominated by smartweed, barnyard grass, Canada bluejoint, prairie cordgrass, sedges, rushes, wild mint, and dock that can tolerate shorter periods of surface flooding and saturated soils.

The management of wetlands on the refuge attempts to simulate historical wet/dry cycles by raising and lowering water levels to meet specific management objectives. Desirable emergent and submergent vegetation establishment and growth is encouraged, invertebrate substrate is increased, water clarity can be improved, accumulated nutrients in bottom sediments are broken down and cycled, and some measure of carp control is achieved. Extensive mudflats are created when wetlands are in the initial drawdown phase and create optimal feeding opportunities for migrating shorebirds, wading birds, and other Neotropical species.

Wet Meadows and Associated Vegetative Communities

Wet, subirrigated meadows make up about 13 percent of the acres on the refuge and occur notably between the Nebraska Sandhills to the south and the drier, uplands to the north (see figure 5, habitat map). These meadows are nearly flat, have saturated soils near the surface for most of the growing season, and frequently pond water for short periods after rainfall events. Much of the western portion of the refuge falls into the wet-meadow category. These wet meadows contain a full complement of native grasses and forbs. Species found in this community include Nuttall's sunflower, blue vervain, goldenrod, wild licorice, swamp milkweed, wild mint, spotted joe-pye weed, and black-eyed susan.

Uplands and Associated Vegetative Communities

There are 10,350 acres of grasslands at Lacreek that consist of sandhills, meadows, and uplands (see



Nuttall's Sunflower

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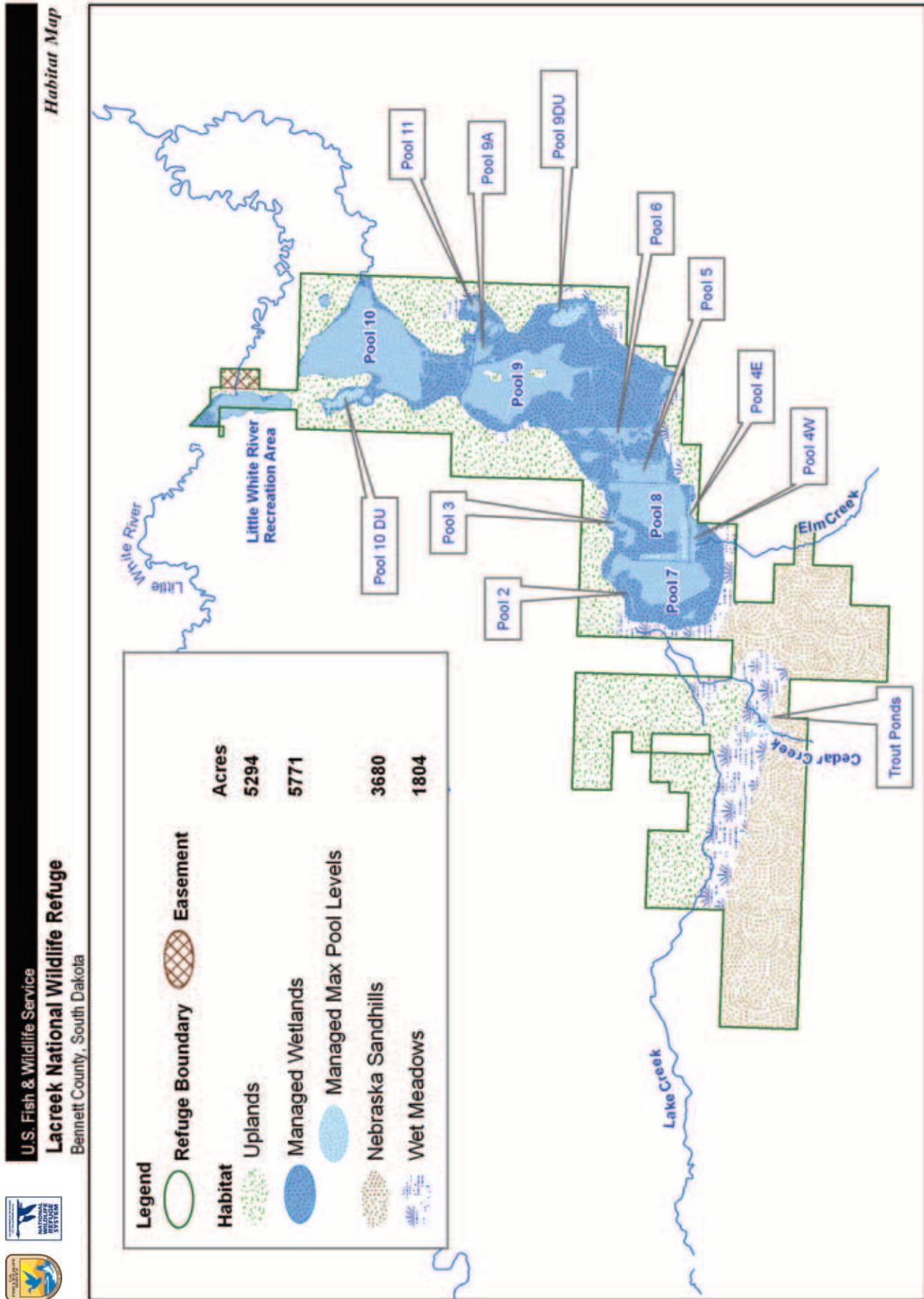


Figure 5. Habitat map

figure 5, habitat map). Approximately 4,900 acres of native grasses are within the refuge, of which 3,726 acres are in the Nebraska Sandhills. Big bluestem, little bluestem, sand bluestem, prairie sandreed, switchgrass, Indian grass, Canada wildrye, June grass, sand dropseed, needle-and-thread grass, western wheatgrass, and salt grass have all been noted on refuge grassland transects.

The sandhills portion of the refuge contains a diverse component of grass and forb species generally not found anywhere else on the refuge. Although not found on the refuge, today it is believed that blowout penstemon may have extended at one time to the edge of the sandhills, including the area of Lacreek NWR. Several small “blowouts” or areas of active sand movement can be found and may be suitable habitat.

During the 1930s, large fields formerly planted to crops were plowed to form ridges, and planted with non-native grasses including smooth brome, crested wheatgrass, and Kentucky bluegrass species to minimize soil erosion. Today, the refuge contains approximately 5,450 acres of uplands dominated by these non-native species. Extensive areas of crested wheatgrass and smooth brome remain on the refuge.

In the early 1970s, habitat management techniques were developed to provide dense nesting cover for waterfowl. Several areas on the refuge were planted to grass species such as smooth brome and alfalfa. These fields initially provided good cover for nesting birds; however, over time they deteriorated and were prone to invasion by Canada thistle and other noxious weeds. The refuge plans to restore these grasslands, along with the crested wheat grass fields, to native grasses and forbs. The native grass restoration process generally involves cropping the field for 3 or more years to eliminate exotic cool-season grass seeds and rhizomes, control Canada thistle and other noxious weeds, and prepare a seed bed for planting native seed. Since 1997, the refuge has restored or is in the process of restoring approximately 670 acres to native grasses. Approximately 350 acres were planted to native grasses in 2000 and 2001 alone. Starting in 2004, refuge staff began to harvest seed from the refuge and other local sites. Over 120 species of native grass, forb, sedge, and rush species have been harvested to be used for restoration. Future plantings will utilize over 100 species of locally collected seed.

Upland vegetation is maintained to provide nesting habitat for migratory and resident bird species. Upland habitats also provide necessary habitat requirements for resident wildlife throughout the year. A variety of management techniques have been implemented to maintain and enhance upland habitat conditions on the refuge including the use

of prescribed fire, grazing, haying, native prairie restoration, and invasive species management.

Shrub and Tree Plantings (Shelterbelts)

The refuge has less than 70 acres of shrubs and trees. Some refuge dikes are lined with American plum, chokecherry, peachleaf willow, sandbar willow, and eastern cottonwood. In order to maintain dikes, and provide secure fire lines for prescribed burning, most of the peachleaf willows will be removed from the dikes. American plum, chokecherry, and sandbar willow provide habitat for species such as Bell’s vireos and willow flycatchers. Large mature cottonwoods will be maintained to provide perch sites for bald eagles and other raptors. The refuge has several mature shelterbelts composed of green ash, American elm, honey locust, hackberry, ponderosa pine, eastern redcedar, and Russian olive. Many of the shelterbelts are near refuge housing, headquarters, and other buildings and provide protection from the wind.

Wildlife

Mammals

A total of 39 species of mammals have been recorded on the refuge. Representative species include coyote, cottontail rabbit, deer mice, shrew, meadow vole, weasel, ground squirrel, prairie dog, badger, mink, beaver, muskrat, skunk, raccoon, white-tailed deer, mule deer, and pronghorn.

Black-tailed Prairie Dogs

It is unknown to what extent prairie dogs historically occurred on the refuge. Prairie dog control programs were enacted prior to refuge establishment and during the early years of the refuge. It is likely, however, that prairie dogs were present north of the sandhills and Lake Creek. Most of these soils were farmed prior to refuge establishment and were seeded to crested wheatgrass and smooth brome. These shallow-rooted introduced grasses are more prone to drought stress than native mixed-grass prairie. The resulting short vegetation allows for rapid expansion of black-tailed prairie dogs during droughts.

Eleven prairie dog towns totaling 502 acres are currently located within the refuge and are found primarily in the uplands north of Lake Creek (see the Draft Black-tailed Prairie Dog Management Plan in appendix E).

Reptiles and Amphibians

Formal and informal surveys and observations on the refuge have noted tiger salamanders, Woodhouse's toad, western chorus frog, leopard frog, bullfrog, and plains spadefoot toad. Turtles include common snapping turtle, western painted turtle, and box turtle. Four species of lizard have been observed: northern earless lizard, northern prairie lizard, many-lined skink, and the prairie racerunner. Snakes include the eastern yellow-bellied racer, western hognose snake, bull snake, plains garter snake, red-sided garter snake, and prairie rattlesnake.

Birds

Over 281 species of birds have been recorded at Lacreek NWR since 1959. The majority of passerines and other birds common to the plains states are found on the refuge at some time during the year. Twenty-four species of waterfowl are commonly observed. During spring and fall migrations, waterfowl numbers have peaked at 29,000 ducks and 37,000 geese in recent years. Refuge files indicate that as many as 80,000 ducks have staged on the refuge during migration. Approximately 150 to 200 trumpeter swans typically winter at Lacreek. The largest nesting colony of American white pelicans in South Dakota is found on the refuge. Nine species of cormorant, herons, egrets, bittern, and ibis use the refuge for migration and/or nesting. Secretive species such as American bitterns are commonly observed. Golden eagles, bald eagles, red-tailed hawks, Swainson's hawks, northern harrier, American kestrel, great horned owls, burrowing owls, and short-eared owls are some of the more common species of raptors seen on the refuge. Twenty-one species of shorebirds use the refuge from spring through fall, some staying to nest. Regionally rare species such as long-billed curlews and marbled godwits are commonly observed. A number of songbirds migrate through or nest on the refuge. Declining species, such as grasshopper sparrows, bobolinks, eastern meadowlarks, and dickcissels, are commonly observed in refuge grasslands.

Trumpeter Swans

Trumpeter swans were introduced on the refuge from Red Rock Lakes NWR between 1960 to 1962. These original birds established the High Plains Flock, which now nest primarily on sandhill lakes to the south of the refuge. An estimated 400 birds make up this flock, with as many as 268 returning to Lacreek NWR during the fall and winter. The trumpeter swans also rely heavily on spring-fed creeks in the sandhills for winter habitat. A portion of this flock migrates north to Greenwater Lake



Snapping Turtle

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Red-headed Woodpecker

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Provincial Park in Saskatchewan, Canada to nest and returns to Lacreek NWR to winter.

Lacreek NWR has not had a successful nesting attempt for over 5 years. Habitat has decreased, but with wetland management efforts, habitat is increased and there may be nesting in the future.

American White Pelicans

American white pelicans began nesting on two islands in Pool 9 shortly after construction. This nesting colony has become one of the largest in South Dakota. A nesting site relatively free from predators, little human disturbance, and abundant food resources both on the refuge and lakes and ponds within flying distance are believed to make this site attractive to nesting pelicans. Although nesting requirements were met previously, predators have become a problem in recent years

Fish

Fish species including northern pike, saugeye, large-mouth bass, black crappie, perch, bluegill, pumpkinseed, bullhead, carp and a variety of

minnows including the state threatened pearl dace and red-belly dace are all found in refuge waters. Rainbow trout are stocked in spring-fed ponds in the sandhills portion of the refuge. Great blue herons, American white pelicans, double-crested cormorants, American bitterns, and western, pied billed, eared, and horned grebes forage for fish in the refuge waters. Selected pools (Pools 3, 4, 7, 10, the trout ponds, and the LWRRA) are open to public fishing.

Threatened and Endangered Species

Table 2 from the South Dakota Natural Heritage Program documents federal and state listed endangered and threatened species found at Lacreek NWR.

Cultural Resources

Prehistoric Resources

Although the number of cultural resources investigations in and around Lacreek NWR have been few, a major discovery was made in 2000 of a large bison bone and stone artifact site located in Pool 8. The site was called the Sierra-Kai site. Mapped and recorded by Service archaeologists in August 2000 during a drawdown of the reservoir, over 1,500 bison bones and numerous stone artifacts were documented. It appears that

the site may have been used to process bison carcasses. A Late Plains period (1500 A.D. to 1800 A.D.) projectile point was recovered with other stone tools. The site covered nearly 20 acres and extended to the northeast. Other indications of prehistoric Native American activity within the boundaries of Lacreek NWR include stone artifact finds near Pool 9 by a Service archaeologist. These sites indicate the potential for other prehistoric sites, usually covered by the waters and vegetation of the reservoirs, to exist along the old creek bed and floodplain dammed in the 1930s to create the reservoirs. It is now known that the Sand Hills and the Badlands areas of Nebraska and South Dakota have evidence of various periods of Native American occupation, possibly going back several thousand years. It is also known from historic records, that the Lacreek NWR area was frequently visited by various tribes during the 18th and 19th centuries; including the Lakota, Cheyenne, Arapahoe and Pawnee, to name a few. Although no prehistoric sites have been determined eligible for nomination to the National Register of Historic Places, future discoveries may change that situation.

Historic Resources

The refuge's early twentieth century history is closely tied to the Civilian Conservation Corps (CCC) and Works Progress Administration (WPA). Young men enrolled in the CCC in the mid- to late 1930s completed much of the dike-construction and

Table 1. 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.



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Red-winged Blackbird

infrastructure work at the refuge. CCC Company #4723 started work at the refuge in spring 1937 and completed its work in fall 1939. The WPA worked at the refuge from 1937 to 1941. Young men working under the WPA planted thousands of trees and shrubs on the refuge. Both the CCC and WPA were involved in building trails, dikes and landscaping.

The refuge buildings were constructed in 1936 and included a service garage and office, small cabin residence, equipment shed, lookout tower, and barn. All these buildings are still present at the refuge except for the equipment shed. The service garage, barn, and lookout tower were determined to be eligible for the National Register of Historic Places (Register) in 1999, but none of these structures has been formally listed on the Register.

The WPA constructed a picnic shelter at LWRRA in 1940-1941. The original fabric of the picnic shelter has been rebuilt over the years and it was determined to be ineligible for the Register in 2000.

Special Management Areas

Wilderness Review

Lacreek NWR meets the size, scenic, and ecological value criteria for wilderness; however, the refuge has been modified by roads, fences, grazing, agriculture, and wetland drainage. These alternations prevent designation as a wilderness area. To be designated a wilderness area; lands must meet certain criteria as outlined in the Wilderness Act of 1964:

- Generally appears to have been affected primarily by the forces of nature, with the imprint of human work substantially unnoticeable;

- Has at least 5,000 acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and
- May also contain ecological, geological, or other features of scientific, educational, scenic or historical value.

Little White River Recreation Area

The LWRRA is a special management area on the refuge. The land was accepted as a donation in fee title under the Refuge Recreation Act. Historically, it has been a place that surrounding community members have used for recreational purposes. Within the deed, there are provisions for activities not normally found on a wildlife refuge. In this area of the refuge there are opportunities for recreational hunting, fishing, swimming, boating, and camping.

Visitor Services

The refuge offers a variety of recreational opportunities to local residents and other visitors centered on the wildlife resources. Opportunities on the refuge include wildlife-dependent and wildlife compatible uses legislated by Congress and outlined in the National Wildlife Refuge System Improvement Act of 1997. These uses include hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation.

The refuge is open to hunting for white-tailed and mule deer, ring-necked pheasant, and sharp-tailed grouse. A number of select pools are open for fishing throughout the year. The refuge is a popular destination for viewing migrations of waterfowl, shorebirds, and Neotropical birds. Popular wildlife watching opportunities on the refuge include trumpeter swans, American white pelicans, burrowing owls, and black-tailed prairie dogs. Interpretive displays and brochures are available at refuge headquarters. An auto tour route and nature trails provide opportunities for viewing and photographing wildlife. The LWRRA has facilities for boating, fishing, swimming, and camping.

Fishing

Fishing is permitted year-round on Pools 3, 4, 7, 10, trout ponds, and the LWRRA. Warm water species such as northern pike, channel catfish, and large mouth bass are the species most desired by anglers on the LWRRA. The trout ponds are spring-fed and remain cold enough to support rainbow trout. The refuge coordinates with the South Dakota

Department of Game, Fish and Parks to manage the recreational fishery; the state stocks game fish.

Hunting

A portion of the refuge is open to pheasant and sharp-tailed grouse hunting. The refuge also provides bow and muzzle loading hunting for deer. Special regulations apply to all hunting activities.

Environmental Education and Interpretation

Refuge staff provides educational talks and tours for schools and other groups upon request. Exhibits, educational videos, and informational brochures are available in the visitor center. Informational brochures and refuge maps are also available at two information kiosks located on the refuge.

Wildlife Observation

The refuge provides outstanding opportunities for viewing wildlife. The abundance and variety of wildlife species combined with relatively low visitation provides many opportunities to view wildlife close up. The refuge offers a 4-mile, self-guided auto tour loop, starting at the refuge headquarters and winding around several large wetlands. Waterfowl, shorebirds, wading birds, and raptors are common along the auto tour loop, as are deer, muskrats, and snapping and painted turtles. Trumpeter swans and large concentrations of ducks and geese begin to arrive in October. Numbers generally peak in November. From November through March, trumpeter swans are easily spotted from the auto tour route. Auto tour guides are available at the visitor center and provide interpretive information along the route.

The Bird Walk Trail (0.2 mile) originates at refuge headquarters and takes visitors around a wooded thicket. The Pelican Islands Trail (0.2 mile) provides visitors with a rare opportunity to view American white pelicans nesting on two islands. During late April and early May, visitors can see up to 1,500 pelican, double-crested cormorant, black crowned night herons, and great blue heron nests located on these islands. Black-tailed prairie dogs, and, at times, burrowing owls, are easily viewed in the large prairie dog towns north of the refuge.

Fire and Grazing History

Historically, grasslands in the northern Great Plains co-evolved with various disturbance regimes such as fire and large-scale grazing. Whether

lightning induced or deliberately set by Native Americans, fire has influenced the composition of the plant community at the refuge. A handful of fire-tolerant shrubs such as chokecherry, American plum, and leadplant were present, while other woody species killed by fire were restricted to areas that were protected from fire. The plant community was dominated by a number of species of grasses with many species of forbs dotting the landscape.

It is believed that the historical fire frequency for the mixed grass prairie was 5 to 7 years. Little information is available on the occurrence of wildfire during the early years of the refuge. More recently, the refuge has had up to three wildfires a year. Potential exists for fairly large wildfires to occur; however, this has generally not been the case.

Local fire departments and area ranchers aggressively suppress wildfire. It is also refuge policy to control all wildfires occurring on the refuge.

Refuge staff now uses prescribed fire to simulate the historical influence wildfire had on the plant communities (see appendix F). Most prescribed fires are generally ignited during late winter through greenup in spring. This time of year presents opportunities to complete prescribed burns when temperatures are lower, humidity is higher, and the fire may be more easily controlled. This time frame also coincides with other refuge activities such as wetland management. Wetlands can be drawn down in late winter and prescribed burned, and then be re-flooded to provide spring migratory habitat. Historically, wildfires likely also would have occurred during the summer and fall. Prescribed fire was infrequently used as a management tool for most of the refuge's history. During the last 10 years, prescribed fire has been increasingly used, and refuge staff now completes five to ten prescribed burns each year, covering 1,500 to 3,000 acres.

Similar to fire, grazing greatly influences the structure and composition of grassland



Mule Deer

Tom Koerner/USFWS

communities. Herbivores such as bison, elk, deer, pronghorn, and black-tailed prairie dog interact with soils, plants, other animals, and other processes to produce unique successional patterns in the landscape at multiple scales.

Most plant species have developed growing points located at or near the ground surface, which allows the plant to be clipped off without killing it. Some contain bitter or toxic substances that cause animals to avoid grazing on them, and some species have spines to cause injury to grazing animal's mouths.

Historically, Lake Creek and other springs on the refuge were some of the only local water sources available. It is likely that herds of bison spent a considerable amount of time here. Their grazing, trampling, trailing, and related activities likely had a significant impact on the development and maintenance of the plant communities.

Bison and elk are no longer present on the refuge. Instead, refuge staff works with local ranchers to mimic natural disturbances due to grazing. Grazing is generally conducted during the spring and early summer, and again in the fall in upland habitats, to stress exotic cool season grasses and favor native warm season grasses and forbs. Wetland and wet meadow grazing may occur for much of the growing season to stress and physically injure aggressive wetland species such as cattails and favor species that provide more seed production, open habitats, and competition to Canada thistle.

Wetland grazing reduces accumulations of organic litter at the surface. A large amount of organic litter often favors invasive species such as Canada thistle. Grazing can also be used as part of an IPM



Tom Koerner/USFWS

Cottontail

program. Refuge staff has found that cattle will actively graze Canada thistle early in the growing season. Follow-up treatments also tend to be easier to complete and more effective after grazing.

Socioeconomics

Population and Demographics

The population in Bennett County grew 11.5 percent from 1990 to 2000. The population estimate for the county in 2004 was 3,522, a 1.5 percent decline from 2000 (U.S. Census Bureau 2005). Martin, the county seat, had a population of 1,106 in 2000.

Farming and livestock ranching are the main agricultural enterprises. About 96 percent of the county land is in farms or ranches. Major crops are winter wheat, alfalfa, hay, proso, sorghum millet, and sunflowers. During wet years, some dry land corn and soybeans are also planted. Movement of grain, livestock, and freight is by truck lines and farm-owned trucks; there is no rail line in the county.

The racial makeup of the county is 40.91 percent White, 0.28 percent African American; 52.07 percent Native American, 0.06 percent Asian, 0.14 percent Pacific Islander, 0.17 percent from other races and 6.38 percent from two or more races (www.en.wikipedia.org/southdakota).

Employment and Income

In 2001, Bennett county had 71 private non-farm employment establishments with paid employees, compared to a total of 24,032 in the state of South Dakota overall. Agriculture is the major employer in the county. A variety of businesses exist in Martin, including health services, education, retail sales, and support services. The median per capita income is \$10,106 (1999) compared with the state which was \$17,562. 39.2 percent of the population was living below the poverty line, compared with the state at 13.2 percent (U.S. Census Bureau QuickFacts 2002).

Air Quality

The National Ambient Air Quality Standards include maximum allowable pollution levels for particulate matter, ozone, sulfur dioxide, nitrogen dioxide, lead, and carbon dioxide. Particulate matter is a measure of tiny liquid or solid particles in the air that is respirable in the lungs.

Air Quality in the area of the refuge is considered good, with no nearby manufacturing sites or major air pollution sources. Carbon from automobiles and diesel engines, prescribed fire activities on the refuge, and dust associated with wind-blown sand and dirt from roadways and fields contribute to particulate matter.

4 Management Direction



4 Management Direction

Introduction

Management Summary

Through integrated restoration, the refuge will strive to restore ecological processes where appropriate and achieve habitat conditions that require reduced management over time. This will 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 will be a priority. Current levels of priority public uses and activities will increase (figure 6).

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

Management Direction

The objectives and strategies below describe how management of the refuge will 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.



American Avocet

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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.

Objectives:

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.

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.

Table 2. 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 Shcmutz 1999; Helzer and Jelinski 1999; Dugger and Dugger 2002; Laubhan et al. 2005.

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 will 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 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



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Burrowing Owls

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.

Objectives:

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 IPM techniques (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.

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.

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.



Sandhill Crane

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Objectives

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.

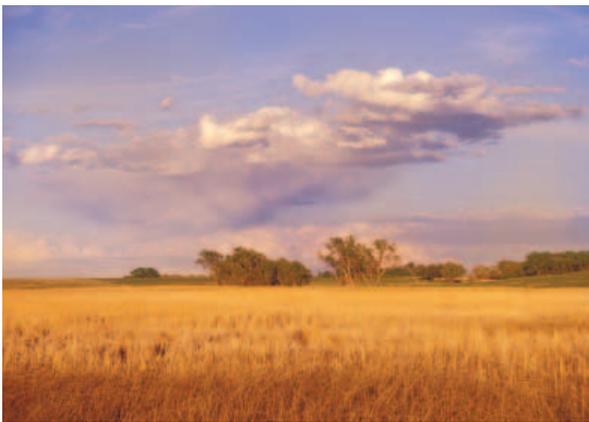
Rationale:

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, 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 heights were then incorporated into Objectives A through D. For Objective A, Virginia rail, sora,



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Meadow

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 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).

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.

Objectives:

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.

Objectives:

Prairie Dog Objective A: 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 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.



Prairie Dog

A refuge-specific prairie dog management plan has been approved 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).

Objectives:

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 will be signed as closed to the public during these periods. The trail leading onto private land to the south will 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.

Objectives:

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 May to early June).

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 (Johnson 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 feet 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



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Trumpeter Swans

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: both with trees. 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.

Objectives:

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 will 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.

Objectives:

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 management 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. Conduct special hunts of coyotes and other predators on islands prior to and during the nesting season.
4. 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 will be counterproductive for increasing the nest success and hatchling survival of waterfowl. Therefore, coyotes will not be one of the target predators for removal, except on and adjacent to the Pelican Islands.

Research Goal

Objectives:

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 will 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.

Hunting Goal

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

Objectives:

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,



Coyote

USFWS



Cottontail

Tom Koerner/USFWS

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).

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 will be required to restrict hunting from both sides of the road ditches in these sections. Pass shooting will 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.

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.

Objectives:

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.

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.



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Waterfowl on Trout Ponds

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. Consider requests for fishing tournaments 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 will have little to no impact on recreational fishing opportunities, but will 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

Provide quality opportunities for wildlife observation and wildlife photography, where compatible with purposes and other uses throughout the refuge.

Objectives:

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

U.S. Fish & Wildlife Service
Lacreek National Wildlife Refuge
 Bennett County, South Dakota

Public Use Map

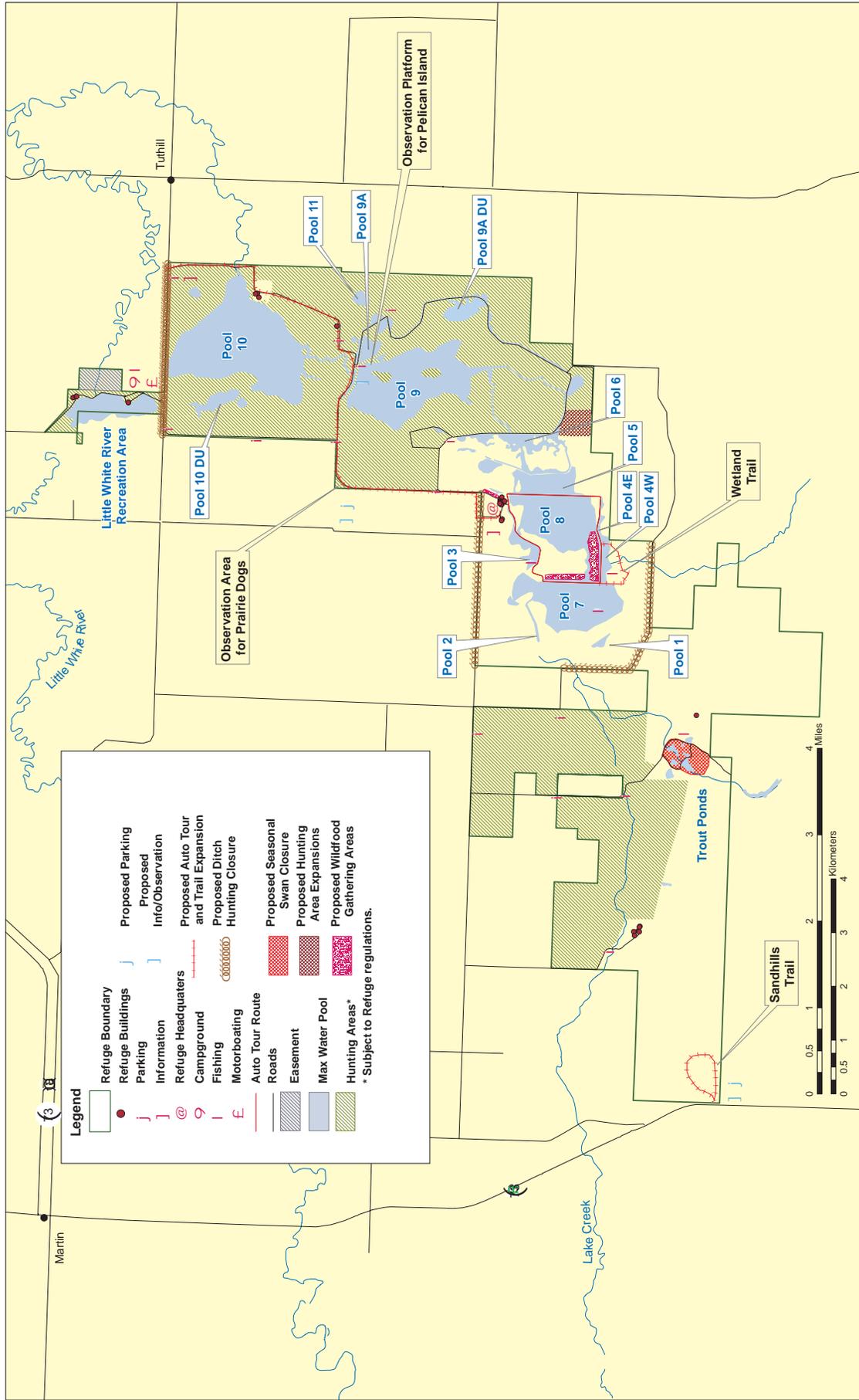


Figure 6. Public use map

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.

Objectives:

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.

Objectives:

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 will 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

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.

Objectives:

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

Capital Improvements Goal

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

Table 3. 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

Objectives:

Capital 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 will not increase the storage capacity of the reservoir, nor will 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.

Objectives:

Partnerships Objective A: 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: 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.

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.

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.

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.

Table 4. 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

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.

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 7). 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.

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.

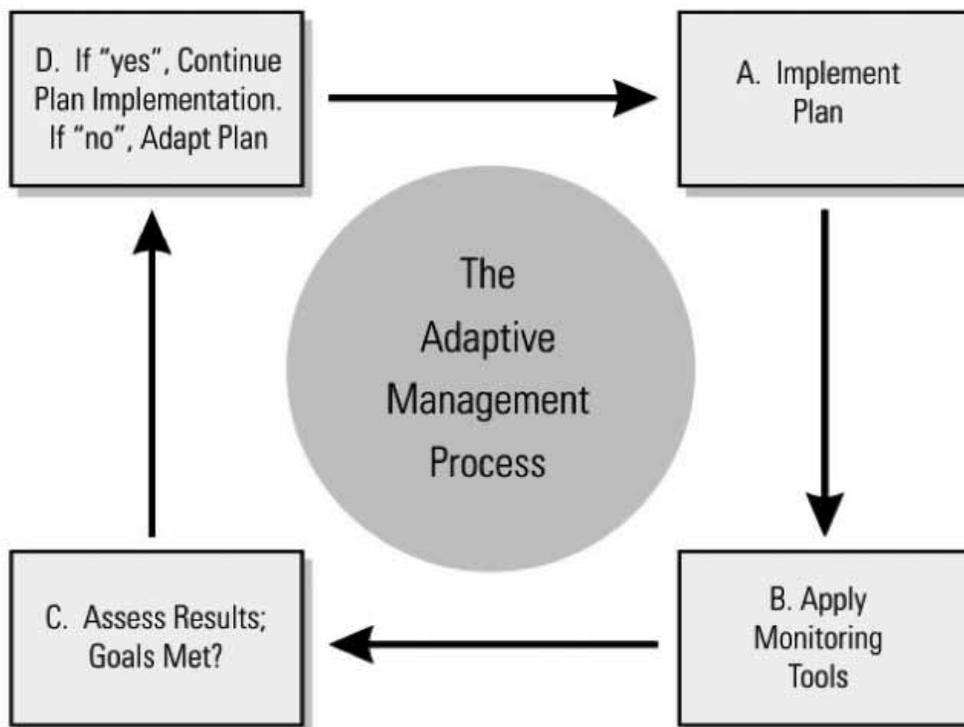
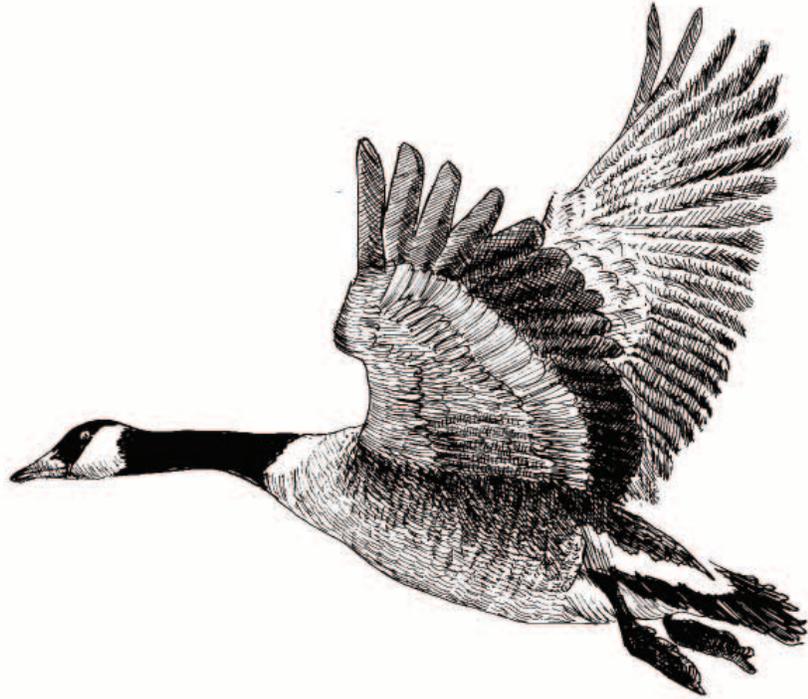


Figure 7. Adaptive management

Glossary of Terms



Glossary

Accessible: Areas and activities allowing physical access to people of different abilities, especially those with physical impairments.

Adaptive Management: The rigorous application of management, research, and monitoring to gain information and experience necessary to assess and modify management activities. A process that uses feedback from research, monitoring, and evaluation of management actions to support or modify objectives and strategies at all planning levels. A process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in management plan. Analysis of results help managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.

Alternative: 1) A reasonable way to solve an identified problem or satisfy the stated need (40 CFR 1500.2). 2) Alternatives are different means of accomplishing refuge purposes and goals and contributing to the System mission (Draft Service Manual 602 FW 1.5).

Amphibian: A class of cold-blooded vertebrates including frogs, toads or salamanders.

Baseline: A set of critical observations, data, or information used for comparison or a control.

Biological Control: The use of organisms or viruses to control invasive plants or other pests.

Biological Diversity: The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur (Service Manual 052 FW 1.12B). The National Wildlife Refuge System's focus is on indigenous species, biotic communities, and ecological processes. Also referred to as Biodiversity.

Biomass: The total amount of living material, plants and/or animals, above and below the ground in a particular habitat or area.

Biotic: Pertaining to life or living organisms; caused, produced by, or comprising living organisms.

Canopy: A layer of foliage, generally the uppermost layer, in a vegetative stand. Can be used to refer to mid-level or understory vegetation in

multi-layered stands. Canopy closure is an estimate of the amount of overhead vegetative cover (also canopy cover).

C score: Coefficient of conservatism that ranges from 0 to 10 and represents an estimated probability that a plant is likely to occur in a landscape unaltered from what is believed to be a pre-settlement condition.

CCP: see comprehensive conservation plan.

Colony: The nests or breeding place of a group of birds (such as herons or gulls) occupying a limited area.

Compatible Use: A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the director of the U.S. Fish and Wildlife Service, will not materially interfere with or detract from the fulfillment of the Mission of the System or the purposes of the refuge (Draft Service Manual 603 FW 3.6). A compatibility determination supports the selection of compatible uses and identified stipulations or limits necessary to ensure compatibility.

Comprehensive Conservation Plan (CCP): A document that describes the desired future conditions of the refuge; and provides long-range guidance and management direction for the refuge manager to accomplish the purposes of the refuge, contribute to the mission of the System, and to meet other relevant mandates (Draft Service Manual 602 FW 1.5).

Concern: See definition of "Issue."

Conspecific: Individuals or pair of the same species.

Cover: present vegetation of an area (also cover type or canopy cover).

Cool-season grasses: grasses that begin growth earlier in the season and often become dormant in the summer. These grasses will germinate at lower temperatures. Examples of cool-season grasses at the refuge are western wheatgrass, needle and thread, and green needlegrass.

Cultural Resources: The remains of sites, structures, or objects used by people in the past.

Cultural Resource Inventory: A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve

various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 CFR 60.4 (Service Manual 614 FW 1.7).

Cultural Resource Overview: A comprehensive document prepared for a field office that discusses, among other things, its prehistory and cultural history, the nature and extent of known cultural resources, previous research, management objectives, resource management conflicts or issues, and a general statement on how program objectives should be met and conflicts resolved. An overview should reference or incorporate information from a field office background or literature search described in Section VIII of the Cultural Resource Management Handbook (Service Manual 614 FW 1.7).

Dense Nesting Cover (DNC): A composition of grasses and forbs that allow for a dense stand of vegetation which protects nesting birds from the view of predators. Usually consists of one to two species of wheatgrass, alfalfa, and sweet clover.

Depredation: Damage inflicted upon agricultural crops or ornamental plants by wildlife.

Developed Wetland: A wetland that can have water levels in it manipulated through various dikes, dams, diversions, and water control structures.

DNC: see dense nesting cover.

Drawdown: The act of manipulating water levels in an impoundment to allow for the natural drying out cycle of a wetland.

Ecological Diversity: The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur (Service Manual 052 FW 1.12B).

Ecosystem: A dynamic and interrelating complex of plant and animal communities and their associated non-living environment. A biological community, together with its environment, functioning as a unit. For administrative purposes, the Service has designated 53 ecosystems covering the United States and its possessions. These ecosystems generally correspond with watershed boundaries and their sizes and ecological complexity vary.

Emergent: A plant rooted in shallow water and having most of the vegetative growth above water. Examples are cattail and hardstem bulrush.

Endangered Species (Federal): A plant or animal species listed under the Endangered Species Act of 1973 (as amended) that is in danger of extinction throughout all or a significant portion of its range.

Endangered Species (State): A plant or animal species in danger of becoming extinct or extirpated in a particular state within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.

Environmental Assessment (EA): A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an Environmental Impact Statement or Finding of No Significant Impact (40 CFR 1508.9).

Extinction: The complete disappearance of a species from the earth; no longer existing (Koford et al. 1994).

Extirpate: The extinction of a population; complete eradication of a species within a specified area.

Fauna: All the vertebrate and invertebrate animals of an area.

Federal Trust Resource: A trust is something managed by one entity for another who holds the ownership. The Service holds in trust many natural resources for the people of the United States of America as a result of federal acts and treaties. Examples are species listed under the Endangered Species Act, migratory birds protected by international treaties, and native plant or wildlife species found on a national wildlife refuge.

Federal Trust Species: All species where the federal government has primary jurisdiction including federally endangered or threatened species, migratory birds, anadromous fish, and certain marine mammals.

Flora: All the plant species of an area.

Forb: A broad-leaved, herbaceous plant; a seed-producing annual, biennial or perennial plant that does not develop persistent woody tissue but dies down at the end of the growing season.

Friends Group: Is defined as any formal organization whose mission is to support the goals and purposes of its associated refuge and the National Wildlife Refuge Association (NWRA) overall. This includes friends organizations and cooperative and interpretive associations.

Fragmentation: The alteration of a large block of habitat which creates isolated patches of the

original habitat that are interspersed with a variety of other habitat types (Koford et al. 1994); the process of reducing the size and connectivity of habitat patches, making movement of individuals or genetic information between parcels difficult or impossible.

Geographic Information System (GIS): A computer system capable of storing and manipulating spatial data; a set of computer hardware and software for analyzing and displaying spatially referenced features (i.e., points, lines and polygons) with non-geographic attributes such as species and age (Koford et al. 1994).

Global Positioning System (GPS): A system which by using satellite telemetry can pinpoint exact locations of places on the ground.

Goal: Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (Draft Service Manual 620 FW 1.5).

Grassland Block: A contiguous area of grassland without fragmentation.

Habitat: Suite of existing environmental conditions required by an organism for survival and reproductions. The place where an organism typically lives and grows.

Habitat Disturbance: Significant alteration of habitat structure or composition. May be natural (e.g., fire) or human-caused events (e.g., timber harvest, discing).

Habitat Type (vegetation type, cover type): A land classification system based on the concept of distinct plant associations.

Impoundment: A body of water created by collection and confinement within a series of levees or dikes thus creating separate management units although not always independent of one another.

Integrated Pest Management (IPM): Methods of managing undesirable species (such as invasive plants) including: education, prevention, physical or mechanical methods of control, biological control, responsible chemical use, and cultural methods.

Interseeding: Seeding into an existing stand of vegetation with a drill or broadcast. Increasing species diversity is one of the primary goals of interseeding

Introduced species: A species present in an area due to intentional or unintentional escape, release, dissemination, or placement into an ecosystem as a result of human activity.

Inviolate sanctuary: A place of refuge or protection where animals and birds may not be hunted.

Invasive plant: a species that is non-native to the ecosystem under consideration and whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health.

IPM: see integrated pest management

Issue: Any unsettled matter that requires a management decision; e.g., a Service initiative, opportunity, resource management problem, a threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition (Draft Service Manual 602 FW 1.5).

Maintenance Management System (MMS): A national database which contains the unfunded maintenance needs of each refuge. Projects included are those required to maintain existing equipment and buildings, correct safety deficiencies for the implementation of approved plans, and meet goals, objectives, and legal mandates.

Management Alternative: See alternative.

Migration: Regular extensive, seasonal movements of birds between their breeding regions and their “wintering” regions (Koford et al. 1994); to pass usually periodically from one region or climate to another for feeding or breeding.

Migratory birds: Birds which follow a seasonal movement from their breeding grounds to their “wintering” grounds. Waterfowl, shorebirds, raptors, and song birds are all migratory birds.

Mission: Succinct statement of purpose and/or reason for being.

Mitigation: Measures designed to counteract environmental impacts or to make impacts less severe.

Mixed-grass prairie: A transition zone between the tall-grass prairie and the short-grass prairie dominated by grasses of medium height that are approximately 2–4 feet tall. Soils are not as rich as the tall-grass prairie and moisture levels are less.

MMS: see maintenance management system.

Monitoring: The process of collecting information to track changes of selected parameters over time.

National Wildlife Refuge (National Wildlife Refuge): “A designated area of land, water, or an interest in land or water within the National Wildlife Refuge System, but does not include Coordination Areas.” Find a complete listing of all units of the System in the current Annual Report of Lands Under Control of the U.S. Fish and Wildlife Service.

National Wildlife Refuge System: Various categories of areas administered by the Secretary of the Interior for the conservation of fish and

wildlife, including species threatened with extinction, all lands, waters, and interests therein administered by the Secretary as wildlife refuges, areas for the protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, or waterfowl production areas.

National Wildlife Refuge System Improvement Act of 1997: Sets the mission and the administrative policy for all refuges in the National Wildlife Refuge System. Clearly defines a unifying mission for the refuge System; establishes the legitimacy and appropriateness of the six priority public uses (hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation); establishes a formal process for determining appropriateness and compatibility; establish the responsibilities of the Secretary of the Interior for managing and protecting the System; and requires a Comprehensive Conservation Plan for each refuge by the year 2012. This Act amended portions of the refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.

Native Species: A species that other than as a result of an introduction historically occurred or currently occurs in that ecosystem.

Neotropical migrant: A bird species that breeds north of the United States and Mexican border and winters primarily south of this border.

Nest success: The percentage of nests that hatch (one or more eggs hatch) successfully of the total number of nests initiated in an area.

Non-governmental organization: Any group that is not composed of federal, state, tribal, county, city, town, local or other governmental entities.

Noxious weed: any living stage (including seeds and reproductive parts) of a parasitic or other plant of a kind that is of foreign origin (new to or not widely prevalent in the U.S.) and can directly or indirectly injure crops, other useful plants, livestock, poultry, other interests of agriculture, including irrigation, navigation, fish and wildlife resources, or public health. According to the Federal Noxious Weed Act (PL 93-639), a noxious weed (i.e., invasive plant) is one that causes disease or has adverse effects on humans or the human environment and, therefore, is detrimental to the agriculture and commerce of the U.S. and to public health. (also see invasive plant)

Objective: An objective is a concise target statement of what will be achieved, how much will be achieved, when and where it will be achieved, and who is responsible for the work. Objectives are derived from goals and provide the basis for determining management strategies. Objectives should be attainable and time-specific and should

be stated quantitatively to the extent possible. If objectives cannot be stated quantitatively, they may be stated qualitatively (Draft Service Manual 602 FW 1.5).

Over-water species: Nesting species such as diving ducks and many colonial-nesting birds that build nests within dense stands of water-dependent plants (primarily cattail), or that build floating nests of vegetation that rest on the water.

Partners in Flight (PIF): A Western Hemisphere program designed to conserve Neotropical migratory birds and officially endorsed by numerous federal and state agencies and non-government organizations; also known as the Neotropical Migratory Bird Conservation Program (Koford et al. 1994).

Pass Shooting: Hunting waterfowl from a stationary location where waterfowl are expected to fly by.

Patch: An area distinct from that around it; an area distinguished from its surroundings by environmental conditions.

Perennial: Lasting or active through the year or through many years; a plant species that has a life span of more than 2 years.

PIF: see Partners in Flight.

Plant Community: An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site -- such as soil, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community, i.e., ponderosa pine or bunchgrass.

Prescribed Fire: The skillful application of fire to natural fuels under conditions of weather, fuel moisture, soil moisture, etc., that allow confinement of the fire to a predetermined area and produces the intensity of heat and rate of spread to accomplish planned benefits to one or more objectives of habitat management, wildlife management, or hazard reduction.

Proposed Action: The alternative proposed to best achieve the refuge purpose, vision, and goals; contributes to the refuge System mission, addresses the significant issues; and is consistent with principles of sound fish and wildlife management.

Priority public use: one of six uses authorized by the refuge Improvement Act of 1997 to have priority if found to be compatible with a refuge's purposes. This includes hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation.

Public: Individuals, organizations, and groups; officials of federal, state, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have indicated an interest in Service issues and those who do or do not realize that Service decisions may affect them.

Public Involvement: A process that offers affected and interested individuals and organizations an opportunity to become informed about, and to express their opinions on, Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management.

Purpose of the refuge: The purpose of a refuge is specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorization, or expanding a refuge, refuge unit, or refuge subunit. (Draft Service Manual 602 FW 1.5).

Raptor: A carnivorous bird (such as a hawk, falcon, or vulture) that feeds wholly or chiefly on meat taken by hunting or on carrion (dead carcasses).

Refuge Operations Needs System (RONS): A national database which contains the unfunded operational needs of each refuge. Projects included are those required to implement approved plans, and meet goals, objectives, and legal mandates.

Refuge Purpose: see purpose of the refuge.

Refuge Use: Any activity on a refuge, except administrative or law enforcement activity carried out by or under the direction of an authorized Service employee.

Resident species: A species inhabiting a given locality throughout the year; non-migratory species.

Rest: Free from biological, mechanical, or chemical manipulation; referring to refuge lands.

Restoration: Management emphasis designed to move ecosystems to desired conditions and processes, and/or to healthy upland habitats and aquatic systems.

Riparian area or zone: Refers to an area or habitat that is transitional from terrestrial to aquatic ecosystems; including streams, lakes wet areas, and adjacent plant communities and their associated soils which have free water at or near the surface; an area whose components are directly or indirectly attributed to the influence of water; of or relating to a river; specifically applied to ecology, "riparian" describes the land immediately adjoining and directly influenced by streams. For example, riparian vegetation includes any and all

plant-life growing on the land adjoining a stream and directly influenced by the stream.

RONS: see refuge operations needs system

Rough fish: A fish that is neither a sport fish nor an important food fish.

Scoping: The process of obtaining information from the public for input into the planning process.

Seasonally flooded: Surface water is present for extended periods in the growing season, but is absent by the end of the season in most years.

Sediment: Material deposited by water, wind or glaciers.

Service: U.S. Fish and Wildlife Service.

Shelterbelts: Single to multiple rows of trees and shrubs planted around cropland or buildings to block or slow down the wind.

Shorebird: Any of a suborder (Charadrii) of birds (as a plover or a snipe) that frequent the seashore or mud flat areas.

Spatial: Relating to, occupying, or having the character of space.

Special-status species: Plants or animals which have been identified through either federal law, state law, or agency policy, as requiring special protection of monitoring. Examples include federally listed endangered, threatened, proposed, or candidate species; state-listed endangered, threatened, candidate, or monitor species; U.S. Fish & Wildlife Service species of management concern and species identified by the Partners in Flight Program as being of extreme or moderately high conservation concern.

Special-use permit: A permit for special authorization from the refuge manager required for any refuge service, facility, privilege, or product of the soil provided at refuge expense and not usually available to the general public through authorizations in Title 50 CFR or other public regulations (Refuge Manual 5 RM 17.6).

Species of concern: Those plant and animal species, while not falling under the definition of special status species, that are of management interest by virtue of being federal trust species such as migratory birds, important game species, or significant keystone species. Species which are (1) documented or apparent populations declines, (2) small or restricted populations, or (3) dependence on restricted or vulnerable habitats.

Species richness: The absolute number of species in an assemblage or community; the number of species in a given area (Koford et al. 1994).

Step-down management plan: a plan that provides the details necessary to implement management strategies identified in the comprehensive conservation plan (Draft Service Manual 602 FW 1.5).

Strategy: A specific action, tool or technique or combination of actions, tools and techniques used to meet unit objectives (Draft Service Manual 602 FW 1.5).

Submergent: a vascular or non-vascular hydrophyte, either rooted or non-rooted, which lies entirely beneath the water surface, except for flowering parts in some species.

Tame species: see dense nesting cover

Threatened Species (Federal): Species listed under the Endangered Species Act of 1973, as amended, that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

Threatened Species (State): A plant or animal species likely to become endangered in a particular state within the near future if factors contributing to population decline or habitat degradation or loss continue.

Travel Corridor: A landscape feature that facilitates the biologically effective transport of animals between larger patches of habitat dedicated to conservation functions. Such corridors may facilitate several kinds of traffic, including frequent foraging movement, seasonal migration, or the once in a lifetime dispersal of juvenile animals. These are transition habitats and need not contain all the habitat elements required for long-term survival or reproduction of its migrants.

Trust Species: see Federal Trust Species.

U.S. Fish and Wildlife Service (Service): The principal federal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people. The Service manages the 93-million-acre National Wildlife Refuge System comprised of more than 530 national wildlife refuges and thousands of waterfowl production areas. It also operates 65 national fish hatcheries and 78 ecological service field stations, the agency enforces federal wildlife laws, manages migratory bird populations, restores national significant fisheries, conserves and restores wildlife habitat such as wetlands, administers the Endangered Species Act, and helps foreign governments with their conservation efforts. It also oversees the federal Aid program which distributes millions of dollars in the Federal Aid program which distributes

the millions of dollars in excise taxes on fishing and hunting equipment to state wildlife agencies.

U.S. Fish and Wildlife Service Mission: The mission of the U.S. Fish & Wildlife Service is working with others to conserve, protect, and enhance fish and wildlife and plants and their habitats for the continuing benefit of the American people.

U.S. Geological Survey (USGS): A federal government agency whose mission is to provide reliable scientific information to describe and understand the earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

USGS: see U.S. Geological Survey.

Vision Statement: A concise statement of the desired future condition of the planning unit, based primarily upon the System mission, specific refuge purposes, and other relevant mandates (Draft Service Manual 602 FW 1.5).

Visual obstruction: A measurement of the density of a plant community; the height of vegetation that blocks the view of predators and conspecifics to a nest.

Visual Obstruction Reading (VOR): A method of visually quantifying vegetative structure and composition.

VOR: see visual obstruction reading

Wading birds: Birds that have long legs that enable them to wade in shallow water. Includes egrets, great blue herons, black crowned night herons, and bitterns.

Warm-season grasses: Grasses that begin growth later in the season (early June). These grasses require warmer soil temperatures to germinate and actively grow when temperatures are warmer. Examples of warm season grasses are Indiangrass, switchgrass, and big bluestem.

Water Control Structure: A metal and/or concrete structure placed in an earthen dam or dike which is used to control the flow of water. Two kinds are generally used. A slide or screw gate moves a metal plate in front of a pipe, restricting or stopping the flow of water into the pipe. A drop board structure uses metal or wooden boards that are dropped into grooves in front of the pipe. Water is blocked until it reaches the top of the board, at which time the water flows freely over the top.

Waterfowl: A category of birds that includes ducks, geese, and swans.

Watershed: The region draining into a river, river system, or body of water.

Weedy Trees: Native and non-native trees established on their own and cause a management issue or problem.

Wetland Management District (WMD): Land which the Service's Refuge System acquires (with Federal Duck Stamp funds), restores, and manages primarily as prairie wetland habitat critical to waterfowl and other wetland birds.

Wetland Reserve Program: A voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. The U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) provides technical and financial support to help landowners with their wetland-restoration efforts. The NRCS goals are to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the program. This program offers landowners an opportunity to establish long-term conservation and wildlife practices and protection. (www.nrcs.usda.gov/programs/wrp)

Wildlife-dependent recreational use: "A use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation." These are

the six priority public uses of the System as established in the National Wildlife Refuge System Administration Act, as amended. Wildlife-dependent recreational uses, other than the six priority public uses, are those that depend on the presence of wildlife. The Service also will consider these other uses in the preparation of refuge CCPs; however, the six priority public uses always will take precedence.

Wildland fire: A free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs on wildlands (Service Manual 621 FW 1.7).

Wildlife-dependent Recreation: A use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation. The National Wildlife Refuge System Improvement Act of 1997 specifies that these are the six priority general public uses of the System.

WMD: see wetland management district.

Woodland: Open stands of trees with crowns not usually touching (generally forming 25- to 60-percent cover).

