

Comprehensive Conservation Plan

North Dakota National Wildlife Refuges

September 2008

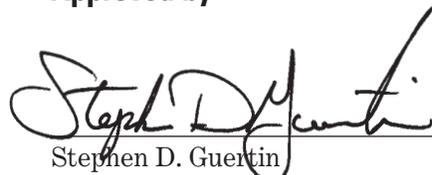
Prepared by the U.S. Fish and Wildlife Service

Audubon National Wildlife Refuge
Chase Lake National Wildlife Refuge
Kellys Slough National Wildlife Refuge
Lake Alice National Wildlife Refuge
Lake Ilo National Wildlife Refuge
Lake Nettie National Wildlife Refuge
Lake Zahl National Wildlife Refuge
McLean National Wildlife Refuge
Shell Lake National Wildlife Refuge
Stewart Lake National Wildlife Refuge
Stump Lake National Wildlife Refuge
White Lake National Wildlife Refuge

and

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9/30/08
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Abbreviations

Administration Act	National Wildlife Refuge System Administration Act of 1966
APHIS	Animal and Plant Health Inspection Service
BCR	bird conservation region
CCP	comprehensive conservation plan
CFR	<i>Code of Federal Regulations</i>
cfs	cubic feet per second
CWCS	comprehensive wildlife conservation strategy
CWD	chronic wasting disease
district	wetland management district
DNC	dense nesting cover
DOI	U.S. Department of the Interior
EA	environmental assessment
EO	executive order
F	Fahrenheit
FMP	fire management plan
FTE	full-time equivalent
GIS	Geographic Information System
gpm	gallons per minute
GPS	Global Positioning System
GS	General Schedule (employment)
HAPET	Habitat and Population Evaluation Team
HPAI	highly pathogenic avian influenza
Improvement Act	National Wildlife Refuge System Improvement Act of 1997
IPM	integrated pest management
ISST	invasive species strike team
msl	mean sea level
NABCI	North American Bird Conservation Initiative
ND	North Dakota
NDGF	North Dakota Game and Fish Department
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRCS	Natural Resources Conservation Service
PIF	Partners in Flight program
PL	public law
PPJV	Prairie Pothole Joint Venture
Refuge System	National Wildlife Refuge System
region 6	Mountain–Prairie Region of the U.S. Fish and Wildlife Service
RLGIS	Refuge Lands Geographic Information System
Service	U.S. Fish and Wildlife Service

SWG	state wildlife grant
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOR	visual obstruction reading
WG	Wage Grade schedule (employment)
WUI	wildland–urban interface

Summary



USFWS

Newly Hatched Mallard Ducklings

This is a summary of the comprehensive conservation plan for 12 of the U.S. Fish and Wildlife Service's national wildlife refuges in North Dakota:

Audubon	Lake Ilo	Shell Lake
Chase Lake	Lake Nettie	Stewart Lake
Kellys Slough	Lake Zahl	Stump Lake
Lake Alice	McLean	White Lake

The National Wildlife Refuge System Improvement Act of 1997 requires the U.S. Fish and Wildlife Service to develop a comprehensive conservation plan by 2012 for each national wildlife refuge. In September 2008, the Service approved the plan for the 12 national wildlife refuges, which will guide management of the refuges for the next 15 years.

The Refuges

The 12 national wildlife refuges were established under different authorities:

- Audubon National Wildlife Refuge was established under the authority of the Fish and Wildlife Coordination Act.
- Under executive order, President Theodore Roosevelt established 2 of the 12 refuges as preserves and breeding grounds for native birds: Chase Lake and Stump Lake national wildlife refuges.
- Under executive order, President Franklin D. Roosevelt established 8 of the 12 refuges as breeding grounds for migratory birds and other wildlife: Kellys Slough, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Shell Lake, Stewart Lake, and White Lake national wildlife refuges.

- Lake Alice National Wildlife Refuge was established under the authority of the Migratory Bird Conservation Act.

To secure lands for migratory birds, the United States Congress established the Migratory Bird Conservation Fund to acquire lands for conservation, to maintain acquired lands for habitat preservation, and to fund expenses necessary for the administration, development, and maintenance of such areas. Associated activities include construction of dams, dikes, ditches, spillways, and flumes for improving habitat and mitigation of pollution threats to waterfowl and migratory birds. The refuges protect habitat with primarily two tools: fee-title ownership and conservation easements.

The prairies of North Dakota have become an ecological treasure of biological importance for waterfowl and other migratory birds. The prairie potholes of North Dakota support a wide diversity of wildlife, but they are most famous for their role in waterfowl production. Although the Prairie Pothole Region occupies only 10% of North America's waterfowl breeding range, it produces approximately 50% of the continent's waterfowl population.

Complexes of wetlands scattered throughout the refuges and surrounding areas attract breeding duck pairs. The refuges provide northern staging areas and habitat for migrating waterfowl. Semipermanent and permanent wetlands provide brood-rearing habitat and migratory stopover habitat, respectively. However, it is the smaller temporary and seasonal wetlands that draw breeding duck pairs to the North Dakota prairies, including the refuges, and other parts of the Prairie Pothole Region.

The Planning Process

The planning process, which included an environmental analysis, began in February 2007 with the issuance of a notice of intent in the *Federal Register*. Public and partner involvement were encouraged and valued throughout the process. The refuge staffs and the public identified the primary issues for the refuges, which the plan addresses. The Service's planning team developed and evaluated management alternatives to meet the purposes, vision, and goals of the refuges. With the selection of alternative B as the preferred alternative, the Service finalized the comprehensive conservation plan in September 2008.

ISSUES

Information from the public scoping, which the Service began in 2007, along with refuge information, identified five major areas of concern about management of the refuges.

Wetland and Upland Habitats

Aggressive management of wetland and upland habitats must be conducted to achieve the goals and objectives of the refuges. Habitat protection needs to be evaluated through a priority system so that different means of protection, through either fee title or conservation easement, can be evaluated. Most of the refuges' uplands that were previously farmed and since restored have the native vegetation character, but have been compromised by invading species such as leafy spurge, Canada thistle, and Kentucky bluegrass. Invasive plants substantially diminish the suitability of upland habitat for many native wildlife species.

While the Service works to minimize the negative effects of energy development, the demand for energy is an increasing factor in habitat quality and preservation at the refuges. The production of biofuels, coal, oil, gas, and wind energy has the potential to impact effectiveness of many refuge programs. The loss of native prairie is occurring at an alarming rate. Prairie is being converted for corn production to produce ethanol, which also has additional needs for irrigation water.

Wildlife Management

Priority species, predators, and wildlife disease require specific management strategies that the refuges need to adopt. Of importance for priority species is monitoring and the provision of essential habitat that promotes increased recruitment or population protection. Several predatory species including the red fox are found at higher than historical levels due to modifications of habitat. These species can adversely affect migratory bird populations. There is an ongoing issue of striking a balance between managing botulism, providing optimal habitats, and maintaining other refuge programs.

Monitoring and Research

The Service needs basic data about recruitment, mortality, and habitat use for representative groups of species. It is important to collect and analyze these data on a regular basis so the Service can make appropriate decisions about the habitats on which these species depend.

Visitor Services

A growing demand for public recreation in North Dakota and the nation makes these refuge uses primary issues of interest: hunting, fishing, wildlife observation, photography, environmental education, and interpretation.

Operations

The efficient use of staff, partnerships, volunteers, and funding—through effective communication and innovation—is needed to support each of the refuges. Facilities at the refuges need to be evaluated and upgraded.

The Future of the Refuges

The issues, along with resource conditions, were important considerations during the development of the vision and goals for the 12 refuges.

VISION

This collection of unique and diverse refuges encompasses a broad range of North Dakota habitat types and landscapes.

These refuges provide vital resting and breeding habitat for waterfowl, other migratory birds, and resident fish and wildlife species.

Visitors to these prairie refuges experience wide-open spaces, skies filled with migratory birds, places to learn, and welcome solitude.

The responsible management of these special places requires adequate funding, dedicated personnel, and successful partnerships.

Achievement of this vision ensures that the American people retain a legacy of wildlife and prairie habitats for future generations.

GOALS

The Service developed the following goals to meet the vision for the refuges.

Habitat and Wildlife Goal

Conserve, restore, and enhance the ecological diversity of grasslands and wetlands of the North Dakota prairie to support healthy populations of ducks and geese, other migratory birds, native species, and other wildlife.

Monitoring and Research Goal

Use science, monitoring, and applied research to advance the understanding of natural resources and management within the North Dakota national wildlife refuges.

Cultural Resources Goal

Identify and evaluate cultural resources that are on Service-owned lands or are affected by Service undertakings. Protect resources determined to be significant and, when appropriate, interpret resources to connect staff, visitors, and communities to the area's past.

Visitor Services Goal

Provide visitors with opportunities to enjoy wildlife-dependent recreation where compatible and expand their knowledge and appreciation of the prairie landscape and the National Wildlife Refuge System.

Partnerships Goal

A diverse network of partners join with the North Dakota national wildlife refuges to support research, accomplish habitat conservation, and foster awareness and appreciation of the prairie landscape.

Operations Goal

Efficiently employ staff, partnerships, and volunteers and secure funding in support of the Refuge System's mission.

MANAGEMENT DIRECTION

Management objectives for habitat types are based on the habitat preferences of groups of target species such as waterfowl, migratory shorebirds, grassland birds, and priority species.

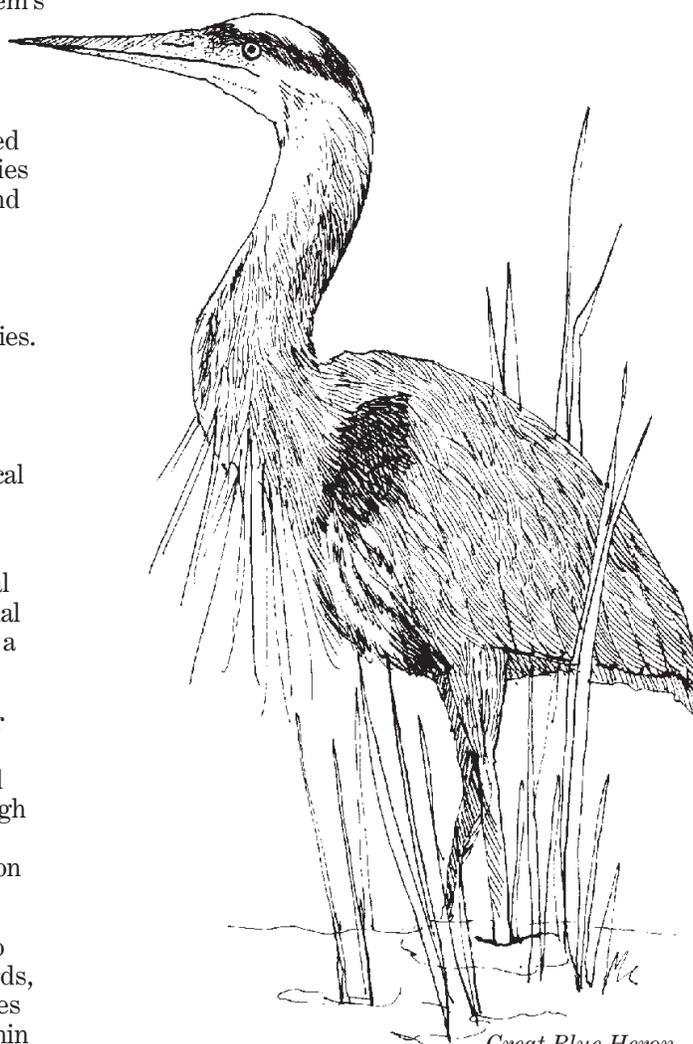
The Service will focus on management of high- and medium-priority habitats, and will identify and restore other degraded habitat tracts to native species. Invasive species management will be limited to legally listed species and those of ecological concern that occur on high- and medium-priority tracts.

The refuges' staffs and partners will expand biological surveys on high- and medium-priority tracts.

The Service will document and protect cultural resources, and will maintain and preserve historical sites. In addition, the Service will conduct educational programs and partner research and inventories on a limited basis.

Refuge staffs will improve and expand programs for youth and conservation groups, and will develop "friends groups." The Service will start or expand environmental education programs for Kellys Slough and Lake Alice national wildlife refuges. A new environmental learning center is planned for Audubon National Wildlife Refuge.

Refuge staffs will expand existing partnerships to address improvement of habitat for migratory birds, and will work with local, state, and federal agencies to promote and protect migratory bird habitat within the refuges.



Great Blue Heron
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1 Introduction



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The mallard is one of the featured waterfowl species at the North Dakota refuges.

The U.S. Fish and Wildlife Service (Service) developed this comprehensive conservation plan (CCP) to provide the foundation for the management and use of 12 national wildlife refuges in North Dakota (see figure 1, vicinity map):

- Audubon National Wildlife Refuge
- Chase Lake National Wildlife Refuge
- Kellys Slough National Wildlife Refuge
- Lake Alice National Wildlife Refuge
- Lake Ilo National Wildlife Refuge
- Lake Nettie National Wildlife Refuge
- Lake Zahl National Wildlife Refuge
- McLean National Wildlife Refuge
- Shell Lake National Wildlife Refuge
- Stewart Lake National Wildlife Refuge
- Stump Lake National Wildlife Refuge
- White Lake National Wildlife Refuge

Based on the results of an environmental analysis and public involvement, the Service's director of region 6 made the decision, on September 30, 2008, to implement this CCP to guide the 12 refuges for the next 15 years. Chapter 4, Management Direction, specifies the actions

necessary to achieve the purposes and vision for the 12 national wildlife refuges. Wildlife is the first priority in refuge management, and the Service allows and encourages wildlife-dependent recreational use as long as it is compatible with the refuges' purposes.

The Service developed the CCP in compliance with the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act) and Part 602 (National Wildlife Refuge System Planning) of The Fish and Wildlife Service Manual. The actions described in this CCP meet the requirements of the National Environmental Policy Act of 1969 (NEPA). Compliance with NEPA included the involvement of the public. The planning process and public involvement are further described in this chapter, under 1.6, The Planning Process.

1.1 Purpose and Need for the Plan

The purpose of this CCP is to identify the role that the refuges play in support of the mission of the National Wildlife Refuge System (Refuge System) and to provide long-term guidance for management of the refuges' programs and activities.

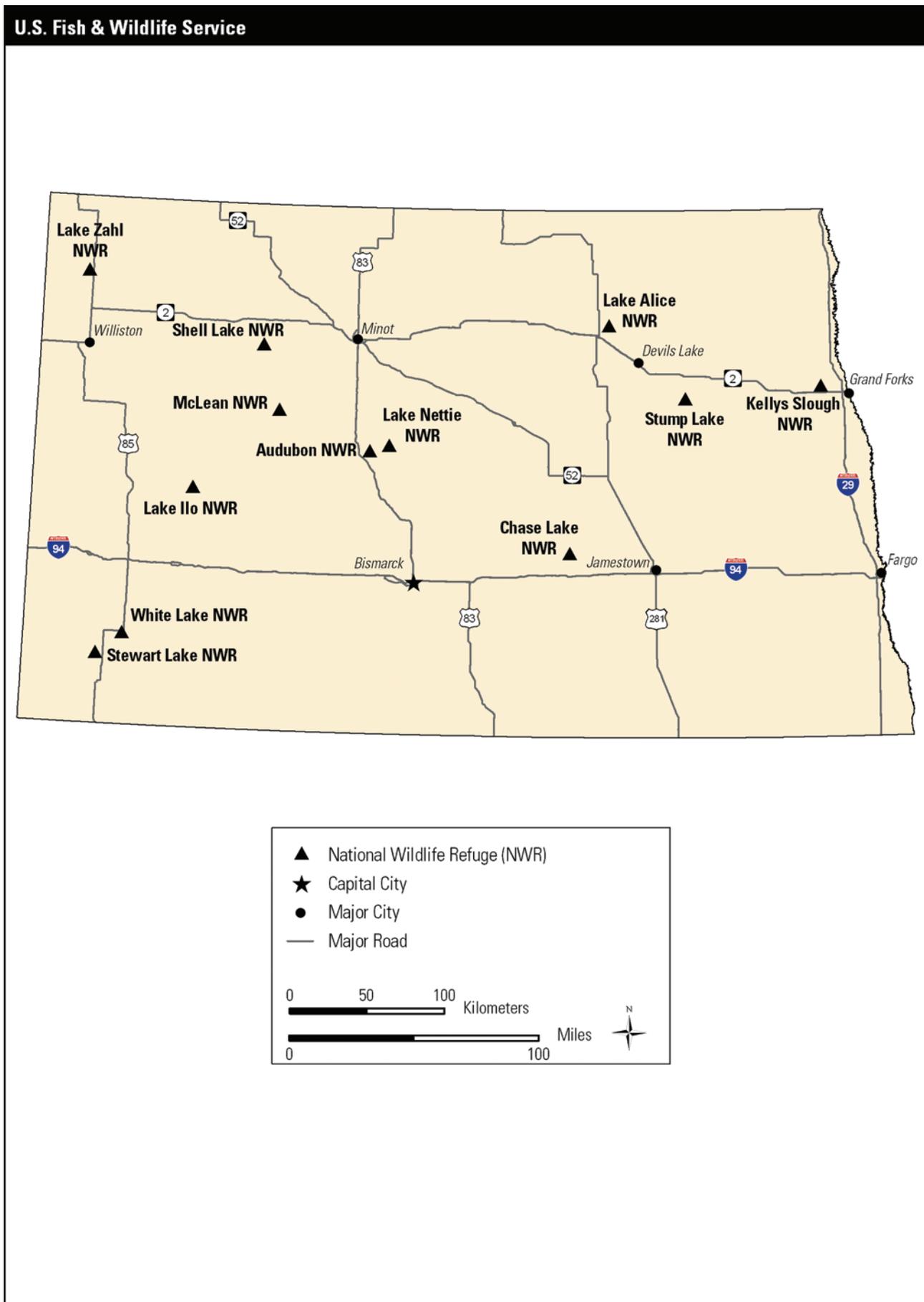


Figure 1. Vicinity map for the 12 refuges, North Dakota.

The CCP is needed

to communicate with the public and other partners in efforts to carry out the mission of the Refuge System;

to provide a clear statement of direction for management of the refuges;

to provide neighbors, visitors, and government officials with an understanding of the Service's management actions on and around the refuges;

to ensure that the Service's management actions are consistent with the mandates of the Improvement Act;

to ensure that management of the refuges is consistent with federal, state, and county plans;

to provide a basis for development of budget requests for the refuges' operation, maintenance, and capital improvement needs.

Sustaining the nation's fish and wildlife resources is a task that can be accomplished only through the combined efforts of governments, businesses, and private citizens.

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

The Service is the principal federal agency responsible for fish, wildlife, and plant conservation. The Refuge System is one of the Service's major programs.



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 a century 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 America's 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. In addition, the Service 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.

SERVICE ACTIVITIES IN NORTH DAKOTA

Service activities in North Dakota contribute to the state's economy, ecosystems, and education programs. The following list describes the Service's presence and activities:

- Employs 170 people in North Dakota.
- Helped by 539 volunteers who donated more than 10,200 hours with Service projects.
- Manages two national fish hatcheries and one fish and wildlife management assistance office.
- Manages 65 national wildlife refuges encompassing 343,145 acres (0.8% of the state).
- Manages 11 wetland management districts.
 - 284,660 acres of fee waterfowl production areas (0.6% of the state)
 - 1,080,636 wetland acres under various leases or easements (2.4% of the state)
- Hosts more than 385,300 annual visitors to Service-managed lands.
 - 166,908 hunting visits
 - 59,500 fishing visits
 - 26,346 photography visits
- Provided \$3.8 million to the NDGF for sport fish restoration and \$3.9 million for wildlife restoration and hunter education.
- Helped private landowners restore, create, and enhance more than 214,000 acres on 8,400 sites and restore 17 miles of river since 1987 through the Partners for Wildlife Program.
- Employs 11 Partners for Fish and Wildlife Program biologists.
- Paid North Dakota counties \$435,325 under the Refuge Revenue Sharing Act (funds used for schools and roads).

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 wildlife. This small but significant designation was the beginning of the Refuge System.

One hundred years later, the Refuge System has become the largest collection of lands in the world specifically managed for wildlife, encompassing more than 96 million acres within 546 refuges and more than 3,000 small areas for waterfowl breeding and nesting. Today, there is at least one refuge in every state including Puerto Rico and the U.S. Virgin Islands.

In 1997, the Improvement Act established a clear mission for the Refuge System.

The mission of the National Wildlife Refuge System 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 states that each national wildlife refuge shall be managed

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

In addition to the mission for the Refuge System, the wildlife and habitat vision for each unit of the Refuge System stresses the following principles:

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

Following passage of the Improvement Act, the Service immediately began to carry out the direction of the new legislation, including preparation of CCPs for all national wildlife refuges. Consistent with the Improvement Act, the Service prepares CCPs in conjunction with public involvement. Each refuge is required to complete its CCP within the 15-year schedule (by 2012).

People and the Refuge System

The nation's fish and wildlife heritage contributes to the quality of American lives and is an integral part of the country's greatness. Wildlife and wild places

have always given people special opportunities to have fun, relax, and appreciate the natural world.

Whether through bird watching, fishing, hunting, photography, or other wildlife pursuits, wildlife recreation contributes millions of dollars to local economies. In 2002, approximately 35.5 million people visited the Refuge System, 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 generated in the local communities that surround refuges. Economists report that Refuge System visitors contribute more than \$792 million annually to local economies.

1.3 National and Regional Mandates

Refuge System units are managed to achieve the mission and goals of the Refuge System, along with the designated purpose of the refuges (as described in establishing legislation, executive orders, or other establishing documents). Key concepts and guidance of the Refuge System are in the Refuge System Administration Act of 1966 (Administration Act), Title 50 of the *Code of Federal Regulations* (CFRs), The Fish and Wildlife Service Manual, and the Improvement Act.

The Improvement Act amends the Administration Act by providing a unifying mission for the Refuge System, a new process for determining compatible public uses at refuges, and a requirement that each refuge be managed under a CCP. The Improvement Act states that wildlife conservation is the priority for Refuge 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 Refuge 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 detailed description of these and other laws and executive orders that may affect the CCP or the Service's implementation of the CCP is in Appendix A, Key Legislation and Policy. Service policies on planning and day-to-day management of refuges are in the Refuge System Manual and The Fish and Wildlife Service Manual.

1.4 Refuge Contributions to National and Regional Plans

The North Dakota refuges contribute to the conservation efforts described in this section.

FULLFILLING THE PROMISE

A 1999 report, *Fulfilling the Promise—The National Wildlife Refuge System* (U.S. Fish and Wildlife Service [USFWS] 1999a), is the culmination of a yearlong process by teams of Service employees to evaluate the Refuge System nationwide. This report was the focus of the first national Refuge System conference (in 1998)—attended by refuge managers, other Service employees, and representatives from leading conservation organizations.

The report contains 42 recommendations packaged with three vision statements dealing with wildlife and habitat, people, and leadership. This CCP deals with all three of these major topics. The planning team looked to the recommendations in the document for guidance during CCP planning.

PARTNERS IN FLIGHT

The Partners in Flight program (PIF) began in 1990 with the recognition of declining population levels of many migratory bird species. The challenge, according to the program, is managing human population growth while maintaining functional natural ecosystems. To meet this challenge, PIF worked to identify priority, land bird species and habitat types. PIF activity has resulted in 52 bird conservation plans covering the continental United States.

The primary goal of PIF is to provide for the long-term health of the bird life of this continent. The first priority is to prevent the rarest species from going extinct. The second priority is to prevent uncommon species from descending into threatened status. The third priority is to “keep common birds common.”

PIF splits North America into seven avifaunal biomes (birds of an ecological regional area) and 37 bird conservation regions (BCRs) for planning purposes (see figure 2, map of BCRs). The 12 national wildlife refuges are within the prairie avifaunal biome in BCRs 11 and 17.

BCR 11 is the most important waterfowl production area on the North American continent, despite extensive wetland drainage and tillage of native grasslands. The density of breeding dabbling ducks commonly exceeds 100 pairs per square mile in some areas during years with favorable wetland conditions. The area comprises the core of the breeding range of most dabbling duck and several diving duck species. BCR 11 provides critical breeding and migration habitat for more than 200 other bird species, including such species of concern as Franklin’s gull and yellow rail and a threatened species, the piping plover. In addition, Baird’s sparrow, Sprague’s pipit, chestnut-collared longspur, Wilson’s phalarope, marbled godwit, and American avocet are among the many priority nonwaterfowl species that breed in BCR 11. According to the NABCI, wetland areas also provide key spring

migration sites for Hudsonian godwit, American golden-plover, white-rumped sandpiper, and buff-breasted sandpiper (NABCI 2007).



Baird's sparrow is a priority species that breeds in BCR 11.

© Bob Gress

BCR 17 is dominated by mixed-grass prairie that lies west and south of the glaciated Prairie Pothole Region (see figure 3, map of the Prairie Pothole Region), east of the Rocky Mountains, and north of the true short-grass prairie. Mostly due to the continued dominance of ranching, many contiguous grassland tracts of significant size persist. As a result, this area is habitat for some of the healthiest populations of high-priority, dry-grassland birds on the continent including mountain plover, McCown’s longspur, and long-billed curlew. The relatively small number of wetlands—including small impoundments created to serve as livestock water sources—receives intensive use by upland-nesting waterfowl and broods (NABCI 2007).

PIF conservation priorities in the prairie avifaunal biome focus on protection of remaining prairies, management of existing grasslands with fire and grazing, and control of invasive plants including woody plant encroachment.

NORTH AMERICAN WATERFOWL MANAGEMENT PLAN

Written in 1986, the North American Waterfowl Management Plan envisioned a 15-year effort to achieve landscape conditions that could sustain waterfowl populations. Specific objectives of the plan are to increase and restore duck populations to the average levels of the 1970s—62 million breeding ducks and a fall flight of 100 million birds.

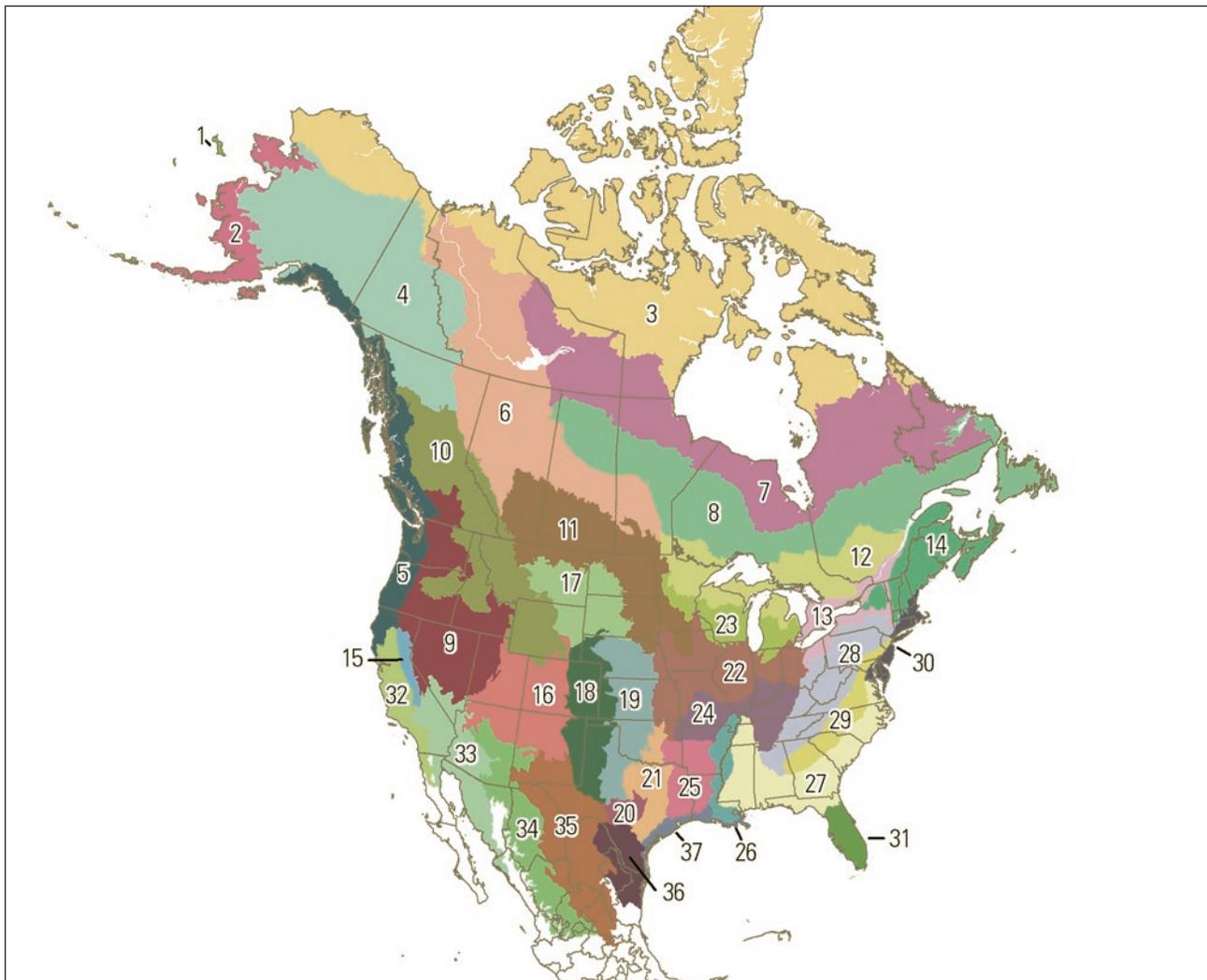


Figure 2. Map of the bird conservation regions of North America.

By 1985, waterfowl populations had plummeted to record lows. Habitat that waterfowl depend on was disappearing at a rate of 60 acres per hour. Recognizing the importance of waterfowl and wetlands to North Americans and the need for international cooperation to help in the recovery of a shared resource, the United States and Canada governments developed a strategy to restore waterfowl populations through habitat protection, restoration, and enhancement. Mexico became a signatory to the plan in 1994.

The plan is innovative because of its international scope, plus its implementation at the regional level. Its success depends on the strength of partnerships called joint ventures, which involve federal, state, provincial, tribal, and local governments; businesses; conservation organizations; and individual citizens.

Joint ventures are regional, self-directed partnerships that carry out science-based conservation through community participation. Joint ventures develop implementation plans that focus on areas of concern identified in the plan.

The 9 of the 12 refuges lie within the Prairie Pothole Joint Venture (PPJV), which covers the Prairie Pothole Region of Montana, North Dakota, South Dakota, Minnesota, and Iowa:

- Audubon National Wildlife Refuge
- Chase Lake National Wildlife Refuge
- Kellys Slough National Wildlife Refuge
- Lake Alice National Wildlife Refuge
- Lake Nettie National Wildlife Refuge
- Lake Zahl National Wildlife Refuge
- McLean National Wildlife Refuge
- Shell Lake National Wildlife Refuge
- Stump Lake National Wildlife Refuge

Established in 1987, the PPJV is one of the original six priority joint ventures under the North American Waterfowl Management Plan. The joint venture protects, restores, and enhances high-priority wetland and grassland habitat to help sustain populations of



Figure 3. Map of the Prairie Pothole Region of the United States and Canada.

waterfowl, shorebirds, waterbirds, and prairie land birds. The PPJV includes one-third (100,000 square miles) of North America's Prairie Pothole Region. The remaining 200,000 acres is located in the Canadian provinces of Manitoba, Saskatchewan, and Alberta. This unique area contains millions of depressional wetlands (potholes) that constitute one of the richest wetland systems in the world. These glacially formed prairie potholes and their surrounding grasslands are highly productive and support an incredible diversity of bird life.

PPJV IMPLEMENTATION PLAN

The Prairie Pothole Region remains the most important waterfowl-producing region on the continent, generating more than half of North America's ducks. Nearly 15% of the continental waterfowl population comes from the PPJV region (Montana, North Dakota, South Dakota, Minnesota, and Iowa). As many as 10 million ducks and 2 million geese use the PPJV region during migration or for nesting. The wetlands and associated grassland habitat in the PPJV region provide breeding habitat to more than 200 species of migratory birds. Bald eagles, peregrine falcons, whooping cranes, piping plovers, and interior least terns frequent the PPJV region during migration and breeding periods.

The PPJV implementation plan was prepared in 2005 and outlined a mission, goals, objectives, and strategies for joint venture activities. Individual state action groups and steering committees prepared state action plans that "stepped down" joint venture activities to the state and local level.

The goal of the PPJV is to increase waterfowl populations through habitat conservation projects that improve natural diversity across the prairie pothole landscape of the United States. The joint venture attempts to carry out landscape-level habitat projects so that waterfowl populations increase during the wet years and stabilize under moderate conditions. Since little can be done to stabilize the breeding populations across the Prairie Pothole Region during extended drought, joint venture strategies are designed to carry out actions that take advantage of years when precipitation is at least normal.

NORTHERN GREAT PLAINS JOINT VENTURE IMPLEMENTATION PLAN

The Northern Great Plains Joint Venture (NGPJV) project area lies between the Missouri River on the east and north, the foothills of the Rocky Mountains on the west, and the sand hills and playa lakes of Wyoming and Nebraska on the south. Three of the 12 refuges are in the NGPJV:

- Lake Ilo National Wildlife Refuge
- Stewart Lake National Wildlife Refuge
- White Lake National Wildlife Refuge

The primary purpose of the NGPJV is to contribute to the attainment of continental population goals (developed under the NABCI) by strategically conserving habitat within the northern Great Plains ecosystem. The NGPJV partnership embraces the goals of NABCI "to deliver the full spectrum of bird conservation through regionally based, biologically driven, landscape-oriented partnerships." The goal of the NGPJV is to maintain and increase populations of the high-priority bird species in the grassland, wetland, riparian, and forest habitats within the NGPJV.

The uniqueness of the northern Great Plains is its arid climate and relatively intact, grassland-dominated landscape. Within this landscape are habitats that have significant value to species of the northern Great Plains; these habitats include big sagebrush areas in Wyoming and Montana, short-grass prairie of the Conata Basin in South Dakota, and riparian corridors in the badlands of North Dakota and South Dakota. It is this variety of habitat types within the larger grassland context that supports such a diversity of birds—from raptors such as the ferruginous hawk and golden eagle, to waterfowl and shorebirds like the northern pintail and piping plover, and declining grassland birds such as Baird's sparrow and McCown's longspur.

The NGPJV implementation plan (Pool and Austin 2006) has a mission to seek new opportunities and foster new partnerships while strengthening existing alliances for the protection, enhancement, and restoration of prairie, wetland, riparian, and forest ecosystems. These conservation actions will place an emphasis on sustaining and increasing populations of migratory birds and resident birds, consistent with bird conservation objectives in regional, national, and international plans.

RECOVERY PLANS FOR FEDERALLY LISTED THREATENED OR ENDANGERED SPECIES

Where federally listed threatened or endangered species occur at the 12 refuges, the Service will follow management goals and strategies in the species' recovery plans. The list of threatened or endangered species that occur at the refuges will change as species are listed or delisted, or as listed species are discovered on refuge lands.

The refuges are following the recovery plans for the following species:

- piping plover (threatened) in the northern Great Plains (USFWS 1994a)
- whooping crane (endangered) (USFWS 1994b)
- interior least tern (endangered) (USFWS 1990)
- western prairie fringed orchid (threatened) (USFWS 1996)

STATE COMPREHENSIVE CONSERVATION WILDLIFE STRATEGY

Over the past several decades, documented declines of wildlife populations have occurred nationwide. Congress created the state wildlife grant (SWG) program in 2001. This program provides states and territories with federal dollars to support conservation aimed at preventing wildlife from becoming endangered and in need of protection under the Endangered Species Act. The SWG program represents an ambitious endeavor to take an active hand in keeping species from becoming threatened or endangered in the future.

According to the SWG program, each state, territory, and the District of Columbia must complete a comprehensive wildlife conservation strategy (CWCS) by October 1, 2005, to receive future funding.

These strategies will help define an integrated approach to the stewardship of all wildlife species, with additional emphasis on species of concern and habitats at risk. The goal is to shift focus from single-species management and highly specialized individual efforts to a geographically based, landscape-oriented, fish and wildlife conservation effort. The Service approves these plans and administers SWG program funding.

North Dakota's CWCS is a strategic vision with the goal of preserving the state's wildlife diversity. It is intended to identify species of greatest conservation need, provide fundamental background information, strategic guidance, and a framework for developing and coordinating conservation actions to safeguard all fish and wildlife resources.

The state of North Dakota has taken a landscape approach to conservation planning, which has numerous advantages. It allows the state to link species requiring conservation to a key landscape and habitat, often within a specific geographic area. This approach also

provides a comprehensive listing of all other fish and wildlife using the landscape, while providing relative plant and soil conditions applicable to the landscape. A landscape approach helps to identify corresponding conservation actions needed across the landscape, along with the potential partners who are or could be addressing them. Three tools are used to identify landscape components: land cover information, ecoregions, and statistical models. Ecoregions were defined based on general similarity of geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. The CWCS recognizes four ecoregions commonly referred to as the Red River Valley, Drift Prairie, Missouri Coteau, and Missouri Slope.

The CWCS identified conservation problems encountered in North Dakota that apply to all four of the ecoregions. Direct loss of habitat is a key issue because very little, native, tall-grass prairie remains in the state. The conservation action will be to protect native tall-grass prairie where possible.

Habitat fragmentation is occurring throughout the state due to construction of roads, shelterbelts, and agricultural practices. Actions will include the removal of dilapidated shelterbelts or stands of trees within grasslands. Habitat degradation occurring from improper grazing practices and loss of the historical fire regime can be fixed by carrying out grazing systems to benefit tall-grass species and promoting the use of fire. Other actions include extending the time between haying and grazing, promoting mid-term required management, and providing incentives to defer or idle cutting of tame grass (cultivated, nonnative grass such as smooth brome). Invasive plants, including noxious weeds such as leafy spurge, will be controlled through biological and chemical methods.

The CWCS for the state of North Dakota was reviewed and information was used during development of the CCP. Carrying out CCP habitat goals and objectives will support the goals and objectives of the CWCS.

1.5 Ecosystem Description and Threats

The Service has adopted watersheds as the basic building blocks for carrying out ecosystem conservation. The refuges span two Service-designated ecosystems—the Missouri River main stem ecosystem and the Hudson Bay ecosystem—with the majority falling within the former (see figure 4, map of ecosystems).

Major threats identified for these ecosystems include native prairie conversion to cropland, expansion of invasive plant species, and wetland drainage and degradation. The refuges play a major role in (1) continued leadership and support of regional initiatives such as the PPJV, and (2) continued support of our conservation partners including the NDGF and private organizations such as Ducks Unlimited.



Marbled Godwit

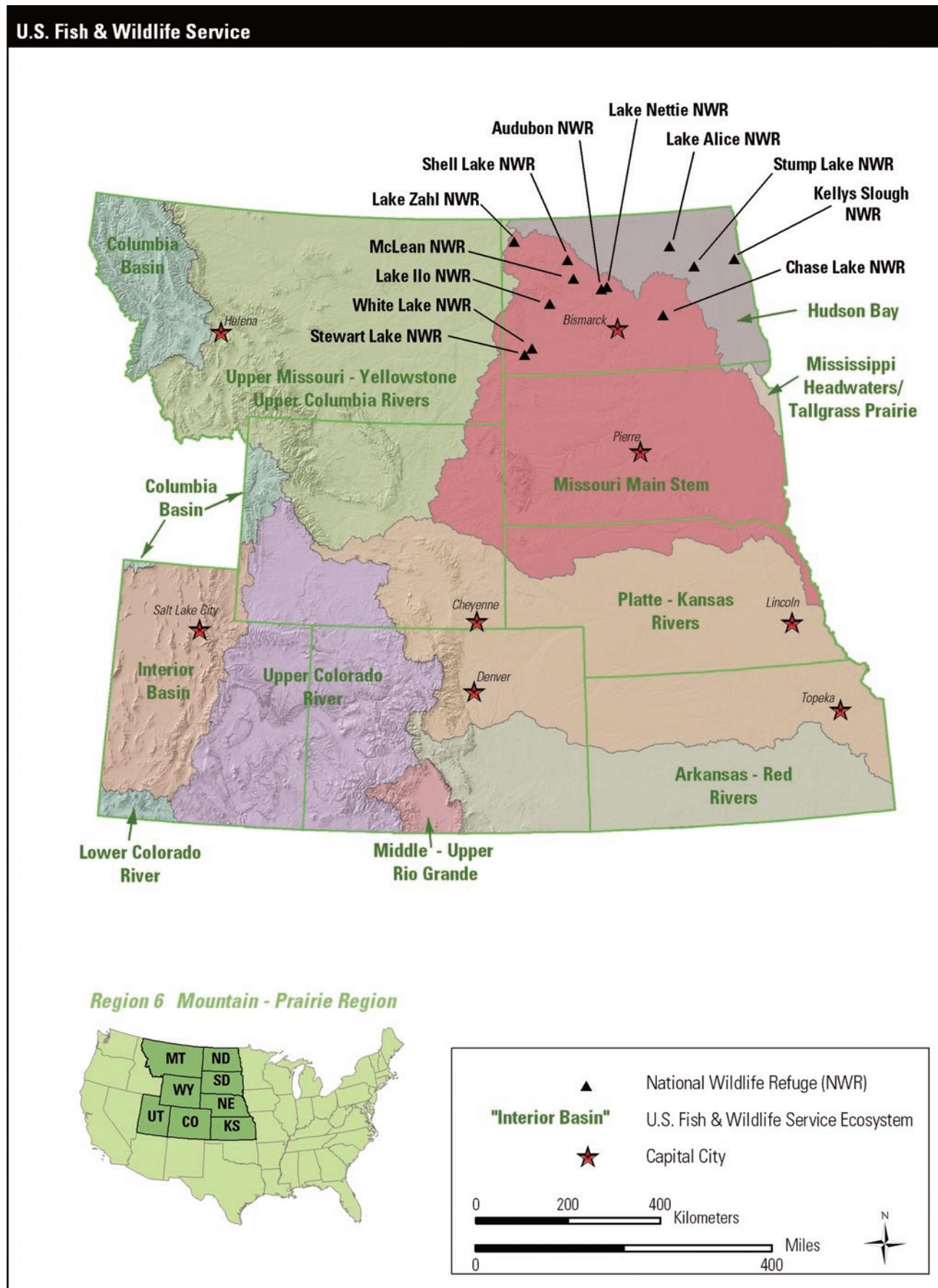


Figure 4. Map of ecosystems in region 6 of the U.S. Fish and Wildlife Service.

In addition, the Service is continually working with private landowners through the Partners for Fish and Wildlife Program to restore and improve grassland and wetland habitats on private lands.

1.6 Planning Process

This CCP for the refuges is intended to comply with the Improvement Act, NEPA, and the implementing regulations of these acts.

The Service issued its Refuge System planning policy in 2000. This policy established requirements and guidance for refuge plans—including CCPs and step-down management plans—to ensure that planning efforts comply with the Improvement Act. The planning policy identified several steps of the CCP and environmental analysis process (see figure 5, steps in the planning process). Table 1 summarizes accomplishment of the main planning steps for this CCP effort.

The Service began “preplanning” in August 2006. The planning team was Service personnel from the affected North Dakota refuges; the regional divisions of refuge planning, realty, and education and visitor services; and the NDGF (see Appendix B, Preparers and Contributors). During preplanning, the team developed a mailing list, internal issues, and a special qualities list. The planning team identified the current status

of refuge programs, compiled and analyzed relevant data, and determined the purposes of the refuges.

A notice of intent to prepare the CCP was published in the *Federal Register* on February 28, 2007. Public scoping began in April 2007, after a planning update and comment form was mailed to interested parties in March 2007.

The Service complied with NEPA through public involvement and environmental analysis (see Appendix C, Public Involvement).

SCOPING

The notice of intent started scoping for the CCP. Scoping is the process of obtaining information from the public for input into the planning process. Table 1 summarizes all scoping activities.

The Service received 25 written comments throughout the scoping process. The planning team used the comments collected from scoping meetings and correspondence in the development of a final list of issues addressed in this CCP (see chapter 2, 2.6, Planning Issues). In addition, over the course of preplanning and scoping, the planning team collected available information about the resources of the refuges and surrounding areas. Chapter 3, Refuge Resources and Descriptions, summarizes this information.

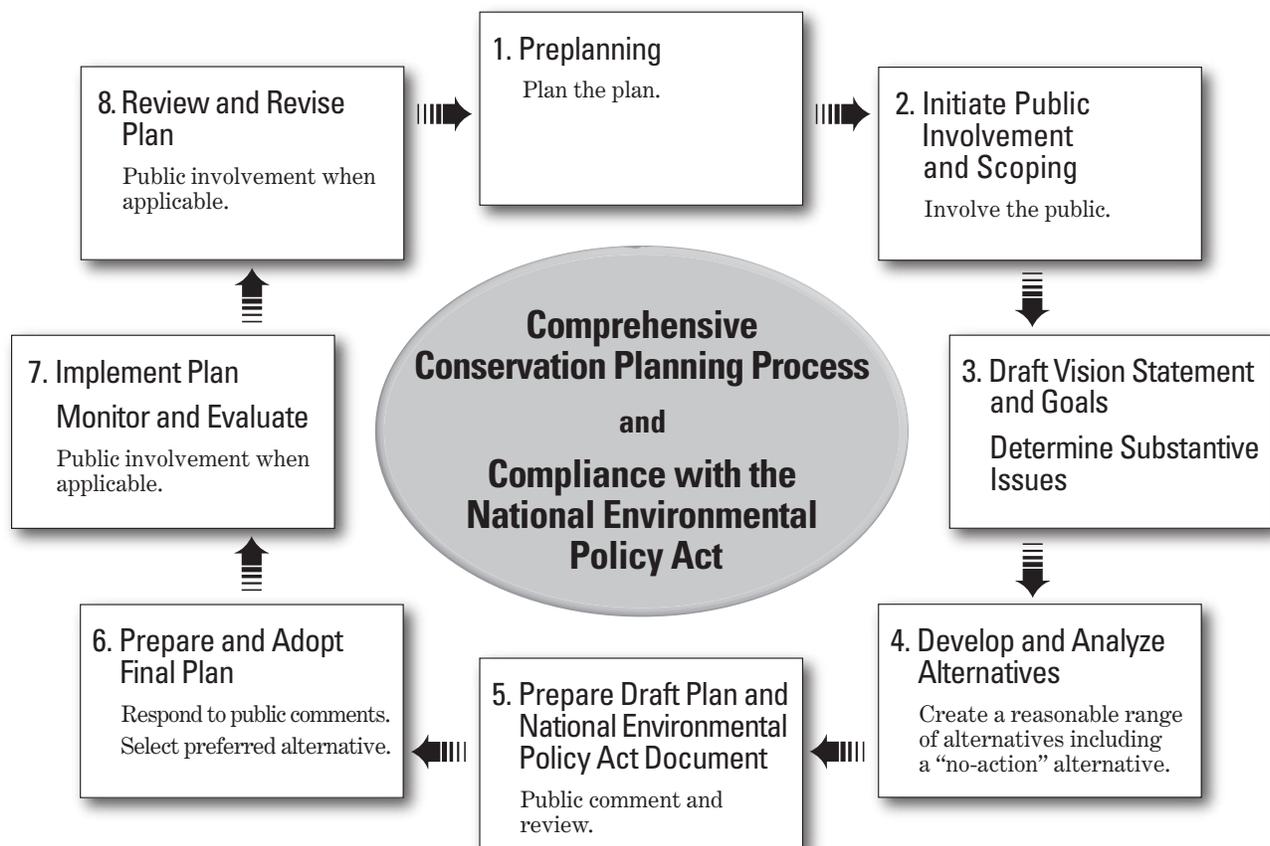


Figure 5. Steps in the planning process.

Table 1. Planning Process Summary for the 12 Refuges, North Dakota.

<i>Date</i>	<i>Event</i>	<i>Outcome</i>
May 2006	Initial Service meeting.	The project leaders for the North Dakota refuges and other Service staff completed an overview of the CCP process.
August 2006	Service field review.	The Service finalized the planning team. The planning team reviewed biological and visitor services issues.
December 2006	Service kick-off meeting.	The planning team identified the refuge purposes; developed a list of initial issues and qualities; started the mailing list; identified biological and mapping needs; and planned public scoping activities.
February 2007	Publication in the <i>Federal Register</i> of the notice of intent to prepare a CCP.	The Service officially notified the public about the CCP to be developed for the refuges.
March 2007	Initial public contact: mailing of planning updates, comment forms, and postage-paid return envelopes.	The planning team offered the public an opportunity to learn about the CCP and provide comments.
March–April 2007	Six public meetings.	The planning team offered the public an opportunity to learn about the CCP and provide comments.
March–April 2007	Development of alternatives.	The planning team developed alternatives for management of the refuges.
February–May 2007	Development of biological objectives.	The planning team developed objectives and strategies for the biological aspects of management at the refuges.
June–July 2007	Development of visitor services objectives.	The planning team developed objectives and strategies for visitor services at the refuges.
May 2008	Service review of the draft CCP and EA.	The Service’s regional staff reviewed the draft CCP and EA and provided comments to the planning team.
August 2008	Draft CCP and EA release to the public.	The Service published and distributed the draft CCP and EA. The public had 30 days to review and comment on the document.
September 2008	Nine public meetings.	Refuge staffs presented the draft CCP and EA and collected public comments.
September 2008	Final plan approval.	The planning team addressed the public comments and finalized the CCP. The regional director determined a “finding of no significant impact” and approved the final plan.

PUBLIC COORDINATION

A mailing list of more than 1,025 names includes private citizens; local, regional, and state government representatives and legislators; other federal agencies; and interested organizations (see Appendix C, Public Involvement).

In April 2007, the Service sent the first planning update issue to everyone on the mailing list. The planning update provided information about the history of the refuges and the CCP process, along with an invitation to public scoping meetings. A comment form and postage-paid envelope to gave the public an opportunity to easily provide comments.

In addition, the local media announced the public meetings.

The Service held six public scoping meetings during March–April 2007 (see table 1 for details). Each attendee received a comment form to submit questions or comments in writing.

STATE COORDINATION

On September 12, 2006, an invitation letter to participate in the CCP process was sent by the Service’s director of region 6 to the director of the NDGF. Two representatives from the NDGF were part of the CCP planning team. Local NDGF wildlife managers and the refuge staffs maintain excellent and ongoing working relations, which preceded the start of the CCP process.

The NDGF’s mission is to “protect, conserve, and enhance fish and wildlife populations and their habitats for sustained public consumptive and nonconsumptive uses.” The NDGF is responsible for managing natural resource lands owned by the state, in addition to enforcement responsibilities for the state’s migratory birds and endangered species. The state manages more than 78,000 acres in support of wildlife, recreation, and fisheries.

TRIBAL COORDINATION

On October 19, 2006, the Service’s director of region 6 sent a letter to six Native American tribal governments in North Dakota, South Dakota, and Minnesota:

- Sisseton-Wahpeton Oyate
- Spirit Lake Tribal Council
- Standing Rock Sioux
- Three Affiliated Tribes
- White Earth Band of Chippewa
- Turtle Mountain Band of Chippewa

With information about the upcoming CCP, the letter invited tribal recipients to serve on the planning team. None of the tribes expressed interest in participating in the process.

DRAFT PLAN

The Service considered all input during development of the draft CCP and environmental assessment (EA). This included changes to the refuges’ current management that were suggested by the public and other groups. The planning process ensured that issues with the greatest effects on the refuges were resolved or given priority.

After scoping and detailed analysis, the planning team developed three management alternatives that best addressed the issues. The Service identified alternative B as the proposed action.

On August 28, 2008, the Service published a notice of availability in the *Federal Register* to announce that the draft CCP and EA document was available for a 30-day public review. A summary of written comments gathered during the review period, along with the Service’s responses, is in Appendix C, Public Involvement.

FINAL PLAN

After an analysis of the public comments, the Service’s director of region 6 selected alternative B as the preferred alternative. Subsequently, the planning team produced this final CCP, based on the draft CCP with minor changes. The biological evaluation for the final CCP determined that there would likely be no adverse effect on threatened or endangered species or critical habitats as a result of the actions of the CCP (see Appendix D, Section 7 Biological Evaluation).

The regional director approved the final CCP in September 2008 after a “finding of no significant impact” (see Appendix E, Environmental Compliance).

Chapter 4, Management Direction, outlines the long-term guidance for management decisions, sets forth objectives and strategies to address the purposes for the refuges and meet goals, and identifies the Service’s best estimate of future needs. The CCP details program levels that are sometimes substantially above current budget allocations and, as such, are primarily for strategic planning purposes.

2 The Refuges



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The North Dakota refuges provide environmental education opportunities for school children.

This chapter describes the establishment, special values, purposes, vision, goals, and planning issues for the 12 North Dakota refuges.

2.1 Establishment, Acquisition, and Management History

The 12 national wildlife refuges are located throughout the state of North Dakota. All 12 refuges are managed toward a common primary purpose to provide habitat and breeding ground for migrating waterfowl, shorebirds, and other wildlife. The refuges were established under several different authorities:

- Audubon National Wildlife Refuge was established under the authority of the Fish and Wildlife Coordination Act.
- Under executive order, President Theodore Roosevelt established 2 of the 12 refuges as preserves and breeding grounds for native birds: Chase Lake and Stump Lake national wildlife refuges.
- Under executive order, President Franklin D. Roosevelt established 8 of the 12 refuges as

breeding grounds for migratory birds and other wildlife: Kellys Slough, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Shell Lake, Stewart Lake, and White Lake national wildlife refuges.

- Lake Alice National Wildlife Refuge was established under the authority of the Migratory Bird Conservation Act.

A brief description of each refuge follows. Maps for each refuge (figures 6–17) are after the description of White Lake National Wildlife Refuge.

AUDUBON NATIONAL WILDLIFE REFUGE

Established as Snake Creek National Wildlife Refuge in 1955 under the Fish and Wildlife Coordination Act, the refuge provides habitat for a wide variety of wildlife. Developed to compensate for habitat lost when Garrison Dam flooded Missouri River bottomlands, the refuge was renamed in 1967 in honor of John James Audubon. A 19th century naturalist and wildlife artist, Audubon spent the summer of 1843 in what is now northwestern North Dakota collecting and painting wildlife of the northern plains.

The Service manages the Audubon National Wildlife Refuge (figure 6); the U.S. Army Corps of Engineers owns the land. The refuge is in McLean County in west-central North Dakota; its headquarters are in Coleharbor, North Dakota, from where it is administered as part of the Audubon National Wildlife Refuge Complex.

Much of the 14,739-acre refuge is comprised of Lake Audubon (10,421 acres). The refuge is an important feeding and resting area for waterfowl migrating in the Central Flyway. More than 3,000 acres of grassland are habitat for upland wildlife of all sizes including Baird's and Le Conte's sparrows, sharp-tailed grouse, fox, coyote, and white-tailed deer. The refuge also has cropland and several large-tree plantings. The 370 acres of wetland provide habitat for shorebirds, gulls, terns, rails, and cranes. Almost 100 islands dot Lake Audubon—enough for 450 acres of giant Canada goose and duck-nesting habitat.

Visitor activities include a 7.5-mile interpretive auto tour route for exploring (1) the area's history, (2) agriculture's role in benefiting wildlife, (3) wetlands and native prairie, and (4) the refuge's contribution in restoration of the giant Canada goose—a bird once on the verge of extinction on North Dakota's prairies. A 1-mile interpretive hiking trail offers a first-hand look at prairie and wetlands. The Service allows fishing during winter and hunters have opportunities for upland birds and deer during special seasons.

CHASE LAKE NATIONAL WILDLIFE REFUGE

Large numbers of American white pelicans nested at Chase Lake in 1863 when General Sibley was active in the area. In 1872, the Northern Pacific Railroad reached Jamestown, North Dakota, and brought a flood of settlers to the area. Market hunting and indiscriminate killing had drastic effects on wildlife populations before the establishment of laws protecting wildlife. In 1905, local resident H.H. McCumber reported about 500 pelicans were left on the lake. By the time the government investigated the area, only 50 pelicans remained. On August 28, 1908, President Theodore Roosevelt established Chase Lake National Wildlife Refuge as a “reserve and breeding area for native birds,” making it one of the oldest refuges in the country.

Found in south-central North Dakota, the 4,440-acre refuge is in Stutsman County and has its headquarters in Woodworth, North Dakota (see figure 7). The refuge is part of the Arrowwood National Wildlife Refuge Complex.

The refuge and surrounding area provide breeding and resting habitat for more than 293 bird species, including the largest breeding colony of American white pelicans in North America. The American Bird Conservancy has designated Chase Lake National Wildlife Refuge as one of America's top 100 globally important bird areas. The refuge includes Chase



© Michael Mauro

Chase Lake National Wildlife Refuge and the surrounding area support North America's largest breeding colony of the American white pelican.

Lake, along with native prairie, dense nesting cover, and an amazing density of wetlands. Most of this land has not been altered since Euro-American settlement times. Thus, Chase Lake National Wildlife Refuge was also designated as Chase Lake Wilderness in 1975. This is one of only two refuges in North Dakota with designated wildernesses.

The refuge offers opportunities for hunting and wildlife observation.

KELLYS SLOUGH NATIONAL WILDLIFE REFUGE

In 1936, President Franklin D. Roosevelt established Kellys Slough National Wildlife Refuge “as a refuge and breeding ground for migratory birds and other wildlife.” The refuge was established to develop and manage a system of wetlands and grasslands that is unique to the Red River Valley of North Dakota.

The 1,270-acre refuge (figure 8) is in Grand Forks County in northeastern North Dakota; its headquarters are in Devils Lake, North Dakota, from where it is administered as part of the Devils Lake Wetland Management District Complex.

The refuge contains an intermittent stream that flows into the Turtle River, a tributary of the Red River. Since the 1960s, the Service has been purchasing lands around the original refuge with federal Duck Stamp money and developing these into waterfowl production areas. In 1991, the Service, with the help of Ducks Unlimited, began constructing several dikes and water control structures with funding from two North American Waterfowl Management Plan grants.

Recent and future land purchases are aimed at acquiring land needed to develop more managed pools for waterfowl on the refuge.

Kellys Slough National Wildlife Refuge supports a diversity of wetland and grassland wildlife, while providing for wildlife-dependent recreation including environmental education and interpretation. The Service does not allow hunting or fishing at the refuge.

Although waterfowl production areas are open to public hunting and other wildlife-dependent recreational use by regulation, several of these areas within and surrounding the original refuge were formally closed to the public through administrative procedures and published in 50 CFR 32.53 (see figure 8). Several other waterfowl production areas near the refuge remain open to public hunting and other recreational activities (see figure 8).

LAKE ALICE NATIONAL WILDLIFE REFUGE

Lake Alice National Wildlife Refuge (figure 9) was established in 1935 under the Migratory Bird Conservation Act as a sanctuary for migratory birds. The refuge is a point of major waterfowl concentration during spring and fall migrations, as well as a significant breeding area for wetland wildlife.

The 12,096-acre refuge is in Ramsey County in northeastern North Dakota; its headquarters are in Devils Lake, North Dakota, from where it is administered as part of the Devils Lake Wetland Management District Complex.

The relatively flat landscape of the area is intertwined with wetlands and marshes. Often called prairie potholes, these wetlands were created by large continental glaciers during the last ice age and provide excellent habitat for a variety of wetland wildlife. Tens of thousands of snow geese, Canada geese, sandhill cranes, and ducks use the lake and surrounding lands each year. Most of the area within the refuge was farmed at one time, so very little native prairie remains.



© Craig Bihrie

Northern pintail is a common duck at the refuges.

A mixture of grasses and legumes have been planted throughout most of the refuge to provide cover for a variety of ground-nesting birds, as well as winter cover and food for many species of resident wildlife.

The refuge provides many photography and wildlife-viewing opportunities, an auto tour, and hiking trails and serves as an outdoor classroom for local schools. The Service allows hunting, but no fishing, at Lake Alice National Wildlife Refuge.

LAKE ILO NATIONAL WILDLIFE REFUGE

Newspaper accounts in the early 1930s indicate Dunn County citizens envisioned creating a lake to enrich their lives. Circumstances became reality in 1936 when a dam was constructed near the confluence of Spring and Murphy creeks. The federal government built the dam as a water conservation project through the Works Progress Administration during the Depression years. Several hundred local citizens were hired during dam construction in 1936 and 1937. The new dam created the Lake Ilo, the first major lake in western North Dakota.

In 1939, Franklin D. Roosevelt signed the executive order establishing Lake Ilo National Wildlife Refuge (figure 10) as a breeding ground for migratory birds and other wildlife. Other refuge purposes include fish- and wildlife-oriented recreation, environmental education, interpretation, conservation of endangered species, and protection of cultural and natural resources.

The 4,033-acre refuge is in Dunn County and has its headquarters in Coleharbor, North Dakota, where it is administered as part of the Audubon National Wildlife Refuge Complex.

Over the years, the Service developed wetlands, shelterbelts, and grassland habitats that created an oasis for both migratory birds and resident wildlife. Lake Ilo covers 1,240 acres with a maximum depth of 15 feet. Refuge uplands, amounting to 2,650 acres, are comprised of native prairie, introduced grasses, cropland, and tree plantings. Refuge management is directed at preserving native plants and animals and creating as much species diversity as possible.

The refuge is unique for its archeological sites dating back 11,000 years. The refuge offers fishing opportunities, but hunting is not allowed.

LAKE NETTIE NATIONAL WILDLIFE REFUGE

President Franklin D. Roosevelt established Lake Nettie National Wildlife Refuge (figure 11) in 1935 as an easement refuge, where there now are fee-title lands and conservation easements. The Service purchased

easements on privately owned land and maintains them as breeding grounds for migratory birds and other wildlife.

Located 5 miles east of Lake Audubon in west-central North Dakota, the 3,055-acre refuge is in McLean County and has its headquarters in Coleharbor, North Dakota, from where it is administered as part of the Audubon National Wildlife Refuge Complex.

Half of the refuge is made up of diverse wetlands. The wetlands are influenced by the water flows of Turtle Creek and agricultural drainage. Uplands, with both native and introduced grass species, make up the other half of Lake Nettie National Wildlife Refuge. In 1962, the Service was authorized to acquire easement lands from private landowners for the purpose of wetland protection, water management, and waterfowl and other wildlife management. In 1966, the Migratory Bird Commission approved acquisition of additional acreage within the meander line of Lake Nettie. In 1997, the Service bought additional acreage under the Garrison Diversion Unit Reformulation Act of 1986. This act required mitigation for Service lands flooded at Audubon National Wildlife Refuge.

The refuge offers opportunities for hunting white-tailed deer. The Service does not allow fishing.

LAKE ZAHL NATIONAL WILDLIFE REFUGE

Lake Zahl National Wildlife Refuge (figure 12) was established on June 15, 1939 as a “breeding ground for migratory birds and other wildlife.”

The 3,823-acre refuge is in Williams County in northwestern North Dakota; its headquarters are in Crosby, North Dakota, from where it is administered by the Crosby Wetland Management District.

Encompassing 3,219 acres in fee title and 604 acres in easements, the refuge includes two large wetland pools totaling 1,226 acres and 350 acres of seasonal wetlands. A dam constructed by the Civilian Conservation Corps in the 1940s maintains the two pools; Ducks Unlimited repaired and upgraded the dam in the 1990s. The wetlands are used by all species of prairie waterfowl, as well as Wilson’s phalarope; ring-billed and California gulls; and common, Forster’s, and black terns. Lake Zahl was one of the original release sites for the giant Canada goose reintroduction program. Refuge wetlands are important feeding and resting areas for waterfowl migrating in the Central Flyway. Ten artificial islands constructed by Ducks Unlimited provide secure nesting habitat for waterfowl.

Upland habitat includes more than 1,200 acres of native prairie grassland, plus 400 acres of areas seeded with tame grass. The grasslands provide for a wide variety of songbirds including Le Conte’s sparrow, Baird’s sparrow, Sprague’s pipit, Nelson’s sharp-tailed sparrow, and chestnut-collared longspur. The uplands are also home to red fox, gray coyote, white-tailed deer, sharp-tailed grouse, and ring-necked

pheasant. In an attempt to curtail winter depredation in the area, 50 acres of cropland provide feed for a large, overwintering population of white-tailed deer.

Visitors use Lake Zahl National Wildlife Refuge for bird watching and hunting. Lake Zahl is open annually for hunting white-tailed deer and upland game birds. The Service does not allow fishing at the refuge.



Grasslands across the refuges are habitat to many songbirds including the Sprague’s pipit.

© Bob Gress

MCLEAN NATIONAL WILDLIFE REFUGE

Originally established as Lake Susie Migratory Waterfowl Refuge by Franklin D. Roosevelt in 1939, the refuge changed its name to McLean National Wildlife Refuge with the same purpose of protecting breeding grounds for migratory birds and other wildlife.

The 760-acre refuge (figure 13) is in McLean County in western North Dakota; its headquarters are in Coleharbor, North Dakota, from where it is administered as part of the Audubon National Wildlife Refuge Complex. This refuge has fee-title lands and conservation easements.

The refuge includes acreage owned by the North Dakota State Land Department as an easement. A dam built in the 1930s and reconstructed in 2003 creates the large wetland that is locally known as Lake Susie and provides excellent wetland habitat for migratory birds.

The Service does not allow hunting or fishing at the refuge.

SHELL LAKE NATIONAL WILDLIFE REFUGE

President Franklin D. Roosevelt established Shell Lake National Wildlife Refuge (figure 14) on June 12, 1939, as a refuge for breeding migratory birds and other wildlife.

Found in northwestern North Dakota, the 1,835-acre refuge is in Mountrail County; its headquarters are in Kenmare, North Dakota, from where it is administered as part of the Lostwood Wetland Management District Complex. This refuge has fee-title lands and conservation easements.

The refuge comprises 785 acres in fee-title and 1,050 acres in easements. The refuge includes Shell Lake, a 450-acre area of open water and wetland that provides excellent habitat for all species of prairie waterfowl, as well as Wilson's phalarope; ring-billed and California gulls; and common, Forster's, and black terns. In many years, especially in the fall, Shell Lake is the only wetland in the immediate area that provides a critical resting area for migratory waterfowl.

Uplands, comprised of native prairie and introduced grasses, provide for a wide variety of breeding songbirds including Le Conte's sparrow, Baird's sparrow, Sprague's pipit, Nelson's sharp-tailed sparrow, and chestnut-collared longspur. Other common wildlife species are red fox, coyote, white-tailed deer, sharp-tailed grouse, and ring-necked pheasant.

Public use is restricted to protect the integrity of Shell Lake National Wildlife Refuge as a sanctuary for breeding and migratory birds. However, opportunities for wildlife viewing of large concentrations of migratory waterfowl exist from adjacent public roads. The Service does not allow hunting or fishing at the refuge.

STEWART LAKE NATIONAL WILDLIFE REFUGE

By executive order in 1941, President Franklin D. Roosevelt established Stewart Lake National Wildlife Refuge (figure 15) as a breeding ground for migratory birds and other wildlife.

The 2,230-acre refuge is in Slope County in southwestern North Dakota; its headquarters are in Coleharbor, North Dakota, from where it is administered as part of the Audubon National Wildlife Refuge Complex. This refuge has fee-title lands and conservation easements.

The centerpiece of the refuge is a 197-acre impoundment constructed in 1936. This impoundment wetland serves as breeding, brooding, and migration habitat for migratory birds and other wildlife. Large wetlands are not typical in western North Dakota and Stewart Lake serves as an oasis in a generally well-drained landscape. The uplands surrounding the impoundment are characterized by short- to midgrass prairie and planted wildlife cover.

The Service does not allow hunting or fishing at Stewart Lake National Wildlife Refuge.

STUMP LAKE NATIONAL WILDLIFE REFUGE

By executive order in 1905, President Theodore Roosevelt established Stump Lake National Wildlife Refuge (figure 16), the third national wildlife refuge in the nation and the first in North Dakota. Roosevelt established the refuge as a preserve and breeding ground for native birds; the refuge originally consisted of four small islands. Historically, Stump Lake was a nationally significant staging area for canvasbacks and tundra swans due to the uniquely large beds of sago pondweed.

Found in eastern North Dakota, the 27-acre refuge is in Nelson County; its headquarters are in Devils Lake, North Dakota, from where it is administered as part of the Devils Lake Wetland Management District Complex. This refuge has fee-title lands.

At the time of refuge establishment in 1905, the elevation of Stump Lake was 1,411.75 feet at mean sea level (msl). In 1990, the elevation of the lake was approximately 1,400 feet msl. In 1993, the levels of Stump Lake and adjacent Devils Lake began rising. By 2005, the original refuge islands were completely inundated. Stump and Devils lakes equalized at 1,447 feet msl in 2007, effectively placing the highest elevation of the original islands under 15 feet of water.

The Service has closed this refuge to the public.

WHITE LAKE NATIONAL WILDLIFE REFUGE

By executive order in 1941, President Franklin D. Roosevelt established White Lake National Wildlife Refuge (figure 17) as a breeding ground for migratory birds and other wildlife.

The 1,040-acre refuge is in Slope County in southwestern North Dakota, 4 miles east of Amidon. Refuge headquarters are in Coleharbor, North Dakota, from where it is administered as part of the Audubon National Wildlife Refuge Complex. This refuge has fee-title lands.

Development of the refuge began in 1936 as a cooperative venture between the Bureau of Biological Survey and the Works Projects Administration: a dam, primary spillway, and emergency spillway were constructed and a 190-acre impoundment wetland was created. This wetland serves as valuable wildlife habitat in a landscape that is generally well drained and contains few natural wetlands. Refuge uplands are characterized by short- to midgrass prairie.

The Service has closed this refuge to the public.

LOCATION MAPS

Figures 6–17 are maps of each refuge and show the refuges' boundaries and ownership.

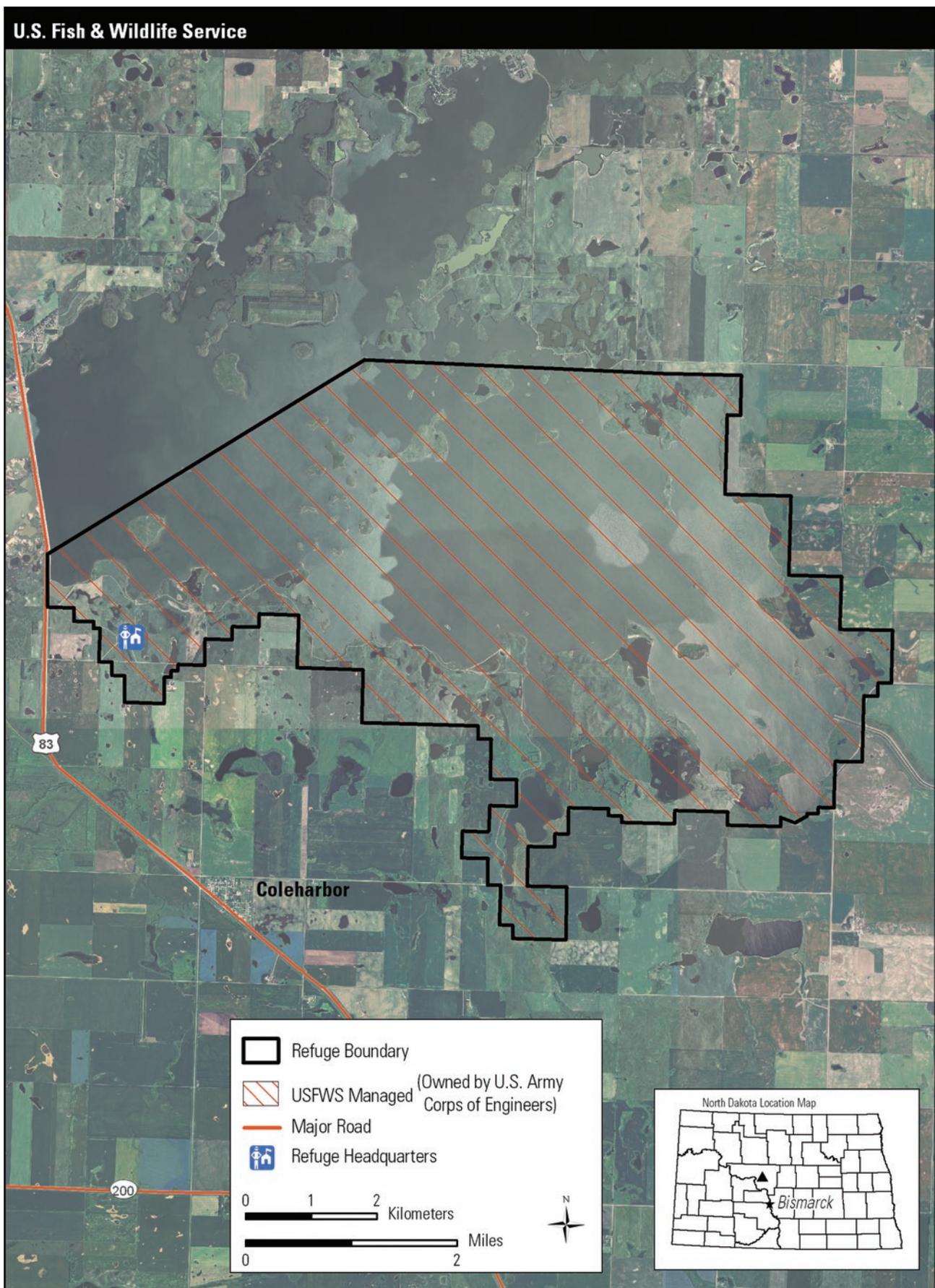


Figure 6. Map of Audubon National Wildlife Refuge, North Dakota.

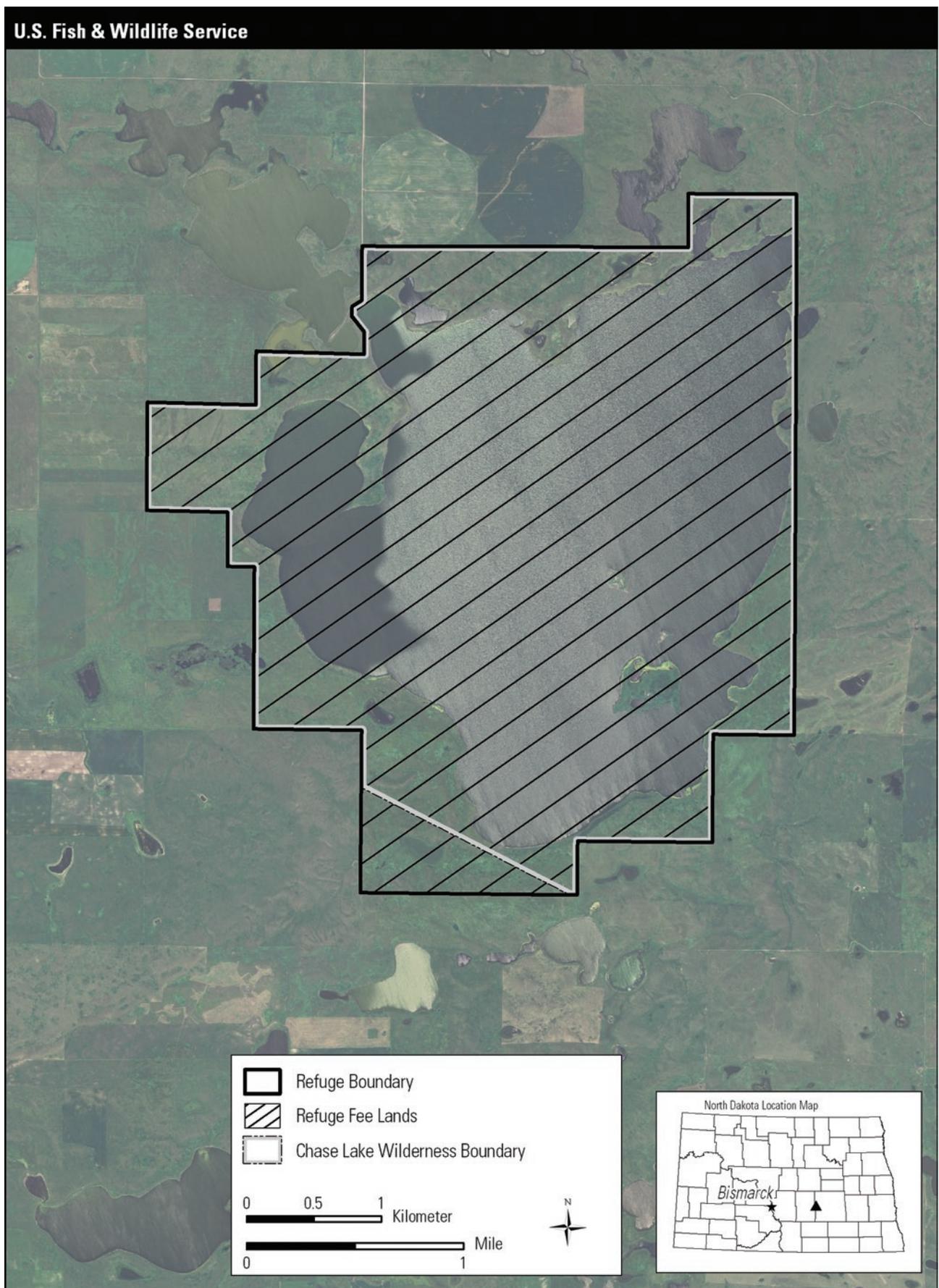


Figure 7. Map of Chase Lake National Wildlife Refuge, North Dakota.

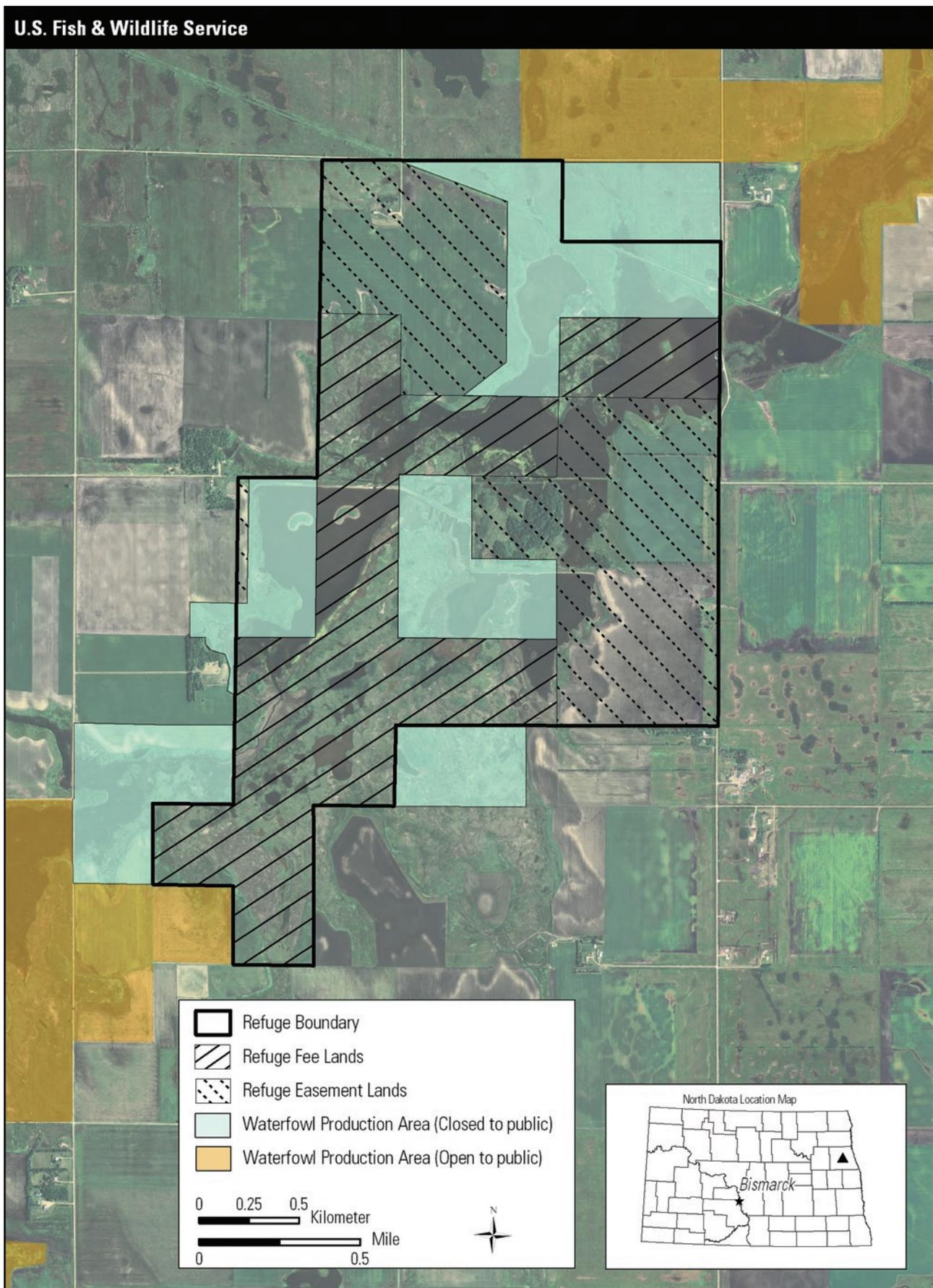


Figure 8. Map of Kellys Slough National Wildlife Refuge, North Dakota.

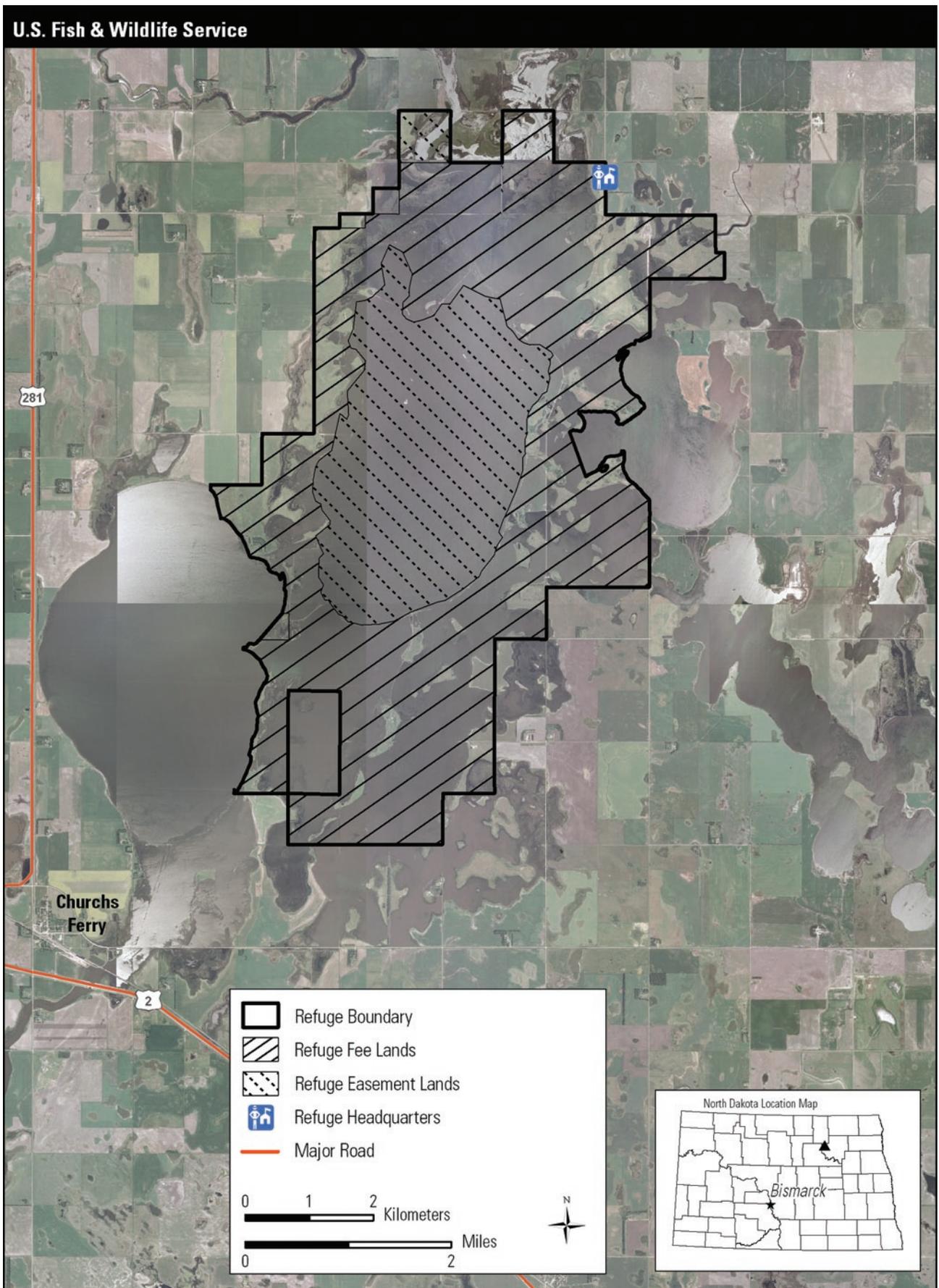


Figure 9. Map of Lake Alice National Wildlife Refuge, North Dakota.

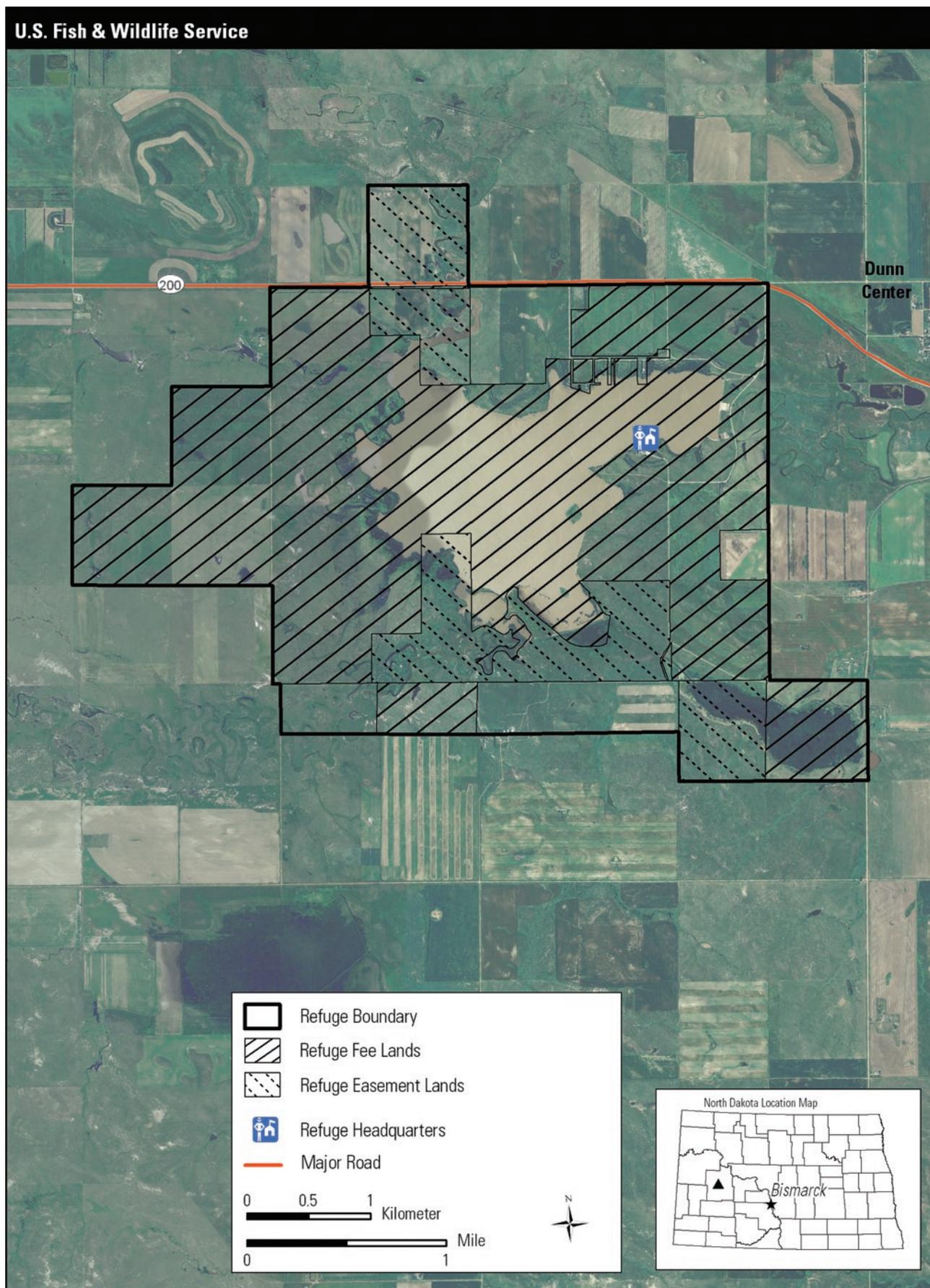


Figure 10. Map of Lake Ilo National Wildlife Refuge, North Dakota.

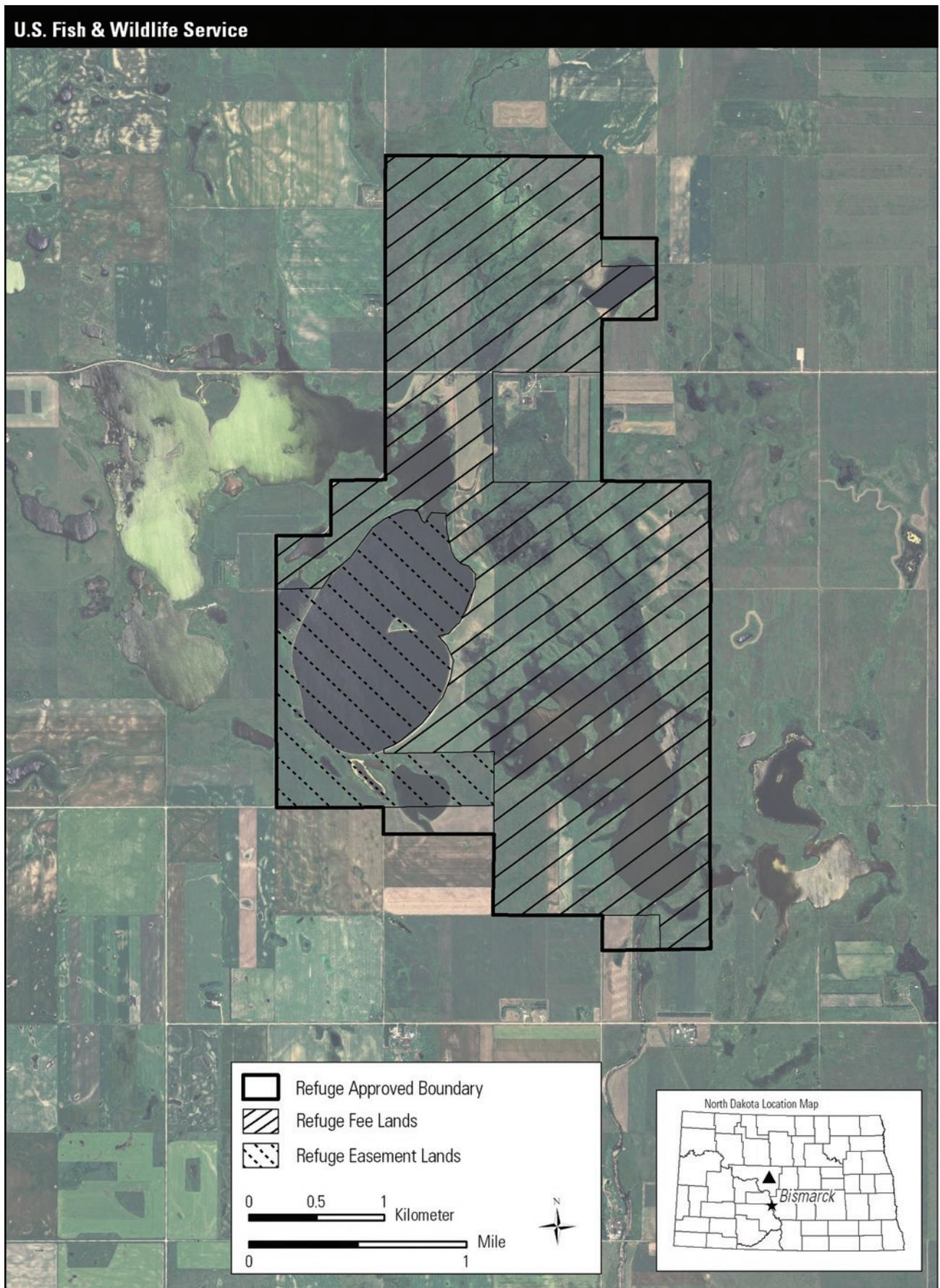


Figure 11. Map of Lake Nettie National Wildlife Refuge, North Dakota.

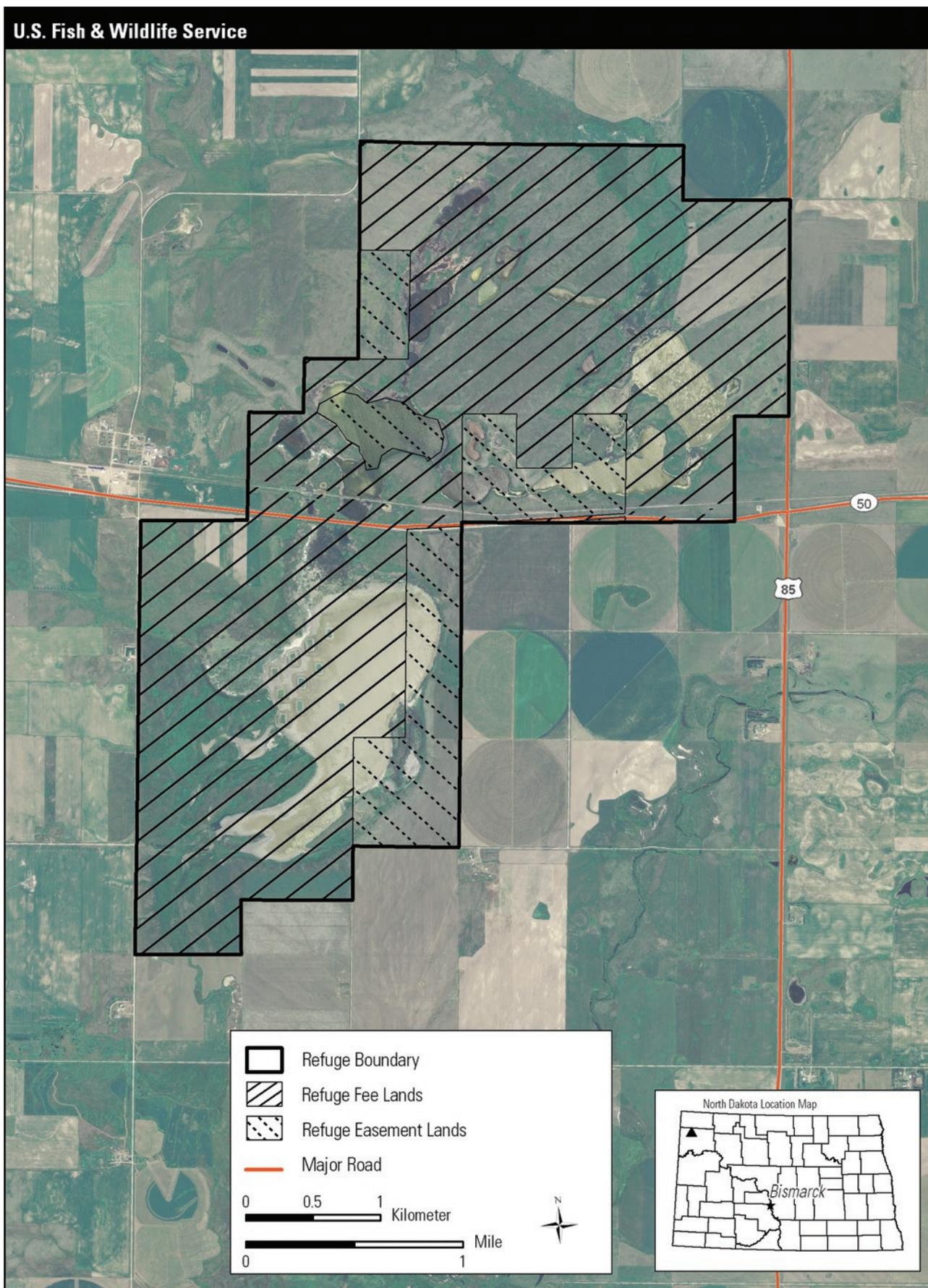


Figure 12. Map of Lake Zahl National Wildlife Refuge, North Dakota.

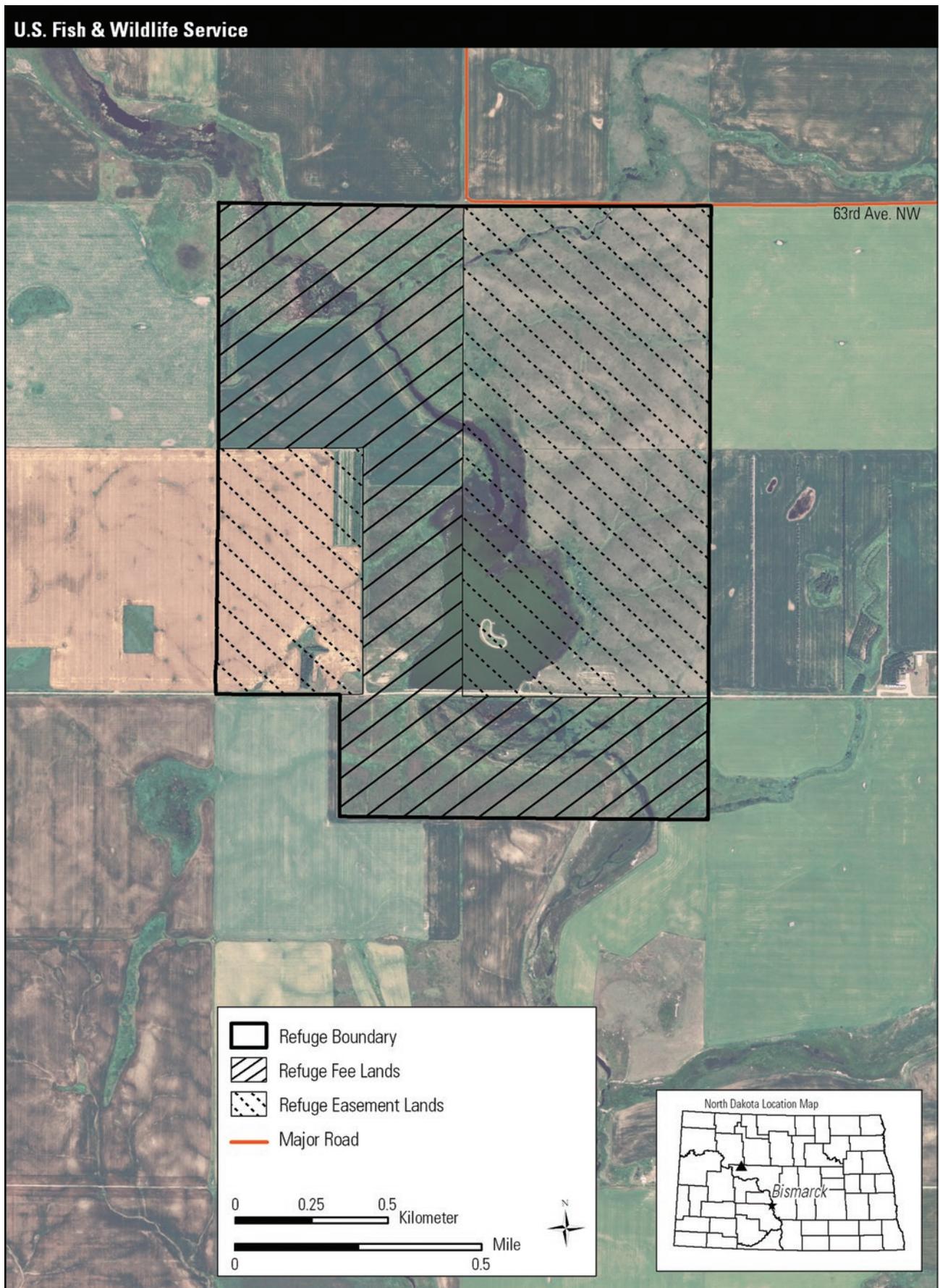


Figure 13. Map of McLean National Wildlife Refuge, North Dakota.

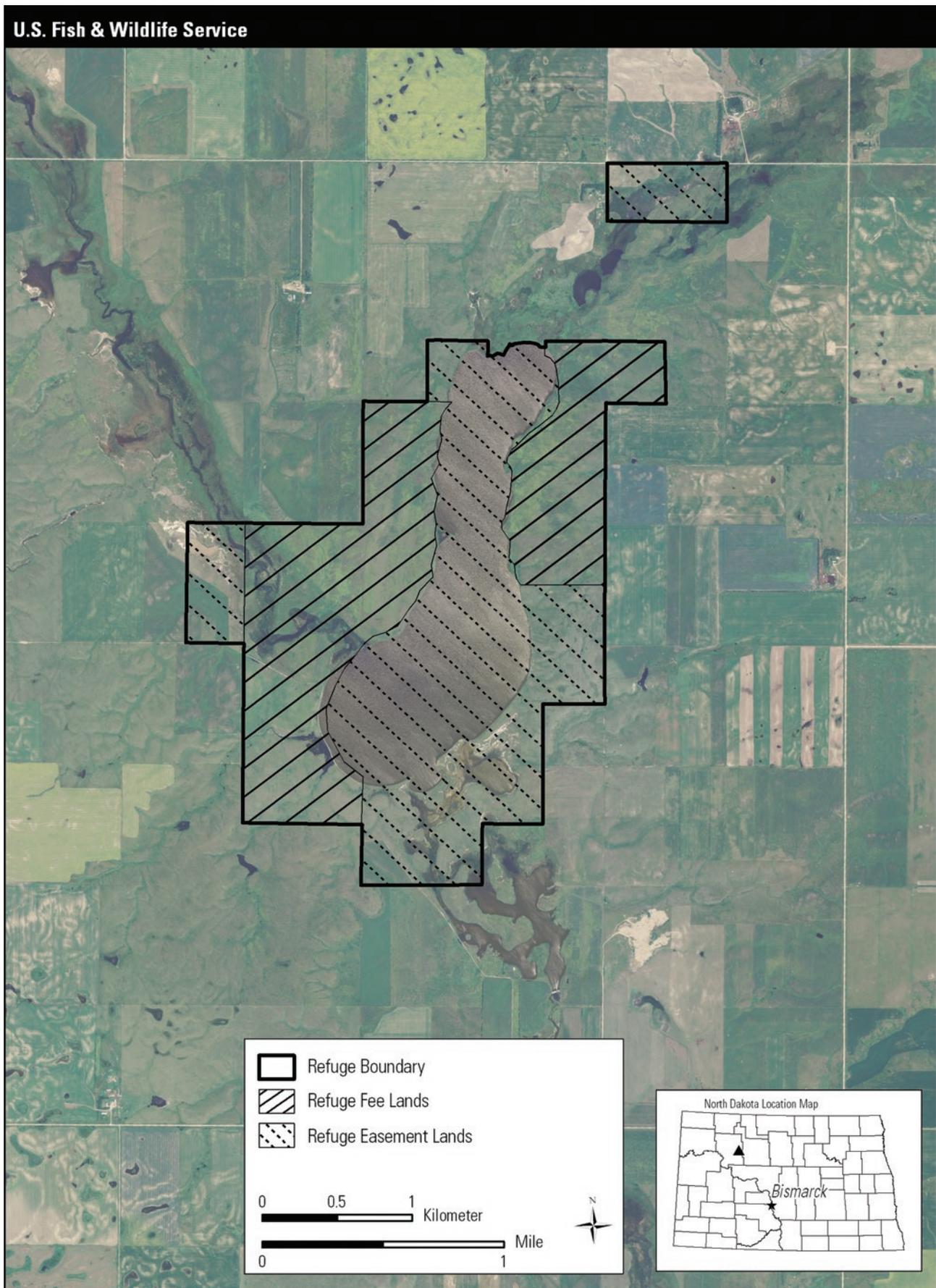


Figure 14. Map of Shell Lake National Wildlife Refuge, North Dakota.

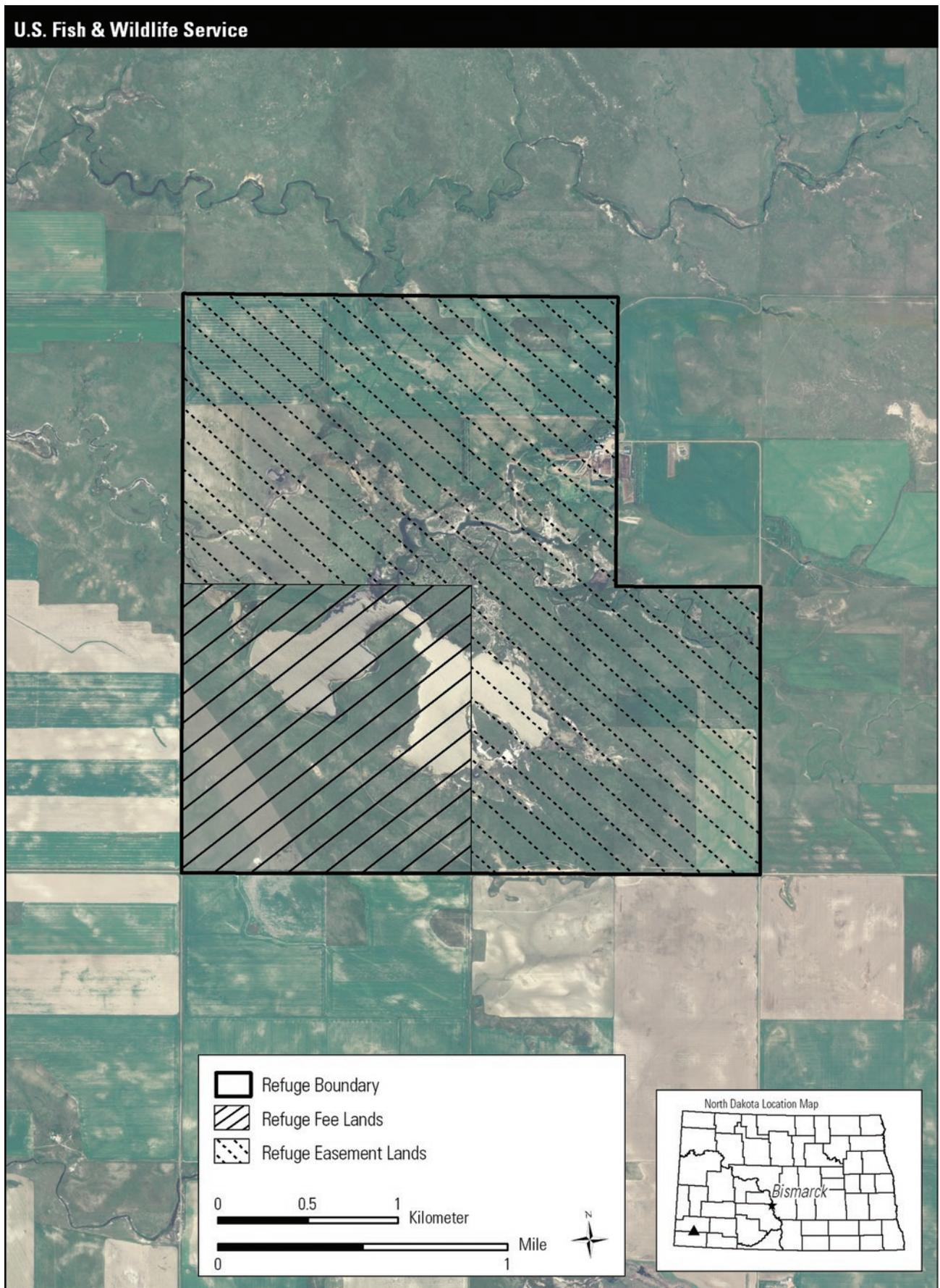


Figure 15. Map of Stewart Lake National Wildlife Refuge, North Dakota.



Figure 16. Map of Stump Lake National Wildlife Refuge, North Dakota.

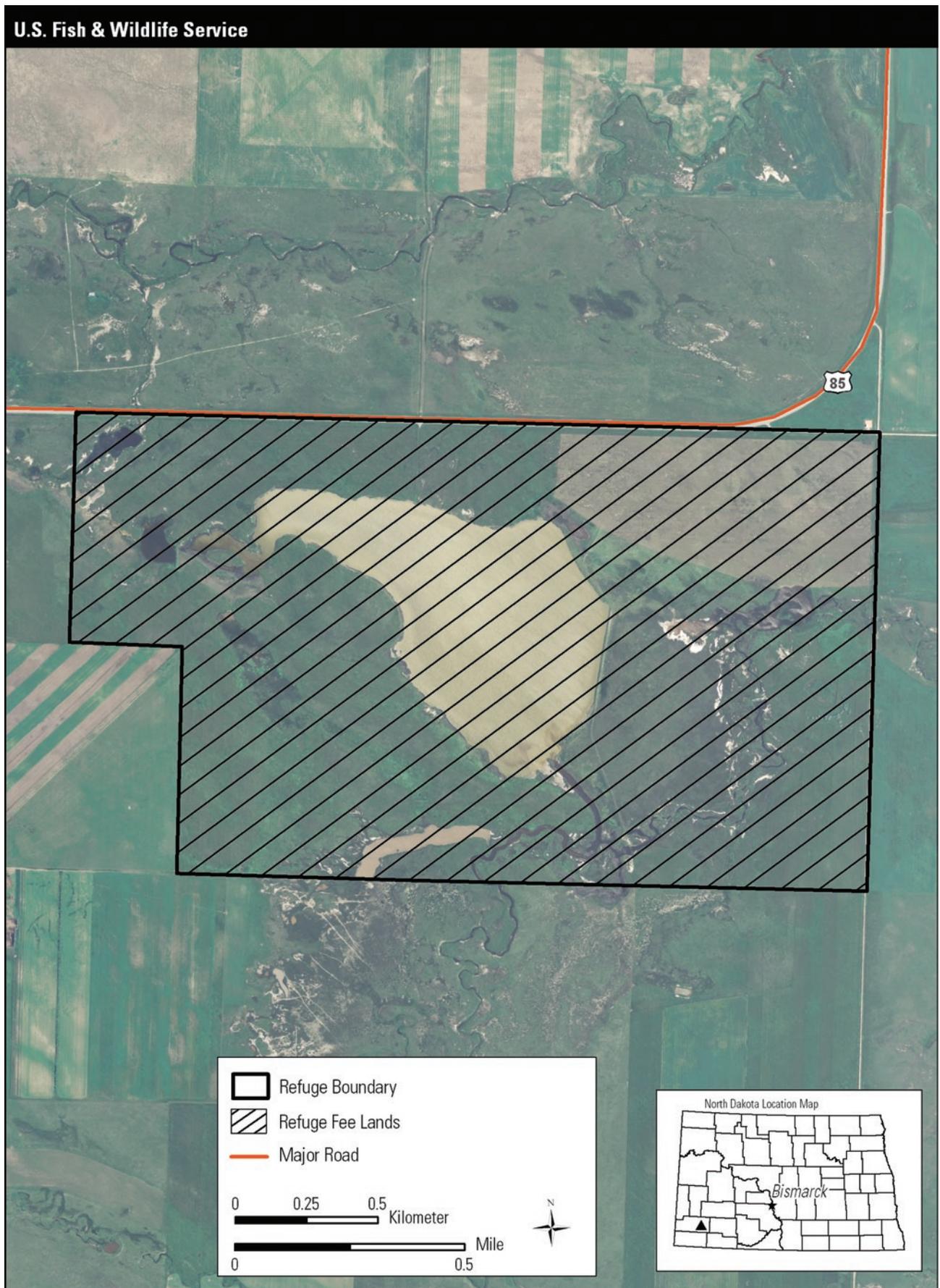


Figure 17. Map of White Lake National Wildlife Refuge, North Dakota.

Table 2. Land Information for the 12 Refuges, North Dakota.

<i>National Wildlife Refuge</i>	<i>Acres Reserved from the Public Domain</i>	<i>Fee-title Acres from Other Agencies</i>	<i>Gift Acres</i>	<i>Purchased Fee-title Acres</i>	<i>Easement Acres</i>	<i>Total Acres</i>
Audubon	0	14,739.19	0	0	0	14,739.19
Chase Lake	0	0	0	4,449.47	0	4,449.47
Kellys Slough	0	680.00	0	0	589.50	1,269.50
Lake Alice	0	160.00	2.18	8,349.86	3,583.50	12,095.54
Lake Ilo	0	0	10.71	3,186.50	835.91	4,033.12
Lake Nettie	0	0	0	2,420.60	634.30	3,054.90
Lake Zahl	40.00	0	0	3,178.98	604.21	3,823.19
McLean	0	0	0	344.00	416.00	760.00
Shell Lake	0	0	0	785.20	1,049.90	1,835.10
Stewart Lake	0	0	3.99	636.01	1,590.40	2,230.40
Stump Lake	27.39	0	0	0	0	27.39
White Lake	0	0	0	1,040.00	0	1,040.00

REFUGE SUMMARY

Table 2 provides a summary of acreages of protected habitat managed by each refuge.

2.2 Special Values

Early in the planning process, the planning team and public identified the outstanding qualities of the 12 refuges. Refuge qualities are the characteristics and features of each refuge that makes it special, valuable for wildlife, and worthy of refuge status. It was important to identify the special values of each refuge to recognize its worth and to ensure that the special values of the refuges are preserved, protected, and enhanced through the planning process. Refuge qualities can be unique biological values, as well as something as simple as, “a quiet place to see a variety of birds and enjoy nature.”

The following summarizes the qualities that make the refuges unique and valued:

- The refuges provide critical spring breeding grounds and staging areas for millions of migratory birds that gather from Mexico and South America.
- The refuges are comprised of and provide protection to two ecosystems: tall- and mixed-grass prairie with an abundance of permanent and seasonal wetlands.
- Wildlife is abundant and highly visible because of varied habitat types and relatively low disturbance levels.
- Visitors can still find wide-open spaces that remain relatively undisturbed.
- Refuges provide for high-quality environmental education.

2.3 Purposes

For this CCP process, the Service combined the 12 national wildlife refuges for evaluation as a group and program. The purposes and management capabilities and challenges are similar for all 12 refuges. The refuges were established under several authorities to provide breeding grounds for migratory birds and other wildlife.

The Migratory Bird Hunting Stamp Act of March 16, 1934, and the Migratory Bird Conservation Act of February 18, 1929, have been used to increase the acreage of the refuges for migratory bird habitat protection:

- The Migratory Bird Hunting Stamp Act provides for the conservation, protection, and propagation of native species of fish and wildlife, including migratory birds threatened with extinction.
- The Migratory Bird Conservation Act provides for meeting the obligations of the United States under a migratory bird treaty with Great Britain by the following:
 - lessening the dangers threatening migratory game birds from drainage and other causes
 - acquisition of areas of land and water for the adequate protection of migratory birds
 - authorizing appropriations for the establishment of such areas, their maintenance and improvement, and for other purposes

In addition, Audubon and Lake Nettie national wildlife refuges increased their area for migratory bird habitat protection through the Garrison Diversion Unit Reformulation Act of 1986. This act required mitigation for Service lands flooded as a result of the construction of the Garrison Dam and Audubon Lake.

2.4 Vision

At the beginning of the planning process, the Service developed a vision for the refuges. The vision describes the focus of refuge management, including what will be different in the future, and is the essence of what the Service is trying to accomplish by the end of the 15-year CCP period. The vision for the refuges follows.

This collection of unique and diverse refuges encompasses a broad range of North Dakota habitat types and landscapes.

These refuges provide vital resting and breeding habitat for waterfowl, other migratory birds, and resident fish and wildlife species.

Visitors to these prairie refuges experience wide-open spaces, skies filled with migratory birds, places to learn, and welcome solitude.

The responsible management of these special places requires adequate funding, dedicated personnel, and successful partnerships.

Achievement of this vision ensures that the American people retain a legacy of wildlife and prairie habitats for future generations.



John and Karen Hollingsworth/USFWS

Several thousand sandhill cranes stage in the refuges each spring and fall.

2.5 Goals

The Service developed six goals for the refuges based on the Improvement Act and information developed during planning. The goals direct work toward achieving the vision and purposes of the refuges and outline approaches for managing refuge resources.

HABITAT AND WILDLIFE GOAL

Conserve, restore, and enhance the ecological diversity of grasslands and wetlands of the North Dakota prairie to support healthy populations of ducks and geese, other migratory birds, native species, and other wildlife.

MONITORING AND RESEARCH GOAL

Use science, monitoring, and applied research to advance the understanding of natural resources and management within the North Dakota national wildlife refuges.

CULTURAL RESOURCES GOAL

Identify and evaluate cultural resources that are on Service-owned lands or are affected by Service undertakings. Protect resources determined to be significant and, when appropriate, interpret resources to connect staff, visitors, and communities to the area's past.

VISITOR SERVICES GOAL

Provide visitors with opportunities to enjoy wildlife-dependent recreation where compatible and expand their knowledge and appreciation of the prairie landscape and the National Wildlife Refuge System.

PARTNERSHIPS GOAL

A diverse network of partners join with the North Dakota national wildlife refuges to support research, accomplish habitat conservation, and foster awareness and appreciation of the prairie landscape.

OPERATIONS GOAL

Efficiently employ staff, partnerships, and volunteers and secure funding in support of the Refuge System's mission.

2.6 Planning Issues

Several key issues were identified following the analysis of comments collected from Service staff and the public and a review of the requirements of the Improvement Act and NEPA. Substantive comments (those that could be addressed within the authority and management capabilities of the Service) were considered during the formulation of the alternatives for future management. These key issues are summarized below.

WETLAND AND UPLAND HABITATS

All of the refuges have a primary purpose to provide optimal habitat conditions for the needs of a suite of waterfowl, shorebirds and other migratory birds, and, to a lesser extent native, resident wildlife. Wetland and upland habitats need to be protected and enhanced through management to achieve goals and objectives. Habitat protection needs to be evaluated through a priority system so that different means of protection, through either fee title or easement, can be evaluated.

Invasive Species

The refuges include uplands, which were previously farmed. Farmed uplands have since been restored to mixes of tame and native grasses and are interspersed with native uplands, the bulk of which have the native vegetation character but are compromised by invading species. The primary invasive plants are leafy spurge, Canada thistle, and absinth wormwood. Kentucky bluegrass and smooth brome are primary invasive grass species. These nonnative grasses and forbs, and potentially invasive native woody species, substantially diminish the quality and suitability of upland habitat for many native wildlife species. Western snowberry and silverberry are native shrubs that have greatly expanded their coverage in some areas where natural regimes of fire and grazing have been altered.



© Al Schneider/USDA-NRCS PLANTS Database

Canada thistle is one of the primary invasive plants at the refuges.

Energy Development

While the Service works to minimize the negative effects of energy development, the demand for energy is an increasing factor in habitat quality and preservation at the refuges. The production of biofuels, coal, oil, gas, and wind energy has the

potential to impact effectiveness of many refuge programs. The Service supports research that helps to understand the effects on wildlife of such energy projects as wind towers and conversion of grassland to cropland to support production of ethanol. It is a high priority for the Service to work in partnership with conservation and agricultural groups to support conservation programs such as the following: federal Farm Bill legislation, NDGF projects, water quality and watershed projects, and private conservation efforts.

The physical structure of wind power turbines has unknown effects on birds. Through studies and analysis, the Service is currently evaluating wind towers to determine their effect on wildlife. In addition, it is unknown if wind power would affect the potential for future habitat protection through conservation easements.

The Service needs to evaluate oil and gas development. Effects on some refuges—including salt-water contamination, filling of wetlands, and road development—have increased as increasing exploration takes place in North Dakota.

Prairie Conversion

The loss of native prairie is occurring at an alarming rate. Prairie is being converted for corn production to produce ethanol, which also has additional needs for irrigation water. An active role by the agricultural community, in partnership with conservation groups, will need to be taken to protect the federal Farm Bill and its conservation provisions, such as the Conservation Reserve Program and swampbuster and sodsaver provisions in the Farm Bill.

WILDLIFE MANAGEMENT

Priority species, predators, and wildlife disease are issues for the refuges.

Priority Species

The piper plover is a federally listed, threatened, shorebird. Breeding piping plovers occur in small numbers on numerous alkali wetlands in the northwestern part of the state. Endangered whooping cranes can be observed in refuge marshes. Chase Lake National Wildlife Refuge is home to the largest population of breeding American white pelican in North America. The primary issues related to these and other priority species center on the following: (1) monitoring populations; (2) monitoring habitat use; (3) identifying, securing, and maintaining essential habitat; and (4) developing habitat conditions in areas with potential for these species and that will promote increased recruitment or population protection to secure and increase their populations.

Predator Management

Several species including red fox, coyote, striped skunk, Franklin's ground squirrel, mink, badger, and

raccoon are found at higher than historical levels due to modifications of habitat and other factors. These species can adversely affect—primarily by predation on nests of grassland-nesting bird species—waterfowl and other migratory bird populations and reduce the likelihood of reaching wildlife population goals and objectives.

The woody vegetation has a negative influence on grassland songbirds because it provides habitat for predators and attracts forest-edge bird species that may displace grassland species.

Wildlife Disease

The refuges administer migratory bird programs and have the lead role in addressing wildlife and, in particular, bird disease issues. National wildlife refuges in North Dakota have a history of botulism outbreaks. Success in combating botulism occurs at the expense of other resources. There is the ongoing issue of striking a balance between providing optimal habitats, maintaining other refuge programs, and managing botulism.

MONITORING AND RESEARCH

Monitoring habitat and wildlife populations is an essential element in achieving the primary goals and objectives of the refuges. The Service needs basic data about recruitment, mortality, and habitat use for representative groups of species. It is important to collect and analyze these data on a regular basis so the Service can make appropriate decisions about the habitats on which these species depend. The use of the refuges as research field stations could make

valuable strides in development of new directions in management and expansion of the knowledge of field biologists.

VISITOR SERVICES

The Service allows hunting only at Audubon, Chase Lake, Lake Alice, Lake Nettie, and Lake Zahl national wildlife refuges. Fishing is allowed only at Audubon and Lake Ilo national wildlife refuges. Wildlife observation, photography, environmental education, and interpretation are wildlife-dependent recreational uses at 10 of the refuges, with the exception of White Lake and Stump Lake national wildlife refuges, which are closed to all public use. A growing demand for public recreation in North Dakota and the nation makes the six wildlife-dependent recreational uses, as specified in the National Wildlife Refuge System Improvement Act, a primary issue of interest. Some of the commenting public want more opportunity to participate in these activities.

OPERATIONS

Funding and staff are not sufficient to fulfill the purposes and meet the goals of the refuges. Identification of priorities and direction of resources efficiently will always be an issue for the refuges. Refuge staffs need to identify and describe unfunded needs to be able to compete effectively for additional money from within the Service and from partners and other sources. Refuge facilities need to be evaluated and upgraded.

3 Refuge Resources and Description



A Female Canvasback with Her Brood

The prairies of North Dakota have become an ecological treasure of biological importance for waterfowl and other migratory birds. The prairie potholes of North Dakota and South Dakota support a wide diversity of wildlife, but they are most famous for their role in waterfowl production. Although the Prairie Pothole Region occupies only 10% of North America's waterfowl-breeding range, it produces approximately 50% of the continent's waterfowl population.

This chapter describes the physical environment and biological resources of lands within the 12 national wildlife refuges. In addition, this chapter addresses the fire and grazing history, cultural resources, visitor services, socioeconomic environment, and operations of the refuges.

3.1 Physical Environment

The refuges are located across North Dakota from the Canadian border south to the state line of South Dakota.

GLOBAL WARMING

The U.S. Department of the Interior (DOI) issued an order in January 2001 requiring federal agencies under its direction that have land management responsibilities to consider potential climate change effects as part of long-range planning endeavors.

The Department of Energy's report, "Carbon Sequestration Research and Development," concluded that ecosystem protection is important to carbon sequestration and may reduce or prevent loss of carbon currently stored in the terrestrial biosphere. The report defines carbon sequestration as "the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."

The increase of carbon dioxide (CO₂) within the earth's atmosphere has been linked to the gradual rise in surface temperature commonly referred to as global warming. In relation to comprehensive conservation planning for Refuge System units, carbon sequestration constitutes the primary climate-related effect to be considered in planning.

Vegetated land is a tremendous factor in carbon sequestration. Large, naturally occurring communities of plants and animals that occupy major habitats—grasslands, forests, wetlands, tundra, and desert—are effective both in preventing carbon emission and in acting as biological “scrubbers” of atmospheric CO₂.

One Service activity in particular—prescribed burning—releases CO₂ directly to the atmosphere from the biomass consumed during combustion yet results in no net loss of carbon because new vegetation quickly germinates and sprouts to replace the burned-up biomass. This vegetation sequesters an approximately equal amount of carbon as was lost to the air (Dai et al. 2006). Several other effects of climate change may need to be considered in the future:

- Habitat available in lakes and streams for cold-water fish such as trout and salmon could be reduced.
- Forests may change, with some plant species shifting their range northward or dying out and other trees moving in to take their place.
- Ducks and other waterfowl could lose breeding habitat because of stronger and more frequent droughts.
- Changes in the timing of migration and nesting could put some birds out of synchronization with the life cycles of their prey.

CLIMATE

The normal average annual temperature in North Dakota ranges from 37° Fahrenheit (F) in the northeast to 43°F along the southern border. January is the coldest month with average temperatures ranging from 2°F in the northeast to 17°F in the southwest. July is the warmest month with temperatures averaging 67°F in the northeast to 73°F in parts of the south. The range of normal average monthly temperatures between the coldest and warmest months is 54°F in the southwest and 65°F in the northeast. These large annual ranges attest to the continental nature of North Dakota’s climate (Jensen, no date).

The highest temperature ever recorded in North Dakota was 121°F at Steele on July 6, 1936, and the lowest temperature measured was -60°F at Parshall on February 15, 1936. Temperatures of 100°F or higher occur nearly every year somewhere in North Dakota. Chances of this occurring are greatest in the south-central area where in about 85% of the years maximum temperature will equal or exceed 100°F. These temperatures of 100°F or more last only for a day or two. In the northeast, temperatures reach 100°F or higher in only 3 years out of 10 (Jensen, no date).

Annual precipitation ranges from less than 13 inches in the northwest to more than 20 inches in parts of the Red River Valley and southeast. The lines of equal precipitation, although subject to some meandering,

are oriented north–south; as a generalization, precipitation increases about 1 inch for every 50 miles of eastward movement.

There are two areas where the general increase of precipitation in an easterly direction does not apply:

- One area is located in the southwest where the annual precipitation of more than 16 inches is higher than the surrounding area. This area of higher precipitation is largely a result of topographic uplift.
- The other area is in the north-central part of the state, where the annual precipitation of less than 16 inches is lower than surrounding areas. This area is caused primarily by air moving downhill from all but a southerly direction, which works against the precipitation process (Jensen, no date).

Annual snowfall in North Dakota ranges from less than 26 inches in parts of Mountrail and McLean counties (west-central part of the state) to about 38 inches in a belt extending diagonally across the state northeast–southwest (Jensen, no date).

PHYSIOGRAPHY, GEOGRAPHY, AND SOILS

Because the refuges cover such a large geographic area, the physical environment and biological resources are described in terms of physiographic region (or level 3 and level 4 ecoregions) (Bryce et al. 1996) in which each refuge is located. Five physiographic regions occur in the 12-refuge area: Red River Valley, glaciated plains, Missouri Coteau, and coteau slope (see figure 18, map of physiographic regions). These physiographic regions correspond closely to the level 3 ecoregions described below.

Ecoregions

Four level 3 ecoregions cover the 12 refuges: Lake Agassiz basin, northern glaciated plains, northwestern glaciated plains, and northwestern Great Plains. The differences in ecosystem properties and functions in the level 3 ecoregions are distinguished by the patterns of biotic and abiotic phenomena: vegetation, climate, soils, land use, wildlife use, and hydrology. Local biotic and abiotic factors have further refined the ecoregions. Each level 3 ecoregion is subdivided into several level 4 ecoregions (see figure 19); level 4 ecoregions are the finest level in the hierarchy (Bryce et al. 1996). Table 3 displays the level 3 ecoregions in which each refuge occurs.

Descriptions of each of the four level 3 ecoregions follow (see figure 19), along with their level 4 ecoregions relevant to the refuges. Most text and graphics in this section are from “Ecoregions of North Dakota and South Dakota” (USGS 2006).

Northwestern Glaciated Plains Ecoregion 42 (Level 3)

Audubon, Chase Lake, Lake Nettie, Lake Zahl, McLean, and Shell Lake national wildlife refuges occur within this ecoregion.

U.S. Fish & Wildlife Service

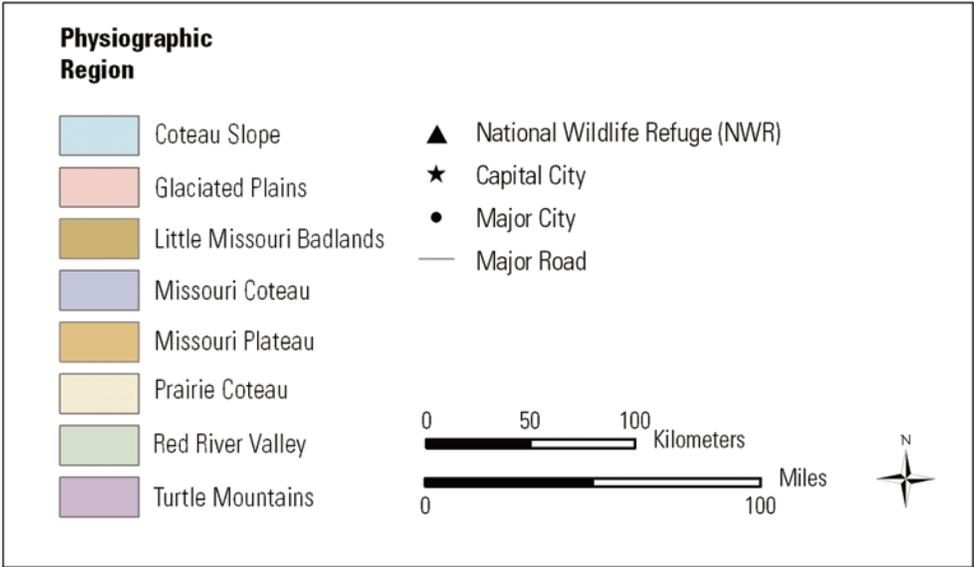
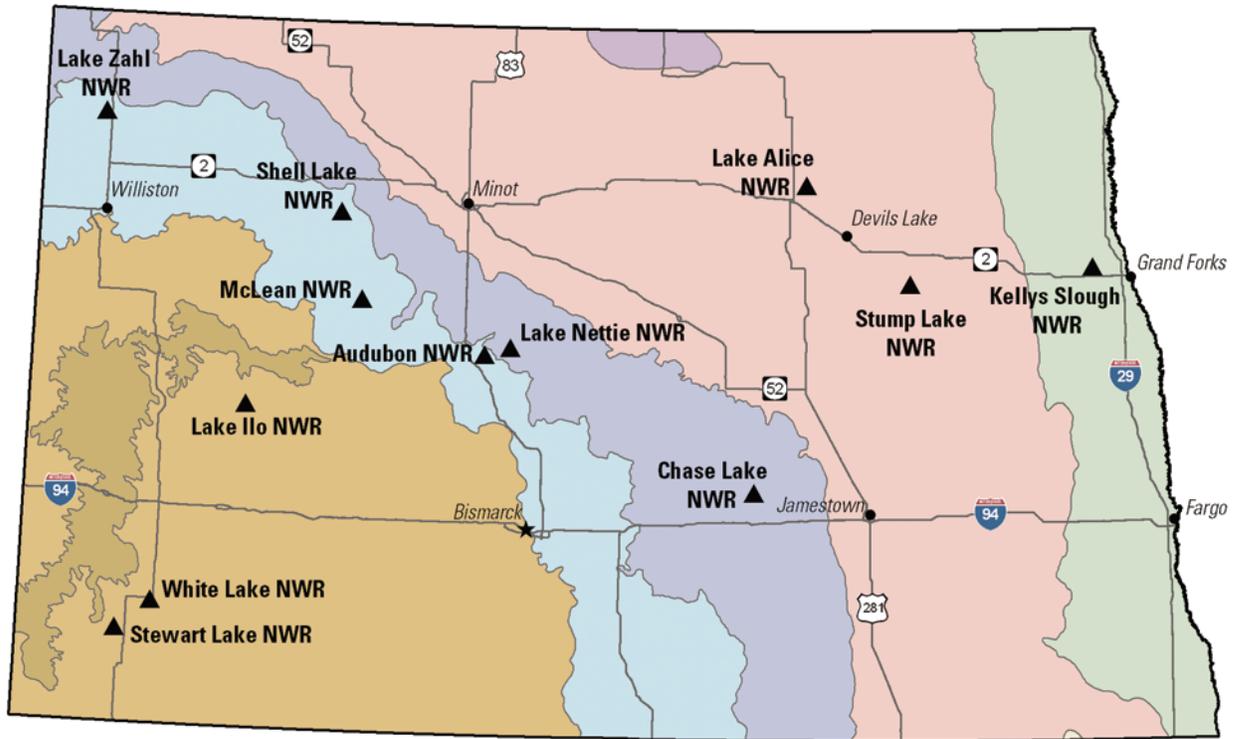


Figure 18. Map of the physiographic regions in North Dakota.

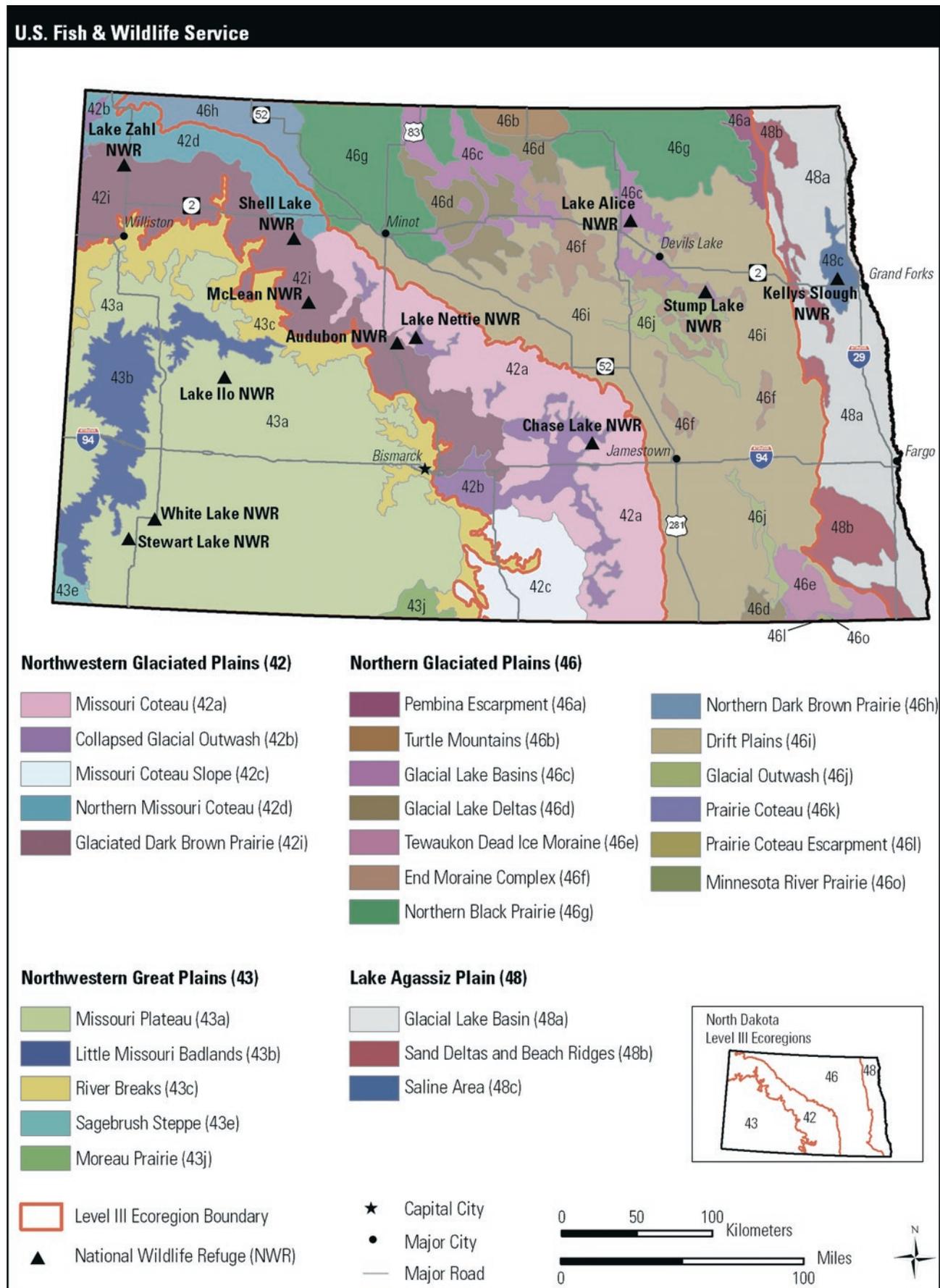


Figure 19. Map of the level 4 ecoregions in North Dakota.

Table 3. Ecoregions of the 12 Refuges, North Dakota.

<i>National Wildlife Refuge</i>	<i>Level 3 Ecoregion Name and Number</i>
Audubon	Northwestern glaciated plains, 42
Chase Lake	Northwestern glaciated plains, 42
Kellys Slough	Lake Agassiz basin, 48
Lake Alice	Northern glaciated plains, 46
Lake Ilo	Northwestern Great Plains, 43
Lake Nettie	Northwestern glaciated plains, 42
Lake Zahl	Northwestern glaciated plains, 42
McLean	Northwestern glaciated plains, 42
Shell Lake	Northwestern glaciated plains, 42
Stewart Lake	Northwestern Great Plains, 43
Stump Lake	Northern glaciated plains, 46
White Lake	Northwestern Great Plains, 43

The northwestern glaciated plains ecoregion marks the westernmost extent of continental glaciation. The youthful morainal (ridges of rock debris at the margins of glaciers) landscape has significant surface irregularity and high concentrations of wetlands. The rise in elevation along the eastern boundary defines the beginning of the Great Plains. Land use is transitional between the intensive dryland farming in Drift Plains ecoregion 46i (below) to the east and the predominance of cattle ranching and farming to the west in the northwestern Great Plains ecoregion 43 (below).

Collapsed Glacial Outwash Ecoregion 42b (Level 4)

Areas of collapsed glacial outwash formed from gravel and sand that was deposited by glacial meltwater and precipitation runoff over stagnant ice. Many large, shallow lakes are found in these areas; these lakes and wetlands tend to be slightly to very alkaline depending on the flow path of groundwater moving through the permeable outwash deposits. They attract birds preferring large areas of open water such as American white pelican, black tern, and Forster's tern, as well as those living in brackish water such as American avocet and tundra swan.

Glaciated Dark Brown Prairie Ecoregion 42i (Level 4)

The boundary of the glaciated dark brown prairie marks a transition to drier conditions. This ecoregion has a well-defined drainage system and fewer wetlands compared with the more recently glaciated Missouri Coteau slope ecoregion 42c to the east. Land use is a mosaic of cropland and rangeland.

Lake Ilo, Stewart Lake, and White Lake national wildlife refuges occur within this ecoregion.

Northwestern Great Plains Ecoregion 43 (Level 3)

The northwestern Great Plains ecoregion encompasses the Missouri Plateau section of the Great Plains. It is

a semiarid rolling plain of shale, siltstone, and sandstone punctuated by occasional buttes and badlands. Native grasslands persist in areas of steep or broken topography, but they have been largely replaced by spring wheat and alfalfa over most of the ecoregion. Agriculture is limited by erratic precipitation patterns and limited opportunities for irrigation.

Missouri Plateau Ecoregion 43a (Level 4)

On the Missouri Plateau west of the Missouri River, the landscape displays the wide open spaces of the American West. The topography of this ecoregion was largely unaffected by glaciation and retains its original soils and complex stream drainage pattern. A mosaic of spring wheat, alfalfa, and grazing land covers the short-grass prairie where herds of bison, pronghorn, and elk once grazed.

Northern Glaciated Plains Ecoregion 46 (Level 3)

Lake Alice and Stump Lake national wildlife refuges occur within this ecoregion. Also commonly referred to as the Drift Plains or Drift Prairie, this area was subject to scouring and deposition due to prolonged glacier activity between 70,000 and 10,000 years ago.

A flat to gently rolling landscape of glacial drift characterizes the northern glaciated plains ecoregion. The subhumid conditions foster a grassland transition between the tall- and short-grass prairies. High concentrations of temporary and seasonal wetlands create favorable conditions for duck nesting and migration. Although the tilled soil is very fertile, agricultural success is subject to annual climatic fluctuations.

Glacial Lake Basins Ecoregion 46c (Level 4)

Lake Souris, Devils Lake, and Lake Dakota once occupied the glacial lake basins. These proglacial (adjacent to a glacier) lakes were formed when major stream or river drainages were blocked by glacial ice during the Pleistocene era. The smooth topography of the glacial lake basins—even flatter than the surrounding Drift Plains (ecoregions 46g, 46i, and 46n)—resulted from the slow buildup of water-laid sediments. The level, deep soils in the lake plains are intensively cultivated. In the north, the primary crops are spring wheat, other small grains, and sunflowers; in the Lake Dakota basin of South Dakota, corn and soybeans are more prevalent.

Lake Agassiz Basin Ecoregion 48 (Level 3)

Kellys Slough National Wildlife Refuge occurs in this ecoregion.

Glacial Lake Agassiz was the last in a series of proglacial lakes to fill the Red River Valley since the beginning of the Pleistocene era. The Lake Agassiz plain is comprised of thick lacustrine (formed in lakes) sediments underlain by glacial till. It is extremely flat and has fewer lakes and pothole wetlands than neighboring ecoregions. The historical tall-grass prairie has been replaced by intensive agriculture. The preferred crops

in the northern half of the region are potatoes, beans and wheat; soybeans and corn dominate in the south. Sugar beets are grown throughout the ecoregion.

Saline Area of the Lake Agassiz Ecoregion 48c (Level 4)

In the saline area of the Lake Agassiz basin, salty artesian groundwater flows to the surface through glacial till and lacustrine sediments from the underlying beds of Cretaceous sandstone. The regional boundary of the saline area of the Lake Agassiz basin delineates an area where salt effects are most evident. Other saline areas occur along the tributaries of the Park, Forest, and Turtle rivers in northeastern North Dakota. Salt-affected soils in the saline area reduce crop productivity. Many areas are not suitable for farming, but are used for range or wildlife habitat.

Soils

Data for soil temperature and frost penetration in North Dakota are scarce. Dr. Guy Wilkinson of the department of soils at North Dakota State University did the most complete study of soil temperatures. Wilkinson measured soil temperature at Fargo, North Dakota, continuously over a 4-year period (Jensen, no date).

At Fargo, the average date of soil surface freezing was November 26. Freezing progressed to greater depths throughout the winter until the average maximum frost penetration depth of 4.5 feet was reached April 1. Surface thawing in the spring began on March 26, a few days earlier than the occurrence of maximum frost penetration. After April 1, soil thawing proceeded both downward from the surface and upward toward the surface from the deeper unfrozen soil until May 1, when the last of the frozen soil at about the 3-foot level was thawed (Jensen, no date).

The lowest average soil temperature of 8.2°F was found at a depth of 0.25 inch on January 17. The time of minimum soil temperature for deeper soil depths was progressively later, with minimum soil temperatures at the 4.5-foot depth occurring on April 1. Highest average soil temperature at the 0.25-inch depth reached the low 80s during the third week in July. As in winter, soil temperatures at greater depths reached their highest levels later in the season. For instance, soil temperatures at the 2-foot depth did not reach their highest levels until about August 6, while 3-foot deep maximum temperatures were reached August 15 (Jensen, no date).

WATER RESOURCES

This section has descriptions of the drainages in which the refuges occur (North Dakota State Water Commission 2005), water quality of the area, and water rights for each refuge.

North Dakota is separated into two major drainage basins by a continental divide running from the northwest and through the central and southeastern part of the state. The northeastern portion of the

state falls generally within the Hudson Bay drainage basin, while the southwestern part is drained by the Missouri River into the Gulf of Mexico.

Hudson Bay Drainage Basin

The Hudson Bay drainage basin includes the Souris and Red river systems plus the large, currently noncontributing, Devils Lake basin. Of the 12 refuges, Kellys Slough, Lake Alice, and Stump Lake national wildlife refuges fall within these basins.

The Souris River originates in Saskatchewan, Canada, and forms a 357-mile loop through North Dakota before it reenters Canada west of the Turtle Mountains. The Souris River drains portions of Saskatchewan, Manitoba, Montana, and North Dakota. There are seven major tributaries in North Dakota; the principal tributary is the Des Lacs River. Annual mean precipitation ranges from 13 inches in the west to 17 inches in the east.

The Red River is the principal river of the basin. From its origin at the confluence of the Ottertail and Bois de Sioux rivers at Wahpeton, North Dakota, and Breckenridge, Minnesota, the Red River winds northerly almost 400 river miles, forming the boundary between North Dakota and Minnesota. From the International Boundary, the Red River flows about 155 river miles to Lake Winnipeg in Manitoba. The valley through which the river flows is actually the bed of glacial Lake Agassiz. The lake bed is very flat and accounts for the meandering course and low gradient of the river. The headwaters of most of the eight major tributaries in North Dakota begin in the drift prairie in the western part of the basin where valleys are narrow and steep-sided. As the tributaries enter the lowlands of the lake bed, the river slopes become very flat, with poorly-defined watershed boundaries.

The Devils Lake basin is currently a noncontributing subbasin within the Red River basin. This basin became a closed basin after the last continental ice sheets receded and southerly drainage to the Sheyenne River ceased. The drainage system of the Devils Lake basin is formed by chains of waterways and connecting lakes, with the majority of the basin's water reaching its ultimate collection point at Devils Lake. Because of the poorly-defined drainage system, approximately 1,300 square miles do not contribute runoff to Devils Lake.

Missouri River Drainage Basin

The Missouri River drainage basin includes the Missouri and James rivers. Nine of the 12 refuges are within this basin: Audubon, Chase Lake, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Shell Lake, Stewart Lake, and White Lake national wildlife refuges.

The Missouri River basin is the largest in the state, draining approximately 48% of North Dakota's total area. The basin coincides roughly with the part of the state having a semiarid climate. The tributaries on the south and west sides of the Missouri River typically occupy small but sharply defined valleys. This area

is well drained with very few natural lakes. The topography is characterized by numerous flat-topped, steep-sided buttes and hills. The area east of the Missouri River is characterized by numerous small lakes and wetlands. Annual mean precipitation in the basin ranges from 13 inches in the northwest to 17 inches in the east.

The James River, a major tributary of the Missouri River, begins in central North Dakota but does not join the Missouri River until it reaches Yankton, South Dakota. The James River in North Dakota is 260 miles long. Ninety-two percent of the James River basin is used for agricultural purposes.

Watershed drainage is the primary source of water supply for the refuges. Water levels in refuge impoundments depend on spring runoff. Impoundments range from natural depressions to those that have structures to control the water level within a lake or pond. Impoundments with control structures function as artificial freshwater wetlands. By varying the water levels in the impoundments, refuge staffs can influence the types of plant and animal communities living in or near the impoundments. Through the change in water level, refuge staffs can also reduce the occurrence of botulism in waterfowl. All surface water control occurs under the jurisdiction of a state permit issued to the refuges.

Water Quality

Some wetland basins function as groundwater recharge areas; such basins tend to be temporarily or seasonally flooded. These basins hold water for only a few months each year, and the water is generally low in dissolved solids. Some basins are through-flow systems with respect to groundwater; that is, groundwater flows in through parts of their bed while other parts recharge groundwater. Through-flow basins hold water over longer periods and the water tends to have higher concentrations of dissolved solids. Some basins serve only as discharge areas for groundwater. Lakes that receive discharge from both regional and local groundwater flow systems and do not lose water to seepage or surface outflow are highly saline (Kantrud et al. 1989).

Human-related disturbance such as drainage and cultivation are the most extreme disturbances seen in most prairie wetlands in North Dakota and South Dakota. In some instances, fill (earth or rocks) or use for solid waste disposal has also destroyed the basins (Kantrud et al. 1989).

Water Rights

During the 1930s, the U.S. Bureau of Biological Survey on behalf of the federal government submitted declarations of filing in North Dakota for many impoundments on national wildlife refuges. Such filing applies for and documents the claim of ownership of the right to use water for current purposes. In 1930, there was a fire at the state capitol that destroyed



Wetland Sunset

USFWS

most of these early filings, and, subsequently, new legislation was introduced to alter the way in which water rights were applied for and processed. As a result, there are many old declarations of filing that have not been entered into the state's water rights database and have never been perfected (described in the following paragraph) in the same manner as the newer water right permits.

The state of North Dakota currently issues a conditional water permit when an application for a water right is made. This permit grants the claimant the right to develop the structure or structures necessary to put the water to beneficial use. After the claimant has developed the necessary structures and put the water to beneficial use, the North Dakota State Water Commission has to inspect the project and verify that the water as claimed is being put to beneficial use. The North Dakota State Engineer then issues a perfected water permit.

Early water rights usually included a storage amount as well as an amount for seasonal use. The seasonal use is the water needed to offset evaporation and is generally seen only in connection with a reservoir. The state instituted a one-time fill rule, eliminating the ability to offset evaporation. This rule was waived in some cases, but many of the later water rights only list a storage volume.

Some water rights—particularly groundwater rights, but also some surface water rights—have an associated flow rate. If there is a decreed flow rate, this is the maximum rate at which water can be pumped or diverted.

The following section is a summary of water rights for each of the 12 refuges.

Audubon National Wildlife Refuge

A letter of understanding between the Bureau of Reclamation, U.S. Fish and Wildlife Service, NDGF, and U.S. Army Corps of Engineers outlines the

operation, including water levels, of Lake Audubon. The Bureau of Reclamation secured Conditional Water Permit Number 1416, which includes 230,000 acre-feet for fish, wildlife, and recreation purposes.

The Service holds four perfected water permits, all for fish and wildlife purposes, for the Audubon National Wildlife Refuge as follows:

- Perfected Water Permit Number 3804, priority date June 27, 1985—325.0 acre-feet for storage plus 52.0 acre-feet to offset evaporative losses.
- Perfected Water Permit Number 3805, priority date June 27, 1985—5.7 acre-feet for storage plus 4.8 acre-feet to offset evaporative losses.
- Perfected Water Permit Number 3378, priority date January 29, 1981—17.1 acre-feet to offset evaporative losses in a 5.7-acre impoundment.
- Perfected Water Permit Number 3379, priority date January 29, 1981—26.9 acre-feet for storage plus 100.0 acre-feet to offset evaporative losses.

Chase Lake National Wildlife Refuge

A water right claim was filed by the U.S. Department of Agriculture on May 25, 1938. The water right is for all creeks, intermittent streams, and other watersheds and their tributaries that empty into Chase Lake, sufficient to maintain the water level at its meander line, which includes approximately 2,576 acres of water surface.

The Service recorded a declaration of filing with the North Dakota State Engineer, priority date September 1, 1934. Records need to be updated and water rights perfected.

Kellys Slough National Wildlife Refuge

A water right claim was filed by the U.S. Department of Agriculture on August 30, 1937, priority date September 1, 1934. The 585.0-acre-foot claim was for 195.0 acre-feet for storage plus 390.0 acre-feet for seasonal use. Inadvertently, the state issued Perfected Water Permit Number 169-59 on August 12, 1992, for

190.0 acre-feet for storage plus 90.0 acre-feet for annual use for fish and wildlife purposes, which abandoned and voided the additional amount of water the Service had claimed.

The Service holds four perfected water permits, all for fish and wildlife purposes, for the Kellys Slough National Wildlife Refuge as follows:

- Perfected Water Permit Number 4761, priority date March 4, 1994, Upper Pool 1—1,228.0 acre-feet for storage minus 266.0 acre-feet to offset evaporative losses.
- Perfected Water Permit Number 4471, priority date May 14, 1991, Lower Pool 1—404.0 acre-feet for storage minus 100.7 acre-feet to offset evaporative losses.
- Perfected Water Permit Number 4309, priority date October 22, 1990, Pool 5—21.0 acre-feet for storage minus 5.3 acre-feet to offset evaporative losses.

Lake Alice National Wildlife Refuge

The Service recorded a declaration of filing with the North Dakota State Engineer February 21, 1935, claiming use of unappropriated water in the Mauvais Coulee watershed to be used on six projects including Lac Aux Mortes (Lake Alice). The right was filed for record on May 12, 1938, claiming 23,940.0 acre-feet (10,260.0 acre-feet for seasonal use and 13,680.0 acre-feet for storage). Perfected Water Permit Number 169A (Lake Alice control structure)—dated November 21, 1967—recognized a priority date of May 25, 1938, for the refuge's water right. However, it established the right for 10,260.0 acre-feet for annual use and 9,200.0 acre-feet for storage, the amounts indicated on the Service's application for a permit (169A) filed in 1966. The purposes stated on the permit are waterfowl wetlands and flood control.

In addition to the declaration of filing, table 4 lists the conditional water permits that Lake Alice National Wildlife Refuge has for fish and wildlife purposes.

Table 4. Conditional Water Permits for Lake Alice National Wildlife Refuge, North Dakota.

<i>Permit Number</i>	<i>Structure Name</i>	<i>Priority Date</i>	<i>Water Flow Rate</i>	<i>Storage (acre-feet)</i>	<i>Seasonal Use¹ (acre-feet)</i>
4565	Outlet Marsh	March 9, 1992	24 cfs ²	229.0	126.0
5060	Pintail Marsh	September 30, 1996	10,000 gpm ³	243.0	93.0
5075	Jerome Marsh	November 21, 1996	—	45.2	25.0
5076	Kenner Marsh	November 21, 1996	—	87.1	42.0
5077	Redhead Slough	November 21, 1996	—	77.0	39.0
5142	Elsperger Marsh	July 28, 1997	10,000 gpm	175.0	175.0
5143	West Chain Lake	July 28, 1997	10,000 gpm	357.6	270.0
5493	Hansen Marsh	April 2, 2001	10,000 gpm	270.6	96.1

¹To offset evaporative losses.

²cfs=cubic feet per second.

³gpm=gallons per minute.

Lake Ilo National Wildlife Refuge

The Service recorded a declaration of filing with the North Dakota State Engineer, priority date September 1, 1934, for 10,850.0 acre-feet from Spring Creek: 7,130.0 acre-feet for storage and 3,720.0 acre-feet for seasonal use as a refuge and breeding ground for migratory birds and other wildlife. Spring Creek is a tributary to the Knife River in the Missouri River watershed. A 1994 review of the original filing documents, more recent survey information, and a more accurate net evaporation calculation resulted in an updated surface acreage, capacity at spillway, and seasonal use. Records should be updated to reflect a total of 6,850.0 acre-feet: 5,157.0 acre-feet for storage and 1,693.0 acre-feet for seasonal use. Records need to be updated and water rights perfected with the North Dakota State Engineer.

Lake Ilo National Wildlife Refuge has Perfected Water Permit Number 4746, priority date January 18, 1994, for 15.9 acre-feet from Spring Creek for storage. For fish and wildlife use, 7.0 acre-feet will be used to offset evaporative losses in borrow areas created during repair and reconstruction of the Lake Ilo dam.

Lake Nettie National Wildlife Refuge

For Lake Nettie National Wildlife Refuge, the Service recorded a declaration of filing with the North Dakota State Engineer, priority date September 1, 1934, for 3,528.0 acre-feet from Turtle Creek in the Missouri River watershed: 2,268.0 acre-feet for storage and 1,260.0 acre-feet for seasonal use. Records need to be updated and water rights perfected with the North Dakota State Engineer.

Lake Zahl National Wildlife Refuge

For Lake Zahl National Wildlife Refuge, the Service recorded a declaration of filing with the North Dakota State Engineer, priority date September 1, 1934, for 6,903.0 acre-feet from the Little Muddy Creek in the Missouri River watershed as a refuge and breeding ground for migratory birds and other wildlife: 3,003.0 acre-feet for storage and 3,900.0 acre-feet for seasonal use. Records need to be updated and water rights perfected with the North Dakota State Engineer.

McLean National Wildlife Refuge

For McLean National Wildlife Refuge, the Service recorded a declaration of filing with the North Dakota State Engineer, priority date September 1, 1934, for 358.0 acre-feet from Deep Water Creek in the Missouri River watershed: 148.0 acre-feet for storage and 210.0 acre-feet for seasonal use. Records need to be updated and water rights perfected with the North Dakota State Engineer.

Shell Lake National Wildlife Refuge

For Shell Lake National Wildlife Refuge, the Service recorded a declaration of filing with the North Dakota State Engineer, priority date September 1, 1934, for

3,096.0 acre-feet from Shell Creek in the Missouri River watershed as a refuge and breeding ground for migratory birds and other wildlife: 1,500.0 acre-feet for storage and 1,596.0 acre-feet for seasonal use. Records need to be updated and water rights perfected with the North Dakota State Engineer.

Stewart Lake National Wildlife Refuge

For Stewart Lake National Wildlife Refuge, the Service recorded a declaration of filing with the North Dakota State Engineer, priority date September 1, 1934, for 1,393.0 acre-feet from Deep Creek, tributary to the Little Missouri River, as a refuge and breeding ground for migratory birds and other wildlife: 802.0 acre-feet for storage and 591.0 acre-feet for seasonal use. Records need to be updated and water rights perfected with the North Dakota State Engineer.

The Service acquired Perfected Water Permit Number 4891, priority date April 17, 1995, for 5.0 acre-feet for storage from an unnamed tributary to Deep Creek. For fish, wildlife, and livestock use, 5.0 acre-feet will be used to offset evaporative losses.

Stump Lake National Wildlife Refuge

The Service has not secured any water rights for the Stump Lake National Wildlife Refuge. There are conflicts with the Bureau of Reclamation and state of North Dakota about the operating level for the lake.

White Lake National Wildlife Refuge

For White Lake National Wildlife Refuge, the Service recorded a declaration of filing with the North Dakota State Engineer, priority date September 1, 1934, for 1,315.0 acre-feet from an unnamed tributary to the Cannonball River in the Missouri River watershed as a refuge and breeding ground for migratory birds and other wildlife: 760.0 acre-feet for storage and 555.0 acre-feet for seasonal use. Records need to be updated and water rights perfected with the North Dakota State Engineer.



This pied-billed grebe—one of many migratory birds that use the refuges—makes a courtship display.

AIR QUALITY

Air quality receives protection under several provisions of the Clean Air Act, including the national ambient air quality standards and the prevention of significant deterioration program. The standards include maximum allowable pollution levels for particulate matter, ozone, sulfur dioxide, nitrogen dioxide, lead, and carbon dioxide.

North Dakota is one of only a handful of states that meets all the NAAQS and has been given attainment status. Attainment status is based on data collected through an ambient air-monitoring network, which has various sites throughout the state. North Dakota is rural, with monitoring data stations throughout the state. Although the data is not on a county-by-county basis, data collected in one county is representative of other areas. North Dakota has energy facilities operating in the central part of the state and oil and gas activity in the western portion of the state. Even with the influence of the energy production activity, North Dakota still has some of the cleanest air in the nation. Some of the monitoring locations are in North Dakota's class 1 area, which includes the three units of Theodore Roosevelt National Park and the Service's Lostwood Wilderness (Terry O'Clair, director, Division of Air Quality, North Dakota Department of Health, personal communication; August 10, 2007).

Prescribed burning is the management activity that has the greatest effect on air quality (find more information in the description of the fire management programs in appendixes F and G). Planning for use of prescribed fire incorporates the management of smoke. To the extent possible, suppression of wildfires also addresses smoke management. The Service identifies sensitive areas and takes precautions to safeguard visitors and local residents. Smoke dispersal is a consideration in determining whether a prescribed burn is within prescription. Generally, the fine-grass fuels and small burn size (80–600 acres) generate low volumes of smoke for short durations (4–5 hours).

3.2 Biological Resources

This section contains descriptions of the vegetative communities and wildlife at the refuges. The vegetation section includes discussions about invasive plants, fire, and grazing, each of which has a major influence on native vegetative communities.

VEGETATIVE COMMUNITIES

Prairies, or grasslands, in North Dakota and throughout the Great Plains have been gaining public interest over the last few years as more people become aware of their decline (see table 5). Before the 1870s, prairies covered more than a third of the United States and almost all of North Dakota. What once was a mosaic of grasses and forbs (flowering plants) where bison roamed is now predominantly agricultural land. With the arrival of increasing numbers of settlers in the late



Jennifer Anderson/USDA-NRCS PLANTS Database

Big bluestem is the predominant native grass of the tall-grass prairie.

1800s, the landscape started to change and continued to change at such a great extent that now only 0.5% of those areas in the United States remain.

Table 5. Prairie Decline in North Dakota.

<i>Prairie Type</i>	<i>Historical Acreage</i>	<i>Present Acreage</i>	<i>% Decline</i>
Mixed grass	35,088,200	11,119,500	68.3
Tall grass	321,230	297	99.9

Source: National Wildlife Federation (2001).

A combination of factors is to blame for this loss. Large-scale agriculture and intensive grazing are often criticized but fire suppression, introduction of invasive plants, altered hydrology, and modified animal communities have contributed. The loss of diversity and distribution of prairie grass and forbs are of great concern, but it is not just plants that have suffered. Grasslands not only provide primary nesting habitat for a variety of bird species, but also are very important staging and feeding areas for waterfowl and shorebirds during long migratory flights. In addition, prairies provide an important food source for small mammals and insects that, in

turn, support larger wildlife species. From a human standpoint, prairies can help to maintain clean air and water, control erosion, provide rich soil, are rich in history and folklore, and provide community income from wildlife-related recreation and tourism. All this combined makes it easy to see why prairies are considered the most endangered ecosystems.

Historically, North Dakota was predominantly mixed-grass prairie in the southwest and tall-grass prairie in the northeast. As the total annual precipitation increases eastward across the state, conditions allow for taller, more robust grasses. Today, some of the best places to find prairie plants in North Dakota are federal grassland refuges, state-owned land, railway rights-of-way, ditches, old cemeteries, pastures, and private property throughout the Missouri Coteau in the central and western parts of the state (Grondahl and Evelsizer 2002).

Many prairie birds currently show population declines. The western prairie fringed orchid is now a rare flower of the tall-grass prairie. The Dakota skipper butterfly is another prairie inhabitant whose numbers are decreasing. Each of these declines is directly related to the loss of prairie.

Prairie provides important values to people. It contains dozens of wildlife species, hundreds of different plants, and thousands of insects. These species provide genetic diversity important to agriculture and medicine. Planted grasslands do not begin to match the diversity found in native prairie.

In addition to its importance to wildlife, prairie is also crucial for soil and water conservation. Prairie provides a reminder of the nation's rural and pioneer heritage; it provides recreational activities such as hunting, hiking, and bird watching; and it offers living laboratories for scientific research. Prairie also provides economic benefits through cattle grazing, haying, and native seed harvesting. When prairie is lost, the nation's natural heritage is lost, along with a valuable resource (North Dakota Parks and Recreation Department, no date).

Mixed-grass Prairie

The mixed-grass prairie is one of the largest ecosystems in North America, with significant areas preserved for natural values in national wildlife refuges, waterfowl production areas, state game management areas, and nature preserves (Johnson 2006a). The predominant grassland vegetation within the mixed-grass prairie is prairie Junegrass, little bluestem, needle and thread, blue grama, green needlegrass, porcupine grass, prairie cordgrass, northern reedgrass, plains muhly, western wheatgrass, and Kentucky bluegrass (NDGF 2005).

One can envision the short-grass and tall-grass prairies intergrading just east of an irregular line that runs from northern Texas through Oklahoma, Kansas, and Nebraska, and then northwestward into west-central North Dakota and South Dakota. The perimeter is

not well defined because of the array of short-stature, intermediate, and tall-grass species that make up an ecotone between the short-grass and tall-grass prairies (Bragg and Steuter 1996). In general, the mixed-grass prairie is characterized by the warm-season grasses of the short-grass prairie to the west and the cool- and warm-season grasses (which grow much taller) to the east. Because of this ecotonal mixing, the number of plant species found in mixed-grass prairies exceeds that in other prairie types. Estimated declines in area of native mixed-grass prairie, although less than those of the tall-grass prairie, range from 30.5% in Texas to more than 99.9% in Manitoba (Austin 1998).

The landscape component across the refuges includes the mixed-grass prairie of the Missouri Coteau and associated wetlands. This area marks the boundary of the western limits of glaciation in North Dakota. The hummocky, rolling hills of the Missouri Coteau dramatically rise 150–500 feet above the Drift Prairie. A high concentration of wetlands are present, roughly 800,000 basin acres. Alkaline lakes are also more prevalent here. Streams and rivers are nearly absent as are upland deciduous forests, but tracts of aspen parkland occur in the north. A considerable amount of native prairie remains, and this area provides primarily for cattle grazing. Areas of reduced slope, particularly the western edge, have been converted to cropland for small grains, sunflowers, corn, and alfalfa hay land. The coteau is known for supporting some of the highest numbers of breeding ducks in North America. Due to the large amount of grassland and wetland that remain or have been restored, this area is especially crucial to many other species and constitutes the focus area, Missouri Coteau breaks. Much of the coteau is classified as good to outstanding for wind energy potential, which could pose the threat of habitat fragmentation. Irrigation and new advances in cropland could allow farming of native prairie. There is established oil and gas activity in the extreme northwest.

Tall-grass Prairie

Tall-grass prairie is the wettest of the grassland types and predominantly contains sod-forming bunchgrasses. Like other grasslands, the tall-grass prairie has species originally from different geographical sources (Sims 1988). Grassland groupings of the tall-grass prairie are (1) the bluestem prairie from southern Manitoba through eastern North Dakota and western Minnesota south to eastern Oklahoma, and (2) the wheatgrass, bluestem, and needlegrass area from south-central Canada through east-central North Dakota and South Dakota to southern Nebraska. The predominant grass vegetation within this area is big bluestem, little bluestem, switchgrass, Indiangrass, prairie dropseed, slender wheatgrass, porcupine grass, mat muhly, fescue sedge, and meadow sedge.

Since 1830, there have been estimated declines of 82.6%–99% in tall-grass prairie within specific states and provinces. These declines exceed those reported for any other major ecological community in North America (Austin 1998).

Less than one-tenth of 1% of all tall-grass prairie in North Dakota lies intact. Nationwide, just 1% remains. No other major ecosystem on the North American continent—not Pacific Northwest old-growth forest, not tundra, not southwestern desert, not eastern deciduous forest—has been so fully altered by people (Domek 1998).

Located in southeastern North Dakota (Richland and Ransom counties), the 70,000-acre Sheyenne grassland straddles the ancient Sheyenne River Delta, where prehistoric meanders of the river flowed into the glacial Lake Agassiz forerunner to the Red River Valley. Just a century ago, this area hosted native grasses, some as high as a human: big bluestem, switchgrass, Indiangrass, and prairie cordgrass (Domek 1998).

Prairie landscapes are shaped by disturbance regimes such as drought, fire, and grazing. That meant wildland fire and bison 130 years ago. On the tall-grass prairie, fire probably played a larger role than did bison in shaping the vegetative mosaic. Fire swept through the area every 3–5 years, burning plant material, and thus recycling nutrients into the soil and setting the stage for diverse, healthy plant growth (Domek 1998).

The tall-grass prairie and associated wetlands within the refuges were historically found predominantly in the eastern fourth of North Dakota. The Red River of the North forms the state line between North Dakota and Minnesota. This area is referred to as the Red River Valley. Until just 10,000 years ago, a large glacial lake named Lake Agassiz covered this area. The flat topography and rich soil of the glacial Lake Agassiz basin provides for excellent but intensive agricultural production including potatoes, beans, sugar beets, corn, and wheat. By the 20th century, much of the tall-grass prairie had been converted to farmland. Few tracts of native vegetation remain; places where small natural areas remain intact are remnants of Lake Agassiz. The shoreline of Lake Agassiz created diagonal striations of sand and gravel a few feet high that are visible in aerial and satellite imagery. The Red River Valley has few wetlands compared with the mixed-grass prairie to the west, with roughly 150,000 total wetland basin acres. Farmland with woodlot and shelterbelt plantings is now prevalent, particularly in Grand Forks County (NDGF 2005).

Wetland Habitat

Wetlands once covered about 4.9 million acres of North Dakota—11% of the state. By the 1980s, the acreage had decreased to about 2.7 million acres, a loss of about 45%. Most of the losses have been caused by drainage for agricultural development. The rate of agricultural conversions in the future will likely depend on crop prices and other economic factors. Most of North Dakota's wetlands are prairie potholes, which provide nesting and feeding habitat for migratory waterfowl and wading birds. About one-half the nation's duck

population originates in the Prairie Pothole Region of North Dakota and other prairie states.

Prairie potholes, or sloughs, are water-holding depressions of glacial origin that occur in 300,000 square miles of prairies in north-central United States and south-central Canada. These potholes provide the most productive wetland habitat for waterfowl in North America. Although comprising only 10% of the continental waterfowl breeding, the Prairie Pothole Region produces about 50% of the duck crop in an average year and much more in bumper years. Potholes also furnish water for other wildlife and livestock (USGS 2007).

Invasive Plants

North Dakota has designated the invasive plants in table 6 as noxious weeds because they pose serious threats to agriculture and the environment. The North Dakota Weed and Pest Control Commission has designated certain weeds as noxious because of their difficulty to control and the costs associated with loss of agricultural production. All of the state-listed noxious weeds were introduced from other ecosystems and have flourished in the absence of natural controls.

The Service considers state-listed noxious weeds as a priority for control efforts. However, many other invasive plants are threatening wildlife habitat and interfering with the Service's management objectives. Refuge staffs deal with these species on a case-by-case basis, depending on available money, time, and resources.



Dalmatian toadflax is a state-listed noxious weed.

Table 6. State-listed Noxious Weeds Found at National Wildlife Refuges in North Dakota.

<i>Common Name</i>	<i>Scientific Name</i>	<i>State-listed Noxious Weed</i>	<i>Invasive Characteristics</i>	<i>Present on Service Lands</i>
Canada thistle	<i>Cirsium arvense</i>	Yes	Yes	Yes
musk thistle	<i>Carduus nutans</i>	Yes	Yes	Yes
absinth wormwood	<i>Artemisia absinthium</i>	Yes	Yes	Yes
leafy spurge	<i>Euphorbia esula</i>	Yes	Yes	Yes
purple loosestrife	<i>Lythrum salicaria</i>	Yes	Yes	No
Dalmatian toadflax	<i>Linaria genistifolia</i> ssp. <i>dalmatica</i>	Yes	Yes	No
diffuse knapweed	<i>Centaurea diffusa</i>	Yes	Yes	No
Russian knapweed	<i>Acroptilon repens</i>	Yes	Yes	No
saltcedar	<i>Tamarix ramosissima</i>	Yes	Yes	Yes
spotted knapweed	<i>Centaurea maculosa</i>	Yes	Yes	Yes
yellow star-thistle	<i>Centaurea solstitialis</i>	Yes	Yes	No
field bindweed	<i>Convolvulus arvensis</i>	Yes	Yes	Yes

The “North Dakota Department of Agriculture Cooperative Weed Management Plan—January 2004” identifies nine goals:

1. Prevent the introduction, reproduction, and spread of designated noxious and invasive nonnative plants into North Dakota.
2. Develop cooperative weed management partnerships with public and private partners to attack shared weed problems.
3. Carry out the most effective, economical, and environmentally appropriate weed control methods for the target weeds.
4. Carry out an early detection and rapid response system; this will include mapping and control of infestations.
5. Reduce the extent and density of established weed infestations to the point that economic and environmental impacts are minimized or eliminated.
6. Educate and inform the public, private landowners, public land managers, and decision makers about invasive weeds and their economic and environmental impacts.
7. Coordinate and standardize the mapping of infestations of all noxious and invasive weeds
8. Seek voluntary compliance with North Dakota weed laws. When necessary, apply enforcement of these laws in a fair and consistent manner.
9. Develop a system to determine the invasiveness of weeds in North Dakota.



The state-listed noxious weed, field bindweed, is present on Service lands.

The Service’s “North Dakota Integrated Pest Management Plan” will be reviewed for possible modification to incorporate the state’s goals that fit with Service policy, goals, and objectives of habitat management.

Invasive plants on Service lands have reduced wildlife habitat and biodiversity. The presence of invasive plants can alter the functioning of ecosystems by loss of wildlife habitat, displacement of native species, change in carrying capacity from reduced forage production, lower plant diversity, and increased soil erosion and sedimentation. These plants are not only problematic on the Service’s fee-title lands, but invasive plants infest rangelands and croplands across North Dakota. The spread of invasive plants occurs by root spread or by seed dispersal via wind, water, refuge visitors, humans, equipment, or animals.

Fire

Historically, grasslands in the northern Great Plains co-evolved with various disturbance regimes such as fire and large-mammal grazing. Whether lightning-induced or deliberately set by Native Americans, historical fires have influenced the composition of the plant communities. A handful of fire-tolerant shrubs such as chokecherry, American plum, and leadplant were present, while other fire-sensitive woody species were restricted to areas that were protected from fire. A number of grass and forb species dominated the plant communities.

It is estimated that the historical wildland fire frequency for the North Dakota prairie was 5–7 years (Bragg 1995), although little information is available on the occurrence of fire during the early years on each of the refuges. Potential exists for large wildland fires to occur; however, this has generally not been the case.

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

The refuge staffs use prescribed fire to simulate the historical influence wildland fire had on plant communities. Historically, wildfires likely occurred during the summer and fall. Most prescribed fires are applied in spring through early summer or in early fall to allow for some recovery of vegetation before winter. These periods present opportunities to use fire for management of invasive cool-season grasses, to open up shorelines and vegetation-choked wetlands, and to provide areas of green browse attractive to migratory waterfowl. During the last 15 years, prescribed fire has been increasingly used.

The combination of prescribed burning and grazing is a practice used to reduce the accumulation of organic litter. A fire creates a “flush” growth of new vegetation, which is then grazed to extend treatment of problem plants such as Kentucky bluegrass and smooth brome. Invasive plants including Canada thistle, absinth wormwood, and leafy spurge can be managed similarly. The refuges have occasionally used this management strategy; however, the strategy shows promise for more frequent use in the future. Overall guidance for use of prescribed fire and management of wildland fire is in the description of the fire management programs (appendixes F and G).

Grazing

Grazing greatly influences the structure and composition of grassland 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 northern Great Plains landscape at multiple scales.



Refuge staffs use prescribed fire to simulate the historical fire regime.



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Prescribed grazing can mimic the natural disturbance that historically occurred.

Most plant species have 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. Some species have spines to cause injury to grazing animals' mouths. It is likely that herds of bison historically spent a considerable amount of time grazing native prairie found in the refuges. Their grazing, trampling, trailing, and related activities likely had a significant effect on the development and maintenance of certain plant communities.

Free-ranging bison and elk are no longer present within the refuges. Instead, refuge staffs work with local ranchers to mimic natural disturbances through livestock grazing. Seasonal grazing of the uplands stresses the invasive cool-season grasses and favors native grasses and forbs. The timing of grazing is also used to stress invasive plants and is prescribed seasonally during periods when specific plants are most palatable to livestock.

Wetland grazing reduces accumulations of organic litter at the surface. A large amount of organic litter often favors invasive plants such as Canada thistle. Grazing can also be used as part of an integrated pest management (IPM) program. Follow-up treatments tend to be easier to complete and are more effective after grazing. Grazing and prescribed burning are practices used to reduce the accumulation of organic litter.

WILDLIFE

This section describes the birds and mammals that are common within refuge lands, as well as the threatened and endangered species that occur in North Dakota and have habitats in refuge lands. Strategic planning for waterfowl is also described.

Birds

Lush, pristine, grasslands and wetlands that are dominated by a rich assortment of native grasses and

sedges occur throughout the refuges. This diverse grassland landscape holds an impressive concentration of waterfowl, shorebirds, and other open-water bird species. Within the upland prairie grassland, many species of raptors and songbirds breed and are widely distributed on protected refuge lands—making North Dakota a primary destination for outdoor enthusiasts. Bird species that occur at the refuges are listed in appendix H.

Complexes of wetlands scattered throughout the refuges attract breeding duck pairs. While semipermanent and permanent wetlands provide brood-rearing habitat and migratory stopover habitat, respectively, it is the smaller temporary and seasonal wetlands that draw breeding duck pairs to the North Dakota prairies and other parts of the Prairie Pothole Region.

Two vegetative groups distinguish the refuges—mixed-grass prairie and tall-grass prairie—and embrace a suite of primary and secondary bird species that are associated with each area (see appendix I). These areas are defined primarily based on major proportional differences in prominence of plant and animal groups. The following text is from “Breeding Birds of North Dakota” (Stewart 1975).

Mixed-grass Prairie

Bird habitats of the mixed-grass prairie include a variety of shallow basin wetland, constructed wetlands, isolated small tracts of deciduous forest, and residential areas. Fluvial (of river origin) wetlands include permanent and intermittent streams and their associated oxbows. Constructed wetlands are represented by stock ponds, dugouts, large shallow-stream impoundments, reservoirs, and sewage lagoons. Deciduous forests include (1) narrow bands of floodplain forest along the Sheyenne, James, and Mouse rivers and their tributaries, (2) local upland forests on river bluffs and high moraines and along margins of permanent lakes, (3) scattered thickets of small trees or aspen groves on the prairie, and (4) tree claims, shelterbelts, and other wooded habitats established by humans. Farmsteads, towns, and city suburbs commonly represent the partially wooded residential areas.

The breeding birds are mostly upland and wetland species that are characteristic of the north-central avifauna (bird species found in a particular geographic region), including endemic (restricted to a geographic region) and pandemic (prevalent over a region) species. Species typical of the eastern avifauna are common along permanent streams and in other wooded habitats on the northeastern and southern Drift Plains, but occur more sparingly elsewhere. Small local populations of a few species that belong to the western and northern avifaunas also occur in this area.

The characteristic breeding birds of this area include 16 primary species, 52 secondary species, and 79 tertiary species. The primary and secondary species in mixed-grass prairie are listed in appendix I.

Tall-grass Prairie

Because of the high fertility of the soils, agricultural development has modified nearly all of the cultivable land within the tall-grass prairie. Only a few, small, remnant tracts of the original, climax, tall-grass prairie remains. Large expanses of cropland are common throughout. The principal crops are small grains (chiefly wheat), corn, potatoes, sugar beets, soybeans, and sunflowers. Occasional narrow bands of floodplain forest along some of the larger streams break up the monotypic habitat. Brushy open woodlands that adjoin tracts of a distinct, sparsely vegetated type of prairie also occur on the limited areas of deltaic sand. In addition, wooded habitats established by people—including tree claims, shelterbelts, and landscaped yards—are found near farmsteads, towns, and city suburbs. Wetland habitats in this area include streams and associated oxbows, and a few widely scattered ponds and marshes.

The breeding birds are dominated by upland, pandemic species of the north-central avifauna in association with many species of the eastern avifauna. In addition, a few species of the northern avifauna and two species of the western avifauna (western kingbird and Brewer's blackbird) are common.

The characteristic breeding birds are categorized according to relative abundance and include 6 primary species that are often common or abundant, 29 secondary species that are fairly common, and 78 tertiary (minor) species that are uncommon or rare. The primary and secondary species for tall-grass prairie are listed in appendix I.

Strategic Planning for Waterfowl

Waterfowl habitat protection and restoration are the primary emphases of the national wildlife refuges. With strategic planning, the Service can make decisions on what habitats need protection and what landscapes have the greatest value to the health of waterfowl populations.

The HAPET in Bismarck, North Dakota, conducts research and develops predictive models. Through HAPET's research and modeling of the Prairie Pothole Region of North Dakota, the Service can predict duck pair density. This modeling tool provides the Service with information needed to conserve and restore wetland and grassland landscapes that will benefit waterfowl and other bird species. The Service bases its protection priority for wetland and grassland habitat on this modeling effort.

The Service's goal is to protect habitat capable of supporting 25 or more breeding duck pairs per square mile. Figure 20 shows the predicted concentrations of duck pairs throughout the refuges within the Prairie Pothole Region. The coteau across North Dakota has the highest predicted concentrations, with up to 100 or more duck pairs per square mile. Consequently, refuge staffs can prioritize habitat protection and management for refuge lands.

Strategic planning increases the likelihood of making cost-effective decisions by avoiding misapplications of management treatments or investing in areas with limited potential to affect populations.

Mammals

There can be little doubt that the activities of the wild bison, which was extirpated (exterminated) from the Prairie Pothole Region of North Dakota and South Dakota in the 19th century, had a major influence on prairie wetlands in pristine times. Unfortunately, there is no documentation of how wetlands were affected by the feeding, drinking, dusting, or other activities of millions of bison as they roamed the prairies. Other grassland mammals extirpated from the area are the grizzly bear, kit fox, and plains wolf. These carnivores probably made only minor use of prairie wetlands (Kantrud et al. 1989).

Today at the refuges, the representative group of mammal species includes coyote, red fox, white-tailed jackrabbit, eastern cottontail, deer mouse, badger, raccoon, muskrat, white-tailed deer, mule deer, thirteen-lined ground squirrel, striped skunk, mink, long-tailed weasel, prairie vole, and meadow vole.

In addition to these common mammal species, occasionally there are confirmed sightings of moose, elk, and pronghorn on or adjacent to refuge lands. Additionally, the refuge staffs have received unconfirmed reports of mountain lion and gray wolf on Service lands.

Threatened and Endangered Species

Habitats for five federally listed species occur within one or more refuges—piping plover, whooping crane, interior least tern, western fringed prairie orchid, and Dakota skipper (butterfly).

Laws passed in the late 1960s gave limited attention to endangered species; however, it was not until the Endangered Species Act was passed in 1973 that significant protection was granted to rare species. This landmark law, considered by some the most significant environmental law ever passed, has been amended and reauthorized by Congress on numerous occasions, most recently in 1988. The Service administers the law for all inland species and certain marine species.

When Congress authorized the Endangered Species Act they declared that species of "fish, wildlife, and plants are of aesthetic, ecological, educational, historical, recreational, and scientific value to the nation and its people." The purpose of the act is to provide a means whereby endangered species and their ecosystems may be conserved. The intent of the Endangered Species Act is not to just list species as endangered or threatened, but rather, to recover the populations of these species to a point where they can be removed from the list.

U.S. Fish & Wildlife Service

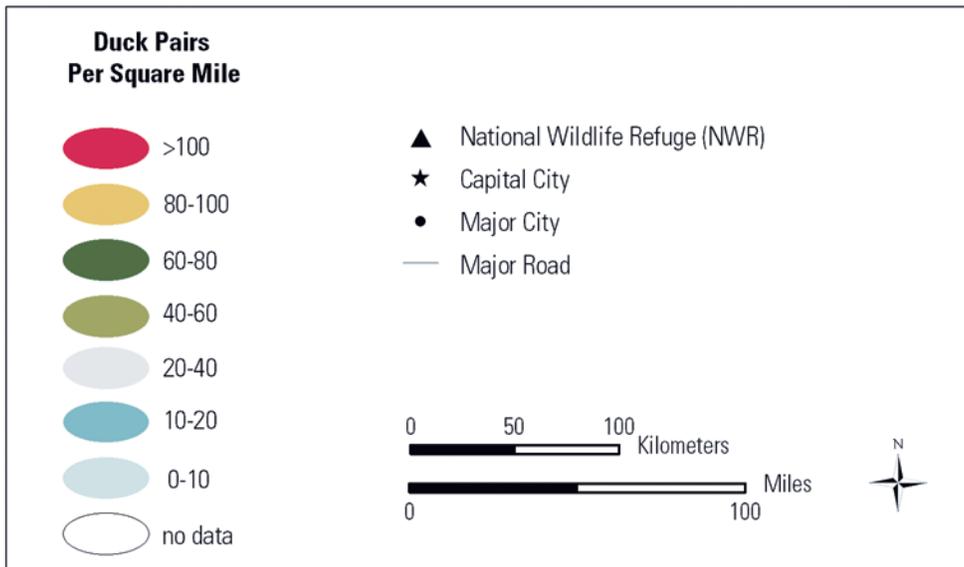
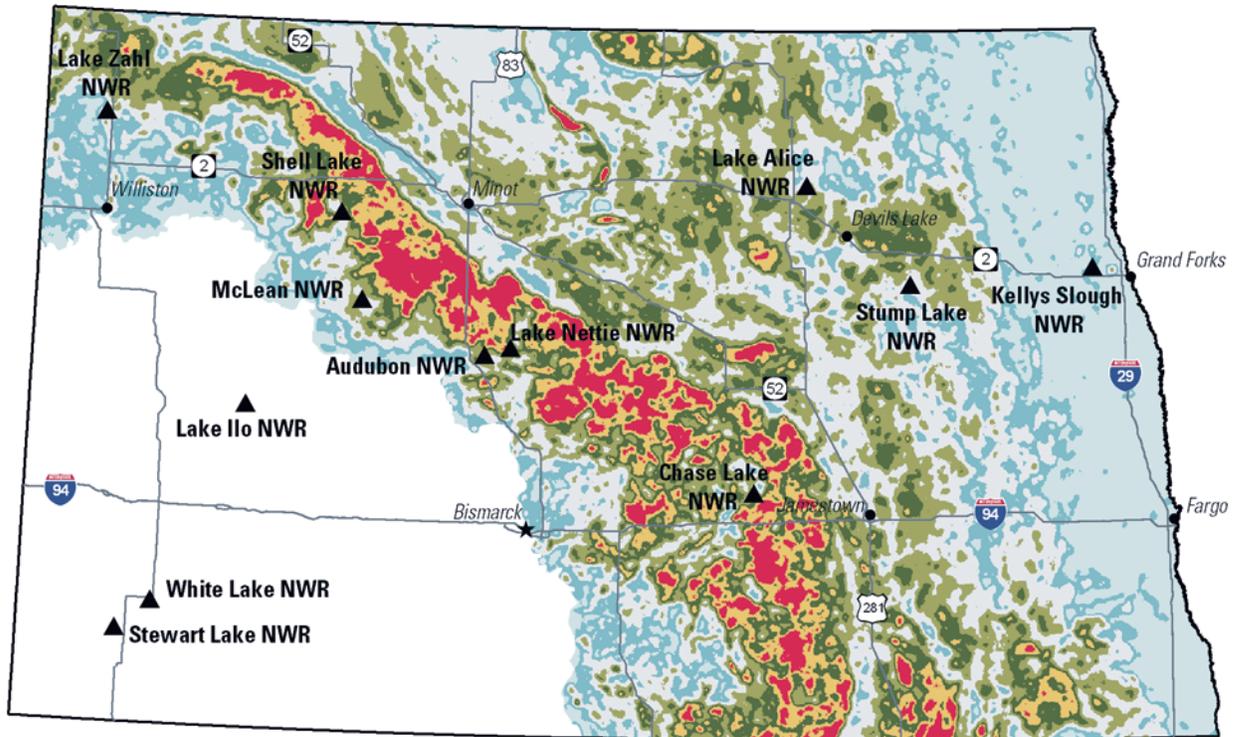


Figure 20. Map of the predicted duck-pair concentrations in North Dakota.

Appendix J shows the federally listed threatened and endangered species found in North Dakota.

Piping Plover (Threatened)

In any given year, 50%–80% of the piping plovers that nest in the United States portion of the northern Great Plains do so in a seven-county area in central North Dakota and extending into northeastern Montana (see figure 21, map of the core area for piping plover in North Dakota). Plovers in this core area breed on barren shorelines associated with alkali lakes and wetlands. Piping plovers use these habitats at nine of the refuges: Audubon, Chase Lake, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Shell Lake, Stewart Lake, and White Lake.

Of the roughly 6,000 piping plovers left in the world, about half breed in the northern Great Plains. This population is declining between 6% and 12% annually (Larson et al. 2002, Plissner and Haig 2000, Ryan et al. 1993), and is expected to go extinct in 50–100 years unless significant conservation activities are started. The decline and poor prognosis led to the 1980s' listing of this population as threatened in the United States and endangered in Canada.



Ryan Hagerty/USFWS

Whooping Crane

Whooping Crane (Endangered)

The whooping crane is one of the most endangered birds in North America. The only naturally occurring wild, migratory population in the world now numbers fewer than 266 individuals (Martha Tacha, USFWS, personal communication; May 22, 2008).

Each spring and fall, whooping cranes use wetlands and agricultural fields in and around the 12 refuges as migratory stopover areas en route to their summer and winter grounds (see figure 22, map of whooping crane sightings).

Interior Least Tern (Endangered)

The interior least tern occurs in open-water habitat and on shorelines of all 12 refuges. This tern, the smallest member of the tern family, arrives on its breeding grounds in early May. The interior least tern nests in small, loosely defined groups on barren beaches of sand, gravel or shells, on dry mudflats and salt-encrusted soils (salt flats), and at sand and gravel pits along rivers. Nesting success depends on the presence of bare or nearly barren sandbars, favorable water levels during nesting and abundant food.

The terns nest in small colonies. The chicks leave the nest only a few days after hatching, but the adults continue to care for them, leading them to shelter in nearby grasses and bringing them food. The terns hover over and dive into standing or flowing water to catch small fish.

The interior least tern was federally listed as endangered in 1985, primarily due to the loss of nesting habitat as a result of dramatic alterations (channelization and impoundment) of important river systems. Water level fluctuations, vegetation of nesting habitat, and disturbance (from people, pets, predators, and livestock) continue to jeopardize nesting success.

Western Prairie Fringed Orchid (Threatened)

Kellys Slough National Wildlife Refuge is the only 1 of the 12 refuges within the range of and having suitable habitat for the western prairie fringed orchid, an endangered flower of the tall-grass prairie. However, there are no records of this orchid occurring in refuge lands. This orchid species is restricted to mostly west of the Mississippi River and currently occurs in Iowa, Kansas, Minnesota, Nebraska, and North Dakota in the United States and in Manitoba, Canada.

The orchids occur most often in wet, unplowed, tall-grass prairies and meadows but have been found in old fields and roadside ditches. The nocturnally fragrant flowers of these perennial orchids attract hawkmoths that feed on nectar and transfer pollen from plant to plant.

The greatest threat to the fringed orchid is habitat loss, mostly through conversion to cropland. Competition with invasive plants, filling of wetlands, intensive hay mowing, fire suppression, and overgrazing threatens these species.



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Western Prairie Fringed Orchid

U.S. Fish & Wildlife Service

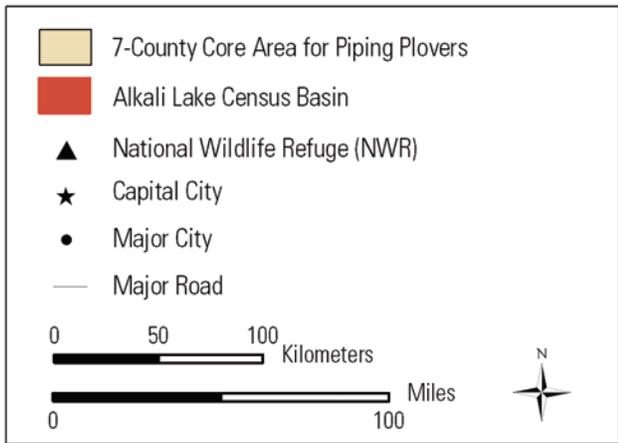
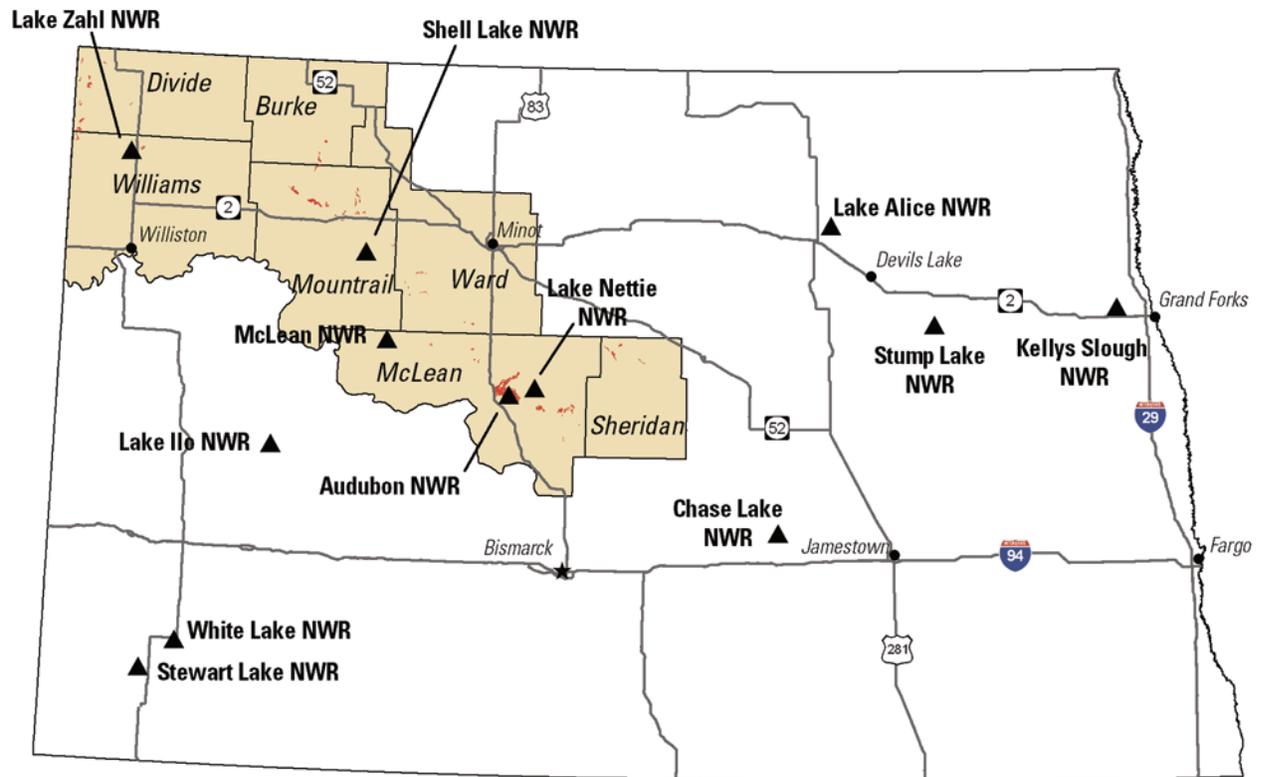


Figure 21. Map of the seven-county core area for piping plover in North Dakota.

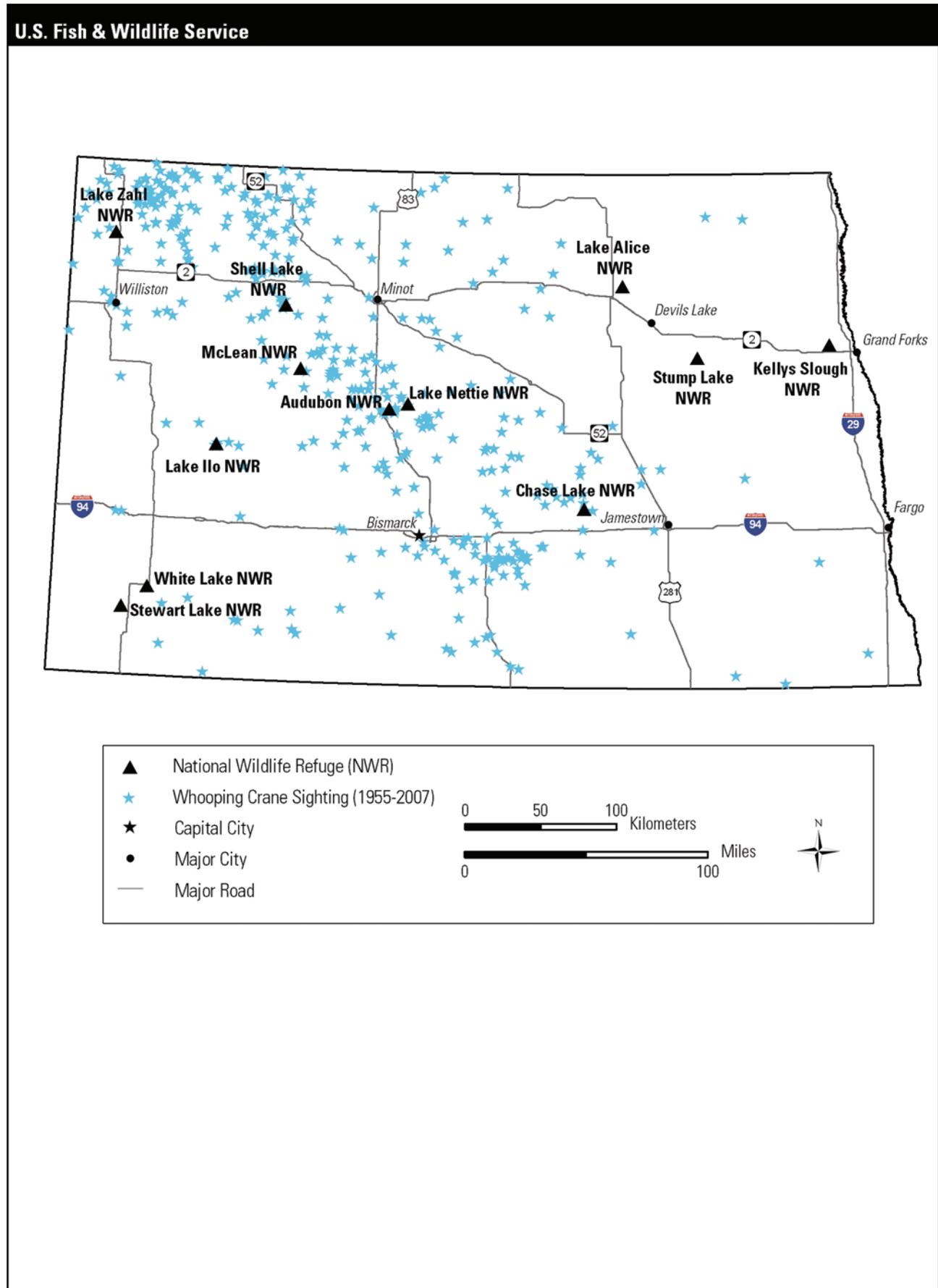


Figure 22. Map of the whooping crane sightings in North Dakota.

Dakota Skipper (Candidate)

Kellys Slough National Wildlife Refuge is the only 1 of the 12 refuges within the range of and having suitable habitat for the Dakota skipper. The skipper is a prairie inhabitant whose numbers have decreased. The skipper is a small butterfly with a 1-inch wingspan. It has a thick body and a faster and more powerful flight than most butterflies.

The skipper is likely to occur throughout a relatively unbroken and vast area of grassland in the north-central United States and south-central Canada, occurring only in scattered remnants of high-quality native prairie. The most significant remaining populations of Dakota skipper occur in western Minnesota, northeastern South Dakota, north-central North Dakota, and southern Manitoba. The skipper's current distribution straddles the border between tall-grass and mixed-grass prairie; it occurs in two types of habitat (USFWS 2002):

- Flat, moist, native bluestem prairie in which three species of wildflowers are usually present—stage-wood lily, harebell, and smooth camas.
- Upland (dry) prairie that is often on ridges and hillsides; bluestem grasses and needlegrasses dominate these habitats and three wildflowers are typically present in quality sites—pale purple, upright coneflowers, and blanketflower.

Dakota skipper populations have declined due to widespread conversion of native prairie for agriculture and other uses. This has left the remaining skipper populations isolated from one another in relatively small areas of remnant native prairie. In addition, many of the habitats where the species persists are threatened by overgrazing, conversion to cultivated agriculture, inappropriate fire management and herbicide use, woody plant invasion, road construction, gravel mining, invasive plant species, and historically high water levels in some areas.

3.3 Cultural Resources

This section is based on the cultural resource overview of the refuges developed for the Service in 2007 by RMC Consultants, Inc.

PREHISTORIC RESOURCES

The cultural history of North Dakota spans over 10,000 years and has been divided into several cultural traditions. From earliest to most recent, these traditions are as follows:

- Paleo-Indian tradition
- Plains Archaic tradition
- Plains Woodland tradition
- Plains Village tradition
- Equestrian Nomadic tradition (Horse Culture)

The Equestrian Nomadic tradition is the most recent tradition and represents protohistoric (initial European contact) and early historic times. Each of these traditions is a way of life that is relatively distinct in terms of variation in technology and subsistence practices.

Perhaps the most dramatic cultural changes in North Dakota prehistory are associated with the Plains Village tradition. This period began at approximately AD 1000 and lasted until 1780, when disease introduced by Europeans decimated village populations. The onset of the Plains Village tradition marks the incorporation of horticultural production into the hunting and gathering subsistence base. Horticultural production allowed for the creation of food surpluses, primarily of corn, and facilitated the aggregation of households into larger, more sedentary earth lodge villages. In North Dakota, these earth lodge villages were most common in the southwestern and northwestern areas of North Dakota. Elsewhere in the state, settlement patterns were characterized by a combination of traits characteristic of the Plains Village tradition and the preceding Plains Woodland tradition. The generic term, Late Prehistoric, is used to describe post-Archaic resources that can be ascribed to neither the Plains Woodland nor Plains Village traditions.

HISTORICAL RESOURCES

Before it was settled by Euro-Americans in the early 1800s, North Dakota was inhabited by several Native American tribes including Arikara, Assiniboine, Cheyenne, Hidatsa, Lakota, and Mandan.

Early Settlement

Scottish and Irish families along the Red River established the first community, Pembina, in the early 1800s (Info Please 2007). The location was originally that of trader Alexander Henry's Fort Pembina, a trading post that competed with the Hudson Bay Company (Robinson 1966). The area would eventually become northeastern North Dakota, but at the time was owned by Great Britain.

Trading posts were established at Fort Union and Fort Clark and at other lesser-known forts (Remele 1988). At these posts, meat and furs were exchanged for guns, metal, cloth, beads, and other trade goods. It was not long before the presence of the white traders was made evident in other ways; a high number of French-Canadian, Scottish, and English traders took Native American wives (mostly Chippewa, Cree, and Assiniboine). In time, a number of North Dakota trading posts and neighboring communities became predominantly populated by the offspring of these marriages, people referred to by the French as *bois brules* or *métis* (Robinson 1966).

Activity and settlement of European and Euro-American people had been consistent for some time in the North Dakota area, but was limited to discreet locations at and around military forts and trading posts. Increased settlement started in the late 1850s and

early 1860s when a concerted effort was undertaken to link St. Paul with trading posts in eastern North Dakota (Robinson 1966).

History of Development

The St. Paul and Pacific Railroad reached the Red River in 1871 and brought growing numbers of people looking toward the Red River Valley as a desirable location to settle. The Northern Pacific Railroad reached the Missouri River shortly after (Remele 1988, Robinson 1966). These two major events—as well as increased boat traffic on the Red River, new stage lines in the area, plus the establishment of a land office in Pembina—opened the door for major settlement.

Numerous towns and settlements sprang up along the new railroad routes. Between 1879 and 1886, the state underwent a settlement boom, mostly by homesteaders, with the formation of some large, organized, mechanized (“bonanza”) farms (Remele 1988). The population of North Dakota increased more than 1,000% between 1878 and 1890, and a second boom occurred after 1905 (Remele 1988, Robinson 1966). Many of the settlers were immigrants of Scandinavian or Germanic origin as well as Norwegian, Russian, and Scotch-Irish-English (Remele 1988). In 1915, more than 79% of the population was immigrants or the children of immigrants (Remele 1988). North Dakota achieved statehood on November 2, 1889 (Remele 1988).

Improved weather conditions, a wartime economy, and federal construction projects related to flood control and irrigation resulted in another economic boom during the 1940s (Remele 1988). Crop yields increased, America entered World War 2, and several large-scale construction projects were carried out along the Missouri, James, and Sheyenne rivers, including the Garrison Dam in the Missouri River.

The development of the state’s natural resources began in the 1950s. Oil was discovered near Tioga in the Williston basin in 1951, and coal resources were mined for use in newly constructed plants to generate electricity (Remele 1988). The communications and transportation networks were also expanded and improved throughout the 1950s (Remele 1988). North Dakota is “the most rural of all the states,” and today 90% of the land is used for (1) farming including cultivation of crops such as wheat, barley, rye, sunflowers, beans, oats, flaxseed, sugar beets, and hay, and (2) for raising beef cattle, sheep, and hogs (Info Please 2007). The state also produces other resources including lignite, clay, sand, and gravel. Outdoor recreation is popular in North Dakota, particularly fishing and hunting.

3.4 Chase Lake Wilderness

In 1964, President Lyndon B. Johnson signed the Wilderness Act (Public Law [PL] 88-577) establishing

the National Wilderness Preservation System. The Wilderness Act mandates that wilderness areas be “administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness.”

The Wilderness Act required the Secretary of the Interior to review federal lands to determine if they contained areas that were suitable for inclusion in the National Wilderness Preservation System. A review of Chase Lake National Wildlife Refuge was done, and it was determined that, because of its unique “roadless prairie” habitat and natural beauty, the area should be designated as a wilderness. In 1975, 4,185 acres of the 4,440-acre refuge were designated as Chase Lake Wilderness. Chase Lake Wilderness is one of only two wildernesses in the Refuge System in North Dakota; the other is Lostwood Wilderness.

The Chase Lake Wilderness receives very little public use, with about 300 visits per year. To preserve the integrity of the wilderness, no motorized vehicles or mechanical equipment are allowed in the wilderness portion of Chase Lake National Wildlife Refuge. Due to the American white pelican colony, visitors to Chase Lake Wilderness need a special use permit issued by the refuge staff. Deer hunting is permitted during the late fall, state firearm season. However, no other public use is permitted.

3.5 Visitor Services

The Improvement Act emphasizes the importance of compatible, wildlife-dependent recreation. The act identifies these six wildlife-dependent recreational uses: hunting, fishing, wildlife observation, photography, environmental education, and interpretation.

HUNTING

Centuries ago, the Missouri Coteau was considered a prominent landmark to the Plains Indians and early European settlers who camped and hunted waterfowl and other game species within the wetland and pothole areas. With the settlement of the prairie states, certain hunting restrictions were established for the protection and propagation of wildlife.

Of the 12 refuges, hunting is permitted at Audubon, Chase Lake, Lake Alice, Lake Nettie, and Lake Zahl national wildlife refuges. Special regulations apply to each refuge and all federal and state regulations apply. Visitors wanting to hunt on one of these refuges should contact the particular refuge for species of take, open and closed areas, seasons of use, and regulations. A map showing areas open to hunting and regulatory text is available at refuge headquarters.

Areas open to hunting are generally open to bow, gun, and muzzleloader deer hunting in accordance with state regulations during state seasons. To reduce hunting group conflicts and migratory bird disturbance, these



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Duck hunters get an early start on a peaceful morning.

seasons do not open until late November. Nontoxic shot is required on all refuge lands. No lead shot may be used at or carried onto a refuge.

FISHING

Winter fishing only is allowed at Audubon National Wildlife Refuge. Fishing is permitted year-round at Lake Ilo National Wildlife Refuge: summer boat fishing and winter ice fishing. Permanent lakes at the refuges offer fishing for northern pike, walleye, yellow perch, and a few other species. The NDGF stocks the two refuge lakes, where anglers commonly seek yellow perch and northern pike. Due to the abundance of aquatic life in the permanent wetlands, growth rates of fish are often very high. During the winter months, ice fishing seems to be the most popular.

Vehicle access to the lakes at both refuges is limited to designated access points. There is no restriction to types of vehicles that may access Lake Audubon during the winter for ice fishing. Lake Ilo has an accessible boat ramp and a fishing pier.



USFWS

Ice houses dot Audubon Lake for ice fishing at Audubon National Wildlife Refuge.

Fishing at the refuges requires the angler to follow both state fishing regulations and special refuge regulations.

WILDLIFE OBSERVATION AND PHOTOGRAPHY

The refuges provide outstanding opportunities for viewing wildlife. They offer optimal viewing for waterfowl, grassland birds, and shorebirds from April through early June and from late August through October. Seasonal highlights include the spring courtship dances of sharp-tailed grouse and western grebe, spring and fall shorebird migrations, daily fall movements of thousands of waterfowl, and winter activities of various bird and mammal species.

Many wildlife species can be observed from public roads. In addition, bird watchers and photographers can access the refuges by designated refuge roads and trails. In some areas, viewing blinds are available in the spring for visitors to observe wildlife in their native habitat. Highlights for bird watchers occur in the spring when breeding grassland birds—such as Baird's sparrow, Le Conte's sparrow, and Sprague's pipit—can often be seen.

ENVIRONMENTAL EDUCATION AND INTERPRETATION

Each refuge headquarters facility has interpretative information associated with its visitor contact area. The visitor contact area includes exhibits and a variety of informational pamphlets about the Service, refuge, Refuge System, and other natural resources-related information. There are generally kiosks located in front of each headquarters facility; kiosks contain information about prairie wetlands and wildlife species found throughout the refuge.

Refuge staffs provide educational talks and tours for schools and other groups, on request. The environmental education and outreach programs expand beyond the boundaries of the refuges, and refuge staffs are involved in local, regional, and statewide programs.

TRAPPING

Each of the refuges has developed a predator management plan. These plans authorize predator control, performed by refuge staffs and their authorized agents, outside the normal trapping season. Trapping targets predators and maintenance of infrastructure. Recreational trapping is not allowed at the refuges.

3.6 Partnerships

The refuge staffs have established partnerships with local, state, and national groups in efforts to achieve habitat objectives and to improve and expand environmental education. Most refuges have local partnerships with the following groups for projects ranging from control of invasive plants to protection of piping plover nests:

- weed boards
- water resource boards
- rural volunteer fire departments
- law enforcement departments
- Scouts
- 4-H clubs
- private landowners

The refuges have worked closely with NDGF and North Dakota's health and agriculture departments

on projects such as hunting and fishing opportunities, disease issues, and management of habitat and invasive plants.

The refuge staffs have partnerships with the following groups and agencies for habitat management, research, and environmental education:

- Army Corps of Engineers
- Bureau of Reclamation
- Delta Waterfowl
- Ducks Unlimited, Inc.
- The Nature Conservancy
- National Audubon Society
- National Turkey Federation
- National Wildlife Federation
- National Fish and Wildlife Foundation
- North Dakota Natural Resources Trust
- North Dakota Wildlife Federation
- USGS

The refuges have also developed working relationships with various oil and wind industry companies.

3.7 Socioeconomic Environment

This section is based on the socioeconomic impact analysis for the refuges that was completed for the Service in 2007 by BBC Research and Consultants.

The 12 national wildlife refuges cover an area of about 46,500 acres and vary in type of public use. Stump Lake and White Lake national wildlife refuges are closed to the public. Related visitor activity—such as spending on food, gasoline, and overnight lodging



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Visitors to Audubon National Wildlife Refuge have opportunities to view sharp-tailed grouse.

in the local area—provides local businesses with supplemental income and increases the local tax base. Management decisions about visitor services, expansion of services, and habitat improvements at the refuges may either increase or decrease visitation and, thus, affect the amount of visitor spending in the local economy.

POPULATION AND DEMOGRAPHICS

The population of North Dakota has declined over the past 25 years, reaching a peak of about 677,000 in 1985 and declining to 634,600 in 2005, a decrease of 6.3%. This overall population decrease has been in nonmetropolitan areas of the state, while metropolitan areas have experienced steady growth (an average of 1.2% per year).

North Dakota has a rapidly aging population—a trend that is expected to become more marked in coming decades and have important policy implications as the baby boomer generation enters retirement.

EMPLOYMENT

The civilian labor force in North Dakota grew from 345,820 to 357,960 between 2001 and 2006. The government (federal, state and local) claimed the largest portion of employment (17%) in North Dakota, followed by health care (12%), retail trade (11%), and farming (8%).

According to the Bureau of Economic Analysis, unemployment in North Dakota fell from a high of 3.6% in 2003 to 3.2% in 2006. Local unemployment rates ranged from 2.1% in Williams County to 9.3 in Rolette County.

OPERATIONS AND ACTIVITIES

The 12 refuges in North Dakota are scattered throughout the state; only Audubon, Kellys Slough, and Lake Alice national wildlife refuges have field offices.

In 2000, the total budget for all Service activities in North Dakota totaled more than \$11,508,000. The Service employs about 170 people throughout the state, 48 of which are involved with management of the 12 refuges. Because many refuge employees work for both national wildlife refuges and wetland management districts, they cannot be considered full-time equivalents (FTEs) when examining the socioeconomic impact of refuges alone. (A full-time equivalent is one or more job positions with tours of duty that, when combined, equate to one person employed for the standard government work-year). The 12 refuges alone support 22.4 FTEs in North Dakota.

The refuges offer many recreational and educational opportunities, which include hunting, fishing, and nonconsumptive activities such as hiking, photography, and wildlife observation. No camping is permitted at refuges in North Dakota.

Hunting is popular at some areas, especially at Audubon, Chase Lake, Lake Alice, Lake Nettie, and Lake Zahl national wildlife refuges. At most refuges, only hunting of deer and upland game birds (pheasant, grouse, and partridge) is permitted but, at Lake Alice National Wildlife Refuge and some other refuges, hunting of waterfowl is permitted as well.

Fishing is one of the most popular activities at the refuges. Audubon National Wildlife Refuge is a popular destination for ice fishing in the winter, and Lake Ilo National Wildlife Refuge is popular for fishing year-round. The most popular game fish at these refuges are walleye, perch and northern pike.

Nonconsumptive activities such as hiking and wildlife observation draw casual visitors, outdoor enthusiasts, educational tours, photographers, and others to the refuges. The array of songbirds and waterfowl at the refuges makes them popular for bird watching. Some areas offer auto tour routes, hiking trails, and picnic tables including Audubon and Lake Alice national wildlife refuges.

The 12 refuges welcomed 79 volunteers for a total of 814 volunteer hours in 2007.

VISITOR LEVELS AND SPENDING

The most popular areas in terms of total visitation are Audubon, Kellys Slough, and Lake Ilo national wildlife refuges.

As part of the Refuge Annual Performance Plan, North Dakota refuges track the number of visitors by purpose of visit (hunting, fishing, wildlife observation, or photography). For 2007, refuge staffs estimate total visitation to the 12 refuges to be almost 37,000 visitor days. Of these 37,000 visitor days, about 3,700 (10%) are for hunting, 18,900 (51%) are for fishing and 14,400 (39%) are for recreational activities. The 2004 “Banking on Nature” (Caudill and Henderson 2005) study estimates total visitation for eight national wildlife refuges in region 6, two of which are located in North Dakota (Arrowwood and Audubon national wildlife refuges). According to the study, about 44% of visitors are nonresidents of the local areas surrounding the refuges visited. Applying this rate to visitation statistics at the 12 refuges, 16,400 visitor days were from nonresidents (1,600 for hunting, 8,400 for fishing and 6,400 for nonconsumptive recreation).

The “Banking on Nature” study also breaks down visitor expenditure by activity (hunting, fishing or nonconsumptive). Among all region 6 refuges profiled in the study, average expenditure per nonresident visitor day is \$55 for hunting, \$34 for fishing and \$18 for nonconsumptive recreation. Hunters and anglers have higher daily expenditures due to costs of supplies related to their activities.

Only nonresident visitor spending can be considered when calculating the socioeconomic impact of refuges on North Dakota’s economy. The money spent by

North Dakota residents on visitation to a local refuge would likely be spent on other local recreational activities if the refuge did not exist, so it cannot be considered new expenditure in the local economy.

BASELINE ECONOMIC ACTIVITY

Combining the effects of Service employment and visitor spending, the total economic activity generated by the 12 refuges on their local economies is approximately \$1,483,000 per year (Caudill and Henderson 2005):

- The refuges affect their local economies through the visitor spending they generate and the employment they support. The 12 refuges support 22.4 FTEs in North Dakota. Based on data from federal wage and salary tables for each position, refuge employment accounts for \$1,270,000 in employee compensation, or roughly \$56,800 per FTE. Using the Bureau of Labor Statistic's Consumer Expenditure Survey data for individuals in these income categories, roughly 79% of annual income is spent locally. Under this assumption, the 12 refuges contribute about \$998,000 to their local economies through employee spending.
- The 12 refuges currently experience total visitation of approximately 16,400 nonresident visitor days per year. Of these, roughly 1,600 are for hunting, 8,400 for fishing and

6,400 (39%) for nonconsumptive recreational activities. Combining these visitation numbers with nonresident spending averages from the "Banking on Nature" study, total visitor expenditure generated by the 12 refuges is estimated to be \$485,000 per year. Of this total, approximately \$89,000 (18%) comes from hunting, \$282,000 (24%) from fishing and \$115,000 (58%) from nonconsumptive recreational activity.

3.8 Operations

Funding for operations at the refuges is for the staff, facilities, and equipment needed to carry out management activities to meet the purposes, goals, and objectives for the refuges.

All refuges have staff and facilities that are shared to manage all the units in a complex (a complex is one or more refuges and one or more districts that are administratively grouped for management efficiency).

Because in most cases facilities are shared with complex staff and for administrative duties, office working conditions are tight and not conducive for conducting business. In addition, visitor centers and interpretive displays are inadequate and do not provide visitors an adequate space to learn about the benefits of the refuges and their resources.

4 Management Direction



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An American avocet searches for food along a wetland shore.

The Service decided to carry out the management direction in this chapter, based on a determination that it does the following:

- Best achieves the refuges' purposes, vision, and goals and helps fulfill the mission of the Refuge System.
- Maintains, and where appropriate, restores the ecological integrity of each refuge and the Refuge System and addresses the significant issues and mandates.
- Is consistent with principles of sound fish and wildlife management.

This chapter describes the overall management focus for the refuges, as well as the objectives and strategies that will be carried out to help refuge staffs achieve the goals. In addition, this chapter includes descriptions of the funding, staff, and step-down plans needed to meet the goals and objectives. Finally, this chapter briefly describes the monitoring and evaluation of both the refuge resources and this CCP, along with the process to amend or revise the plan.

4.1 Management Focus

The refuge staffs will manage wetland and upland habitats to meet the refuges' vision and goals by carrying out the objectives described in this chapter.

Management objectives for habitat types are based on the habitat preferences of groups of target (indicator) species, which consist of members of taxonomic groups such as waterfowl, shorebird, grassland species, and upland species. Refuge staffs will emphasize adaptive management, including monitoring the effects of habitat management practices and using research results to direct ongoing management. Upland and wetland management will benefit migratory birds, particularly waterfowl species; management efforts will be expanded to benefit species of the Central Flyway.

The national wildlife refuges and wetland management districts in North Dakota received more than 385,000 visitors during fiscal year 2007. It is a high priority for the refuge staffs to foster an appreciation, support, and understanding of the refuges' vision and provide opportunities for wildlife-dependent recreational uses. Audubon National Wildlife Refuge will construct an administrative and learning center to facilitate refuge visitors and provide for a safe, quality visit. Kellys Slough and Lake Alice national wildlife refuges will enhance trails, kiosks, and interpretive displays to provide the public with an awareness of the refuges' resources. Fishing and hunting will be maintained at refuges that are currently open to these uses to provide good-quality experiences for the public.

4.2 Goals, Objectives, Strategies, and Rationale

This section has objectives, strategies, and rationale following each goal to describe how the Service will manage the refuges to meet the goal.

A *goal* is a descriptive, broad statement of desired future conditions that conveys a purpose, but does not define measurable units.

An *objective* is a concise statement that indicates what is to be achieved, the extent of the achievement, who is responsible, and when and where the objective should be achieved.

Strategies provide ways to achieve objectives.

The *rationale* for each objective provides context such as background information, assumptions, and technical details.

Note: Although the Service identified needs during the planning process, there are no assurances that any projects or staff positions will be fully or partially funded. Implementation of some objectives in this chapter will be subject to future increases in staff or funding, or both. However, there are opportunities to examine current allocations of funds and resources and determine the best uses based on a comprehensive evaluation of critical needs.

HABITAT AND WILDLIFE GOAL

Conserve, restore, and enhance the ecological diversity of grasslands and wetlands of the North Dakota prairie to support healthy populations of ducks and geese, other migratory birds, native species, and other wildlife.

Wetlands

A developed wetland has a water control structure or some other capability for managers to manipulate the water level. Developed wetlands generally are managed impoundments. Their relatively shallow depths and periodic flooding and drying nature make for highly productive systems with respect to invertebrates and wetland vegetation. Corresponding bird use is diverse.

Meeting objectives for developed wetlands will require that water level management is carried out in a timely and appropriate manner. Ideally, impoundments will provide a mosaic of wetland habitat types to a wide variety of wetland-dependent birds such as waterfowl, shorebirds, and wading birds. This mosaic of habitat types will satisfy the needs of nesting, molting, and migrant waterbirds, as well as waterfowl broods and other fledgling waterbirds.

Flooding that began in the mid-1990s within the Devils Lake area has affected about 6,000 acres of developed wetlands at the 12,000-acre Lake Alice National Wildlife Refuge, including refuge structures and facilities. Sixteen water control structures and associated dikes are currently underwater and will likely need major repairs when the water recedes, at which time the refuge staff will evaluate vegetation conditions for reclamation.

Two developed wetlands, Lake Audubon and Lake Ilo, will not be addressed within this CCP. Although they occur within refuges covered by this CCP, these two wetlands have unique management plans, objectives, and purposes. Management of Lake Audubon and Lake Ilo is discussed in a step-down plan located at the headquarters of Audubon National Wildlife Refuge.

Wetlands Objective 1

Provide between 30% and 70% coverage of emergent vegetation (over water) on average, over 11 of 15 years.

Strategies

- Estimate the percent coverage of emergent vegetation through either visual estimation or GIS area determination using aerial photos taken annually in early July.
- Adjust water control structures and management plans to achieve hemi-marsh (see a description under rationale below).
- Review all water management structures for improvements or repairs that will enhance management capability and seek money necessary to carry out the improvements or repairs.

Rationale

Previous research has indicated that wetlands with an approximate 50:50 ratio of open water and emergent vegetation such as cattails and bulrushes, often termed hemi-marshes, attract the highest densities and diversities of wetland birds (Weller and Spatcher 1965).

Open water to emergent vegetation ratios will likely be close to the 50:50 ratio (that is, 30:70 ratio, 70:30 ratio) in most developed wetlands, as recommended by Weller and Spatcher (1965), in most years (about 11 of 15), through targeted water level management.

Because of the dynamics involved with prairie-wetland conditions over time, in certain years the coverage of emergent vegetation may fall well outside of the target range (30%–70% coverage). During years of extreme drought, emergent vegetative cover may exceed the upper-end target of 70%; during extremely wet periods, wetlands may revert to a more open-water state, supporting far less than 30% coverage by emergent vegetation.

Growing-season drawdowns can effectively manipulate plant community composition. Drawdowns and, more specifically, drawdown intervals can influence plant

species composition, structure, and seed production (Frederickson 1991).

A sharp increase in invertebrate populations when wetlands relood following a dry phase is an important reason for artificially flooding and draining wetlands to enhance waterfowl habitat (Cook and Powers 1958, Kadlec and Smith 1992).

Wetlands Objective 2

Within 10 years of CCP approval, establish a monitoring plan for high-priority wetlands for water quality, aquatic invertebrates, and emergent and submergent aquatic vegetation. Include monitoring the changes in species diversity at a minimum of 3-year intervals for vegetation and 5-year intervals for water quality and aquatic invertebrates.

Strategies

- Randomly sample vegetative zones (wet meadow, shallow marsh, deep marsh, and open water) (Stewart and Kantrud 1971) along transects, using a 2.7-square-foot plot frame (Daubenmire 1959). Measure percent cover of different plant species.
- Randomly sample invertebrate abundance and biomass in all major vegetative zones.
- Sample water quality for salinity and total dissolved solids.

Rationale

Understanding how water management actions alter developed wetlands is critical to ensuring long-term health and sustainability. The composition of aquatic plant and invertebrate communities supported is directly related to hydrology and water chemistry and, in turn, affects habitat. For example, salinity can

negatively influence invertebrate composition directly by affecting physiology (Williams and Crawford 1989, Euliss et al. 1999) or indirectly by affecting habitat structure and foods (Krull 1970, Wollheim and Lovvorn 1996). Other examples include documented reports that high concentrations of suspended silt and clay are toxic to zooplankton, and agrichemicals can cause significant mortality of aquatic invertebrates (Borthwick 1988).

Overall productivity in both the short term and the long term could be negatively affected, because plant community structure and composition influences use by invertebrates and vertebrates such as birds (Laubhan and Roelle 2001). Both plants and invertebrates play significant roles in nutrient cycling and are integral to components in the food chains of a wide variety of vertebrates (Murkin and Batt 1987).

The vegetative community of a wetland is one of the most significant driving forces in the makeup of that wetland's other biotic components (for example, invertebrates and birds). Wetland vegetative structure and floristic composition is important to nearly all waterbirds from the standpoint of nesting, brood rearing, foraging, and migration stopover habitat (Laubhan and Roelle 2001). The same vegetative factors influence invertebrate community composition (Voigts 1976). Managing for a diversity of wetland flora in a wetland community generally equates to a corresponding diversity of waterbirds. Decreased waterbird use generally equates to decreased heterogeneity of a wetland's floral community. Variability in a wetland's floral community is driven in part by the temporal influence of climate (Euliss et al. 2004), but may also be tied to alterations that affect fundamental processes (for example, hydrology, water chemistry, and sediment dynamics) and might alter



A mix of open water and emergent vegetation attracts high densities of different wetland birds.

system tolerance with respect to the germination and growth of certain wetland plant species (Laubhan et al. 2006).

The importance of invertebrates is substantial for a number of bird groups. Invertebrates are a key food resource for shorebirds (Helmers 1993, Laubhan and Roelle 2001), cranes, grebes, herons, rails, and ibis (Laubhan and Roelle 2001), as well as a number of duck species (Bartonek 1968, 1972; Krapu and Swanson 1975; Swanson et al. 1979; Meyer and Swanson 1982; Swanson et al. 1984). According to Skagen and Oman (1996), more than 400 genera of invertebrate prey are consumed by 43 species of shorebirds in the Western Hemisphere alone. A diversity of invertebrates is a critical supporting factor of a wetland bird community, not only with respect to various bird groups, but also concerning various foraging guilds (groups of species that use a common resource in a similar fashion, for example, birds that glean and birds that probe) within a specific group (for example, shorebirds). Differences in foraging technique, as well as bill length and body size, allow birds to partition themselves and use different invertebrate species to avoid overlap in habitat use (Recher 1966).

In addition to their obvious role in the feeding ecology of various waterbirds, invertebrates provide critical food chain support for many other organisms and play substantial roles in overall wetland productivity and nutrient cycling (Murkin and Batt 1987). Rosenberg and Danks (1987) point out that invertebrates of freshwater wetlands are poorly studied and there is little existing information.

Invertebrates that inhabit prairie wetlands are well suited to cope with the highly dynamic and harsh environmental conditions of this region (Euliss et al. 1999). The invertebrate community of the Prairie Pothole Region is comprised mostly of ecological generalists that have the necessary adaptations to tolerate environmental extremes. However, invertebrates are sensitive to agrichemicals that can accumulate in wetlands (Borthwick 1988, Grue et al. 1989), and there is strong interest in their use as indicators of wetland and landscape condition in the Prairie Pothole Region (Adamus 1996).

Invertebrate sampling data could be tied to water quality data to determine if salinity levels are affecting invertebrate composition directly via physiology (Newcombe and McDonald 1991, Euliss et al. 1999), or indirectly by affecting habitat structure and foods (Krull 1970). Eventually, the Service will gain an improved understanding of the invertebrates that developed wetlands support across space and time, through the acquisition of initial baseline data and subsequent periodic monitoring.

Uplands

Native prairie is defined as native (“unbroken”) sod and exists in the refuges in various acreages and with broad management histories. Most of the northern

mixed-grass prairie and tall-grass prairie have been destroyed through conversion to agriculture, and remnant tracts appear to be particularly vulnerable to invasion by smooth brome and Kentucky bluegrass (Murphy and Grant 2005). Losses are more severe in the Drift Plain physiographic region than the Missouri Coteau physiographic region.

Key roles of the Refuge System include contribution to ecosystem integrity and the conservation of biological integrity. Thus, the refuges should contribute to the conservation of native prairies unique to North Dakota.



Prairie Smoke

USFWS

Uplands Objective 1

Within 2 years of completion of CCP, each national wildlife refuge will identify native prairie tracts and establish permanent vegetation monitoring transects to collect baseline floristic composition data.

Within 2 years of CCP approval, each refuge will identify native prairie tracts and establish permanent vegetation monitoring transects to collect baseline floristic composition data.

Strategies

- Use current vegetation inventory data and landscape characteristics to identify native prairie tracts. Enter tract boundaries into RLGIS.
- Establish permanent transects to collect baseline data about plant species composition, following procedures of the belt transect methodology (Grant et al. 2004).

Rationale

A prerequisite to setting detailed objectives for native prairies is to complete a basic inventory of existing native prairie. Thus, this objective calls for such an inventory, and the next objective states that once the inventory is complete, each refuge will develop a system to prioritize native prairies and subsequently develop detailed objectives for desired vegetation

conditions. The third objective notes that, for units designated as lower priority, the management emphasis will be on providing appropriate structural diversity to meet the needs of a broad array of waterfowl and other grassland bird species.

Uplands Objective 2

Within 2 years of completing the basic inventory of native grasslands (objective 1, above), each refuge will (1) develop a specific and detailed method to prioritize native prairie units, (2) develop detailed objectives describing the desired vegetation conditions in these prairies, and (3) carry out the appropriate management strategies necessary to achieve these conditions.

Strategies

- Following the example from J. Clark Salyer Wetland Management District provided in appendix K (priority-setting example for native prairie), develop a method to prioritize native prairie units and describe desired vegetation conditions.
- Manage tracts or portions of tracts with prescribed fire, grazing (see appendix L, compatibility determinations), “interseeding,” herbicide application, or appropriate combinations of these tools.

Rationale

Recent inventory data suggest that relatively intact native herbaceous flora is uncommon in North Dakota, with few remaining large tracts dominated by native grasses and forbs. Native warm-season grasses are especially uncommon. This objective focuses on the restoration and maintenance of floristic composition. Smooth brome, Kentucky bluegrass, and other introduced plants are prevalent in native prairie across North Dakota. Kentucky bluegrass tends to increase under prolonged rest or with grazing but decreases with fire, especially when burning occurs during stem elongation or in dry years. Smooth brome also increases under rest but, in contrast to Kentucky bluegrass, appears sensitive to repeated grazing but unaffected or variably affected by prescribed fire. A strategy to improve competitive abilities of native herbaceous plants should match the types, timing, and frequencies of disturbances under which these plants evolved.

Smooth brome generally is more difficult to control once established than Kentucky bluegrass and more significantly alters the quality and structure of native prairie. Therefore, restoration management focuses more on strategies to reduce brome. Although the focus of this objective is on the restoration and maintenance of floristic composition in native prairie, wildlife such as prairie birds and butterflies will also benefit.

Examples of objectives to prioritize native prairies and describe desired vegetation conditions were developed for J. Clark Salyer Wetland Management

District and are provided in appendix K (priority-setting example for native prairie). However, each refuge staff needs to develop objectives specific to their area and situation.

Uplands Objective 3

Each refuge will identify native prairie units that are of high and low priority for native prairie restoration, as described in objective 2. Manage low-priority native prairie tracts to provide a mosaic of vegetative structure across a broad landscape to satisfy the habitat needs of grassland-dependent bird species, primarily waterfowl: a minimum of 40% in a high visual obstruction reading (VOR) category (>8 inches), a minimum of 25% in a medium VOR category (4–8 inches), and a minimum of 5% in a low VOR category (<4 inches).

Strategies

- Manage tracts or portions of tracts with prescribed fire, grazing (see appendix L, compatibility determinations), or a combination of both.
- Manage tracts with select chemical herbicides (imazapic-based).

Rationale

By 2 years after CCP approval, refuges will identify high-priority native prairie tracts to manage for floristic quality, floristic composition, and landscape characteristics that underlie the quality of nesting habitat of grassland-dependent birds. This will improve



Smooth brome, an invasive species, is difficult to control once established and significantly alters the quality of native prairie.

the chances of restoring at least some native prairie by more intensively managing these areas. For the remaining native prairie tracts, it is likely most of the prairie has passed a threshold such that restoration of a modestly diverse, native herbaceous flora is an unrealistic and impractical goal. With modest effort, the prevalent, introduced cool-season grasses and scattered low shrubs can be managed to provide a mix of postdisturbance structural types attractive to a broad array of native grassland bird species, with a focus on waterfowl.

This objective focuses on providing vegetation structural diversity, emphasizing structure that is moderate- to tall-dense for nesting waterfowl. Structural habitat preferences of bird species vary widely (for example, VORs, Robel et al. 1970). It is assumed that the needs of all species will not be met on a single tract or management unit, but rather the needs of various species groups will be met by providing a mosaic of vegetative structures (high, medium, and low) across many tracts of land in the refuges. Native prairies will be managed for a higher percentage of high and medium VOR acres ($\geq 40\%$ and $\geq 25\%$, respectively) and lower percentage of low VOR acres ($\geq 5\%$). In addition to mallards, several other upland-nesting duck species (northern shoveler, gadwall, northern pintail, and blue-winged teal) prefer VORs in the medium (4–8 inches) and high (> 8 inches) categories (Laubhan et al. 2006).

Invasive Plants

Significant infestations on Service lands have resulted in more than a loss of habitat for wildlife and a decline in species diversity in prairie grasslands. Control of invasive plants is costly in time and money. Control requires careful planning, implementation, and monitoring as defined by an integrated approach to management of invasive plants designed to meet a habitat objective.



Alfred Brousseau/USDA-NRCS PLANTS Database

Yellow star-thistle is a state-listed noxious weed.

Invasive Plants Objective 1

Within 1 year after CCP approval, develop an IPM plan for control of invasive plants, including noxious weeds.

Strategies

- Review and update the IPM plan every 5 years.
- Prepare annual progress reports or have meetings to share current treatment techniques and results. In annual updates, include information on what treatment protocols may or may not have been successful in achieving stated objectives and any future plans.

Rationale

The Service has developed an IPM plan for each refuge. These plans detail strategies (1) for control or elimination of key invasive plants affecting Service resources, and (2) to comply with state and federal noxious weed and invasive plant laws. The Service will use an integrated approach for pest management to treat infestations of invasive plants on Service lands. The plans identify the current extent of encroachment by all species of concern and suitable control methods and monitoring needs. The plans document infestations and provide an index to effectiveness of management actions. A surveillance program will be designed and carried out to document the spread and introduction of invasive plants. The implementation of an early detection and rapid response system will require coordination with North Dakota Department of Agriculture, weed boards, weed management areas, and other state, federal and local partners. During annual coordination, all parties will share information and discuss the most effective, economical, and environmentally appropriate control strategies for priority invasive plant species.

Invasive Plants Objective 2

Within 5 years of CCP approval, establish a baseline inventory of all invasive plants, including noxious weeds, on Service lands.

Strategies

- Conduct inventories following the USFWS Strike Team operational guidelines, when completed, which will include mapping criteria.
- Store all inventory data in RLGIS.
- Repeat inventories at a minimum of 10-year intervals.

Rationale

Invasive plants are a major threat to native ecosystems in the United States, considered second only to habitat destruction in significance. Invasive plants have infested approximately 2 million acres of Refuge System lands. Infestations of invasive plants have a direct effect on the ability of the refuges to

fulfill their wildlife conservation mission including species recovery and maintenance and restoration of biological diversity, biological integrity, and natural functions.

Recognizing the need for a rapid response to invasive plant control, the Service sought increased funding in the fiscal year 2004 budget to support invasive species strike teams for the Refuge System. Specifically the Service sought to “Develop ‘Refuge Invasive Species Strike Teams [ISSTs]’ (similar in organizational structure and responsiveness to ‘hot shot’ crews used in interagency fire fighting). Strike teams will respond rapidly to invasive species problems identified by a refuge, or a grouping of refuges” (USFWS 1999). This strategy clarifies the intent to create a set of unique teams, ISSTs, to address primarily new infestations of invasive plants. The idea behind ISSTs is to attack invasive infestations in a more effective and cost-effective way. The ISSTs represent a new way of doing business in dealing with invasive plants.

The Service’s budget documentation for fiscal year 2004 stated, “The program goal is to increase the rapid response capability for invasive plant management, using a highly trained, equipped, and mobile response force that refuge managers can call on to support control efforts on newly discovered and satellite (‘spot fire’) infestations. The teams will provide an emergency rapid response initial attack force for a set of refuges within a wide geographic area. The design of the ISST program is based upon models developed for the National Park Service’s Exotic Plant Management Teams and interagency firefighter ‘Hot Shot’ crews.” (DOI 2004)

Through these initial efforts, the Service established three geographic ISSTs: Everglades Focus Area based at J.N. Ding Darling National Wildlife Refuge, Florida; Columbia-Yellowstone-Missouri Rivers Focus Area based at the Great Falls, Montana; and Southwest Focus Area (Arizona, California, New Mexico, and west Texas) based at Imperial National Wildlife Refuge, Arizona. In fiscal year 2006, the Service sought and acquired funding for two additional ISSTs: Hawaiian and Pacific Islands Focus Area and the North Dakota Refuges Focus Area.

The ISST program is based on models developed for the National Park Service’s “Exotic Plant Management Teams” and interagency firefighter hotshot crews. The Service will develop working relationships with other federal and state agencies to share and incorporate successful and unsuccessful strategies where appropriate, including centralized coordination at a national level. Individual ISSTs must evaluate their programs annually and make adjustments depending on their individual needs and consultation with the Service’s invasive species coordinator.

As of July 2007, the Service’s ISSTs have operational guidelines in a draft form. The draft mission statement is as follows: “To protect the natural resources of the

Refuge System from the impacts caused by invasive plants, primarily through early detection and rapid response principals, which may include prevention, control, monitoring, restoration and education.”

The North Dakota ISST first received full funding in fiscal year 2006. North Dakota refuges had recognized the need to fight invasive plants many years ago and were conducting IPM strategies throughout the state. The rapid spread of invasive plants and declining budgets hampered this effort. The focus of the ISST was to provide funding to each refuge to hire and train individuals to identify and treat invasive plants. Many Service lands in the refuges did not have any digital information recorded for invasive plants. One goal of the ISST was to hire and train an inventory crew to traverse all Service-owned lands in North Dakota and collect invasive plant inventory information to be saved in RLGIS. This information will provide managers a starting point in the prioritization of areas to be treated for invasive plants.

Trying to manage an infestation of invasive plants without any idea of the size, canopy cover, or rate of spread jeopardizes the efficiency of the control efforts and wastes precious time and money. An inventory will help prioritize the strategies used to eliminate new and isolated infestations and contain or reduce larger infestations by attacking the perimeter and working toward the center. Inventory maps are an invaluable planning tool for management as well as critical to monitoring efforts. These inventory maps will play a critical role in monitoring the effectiveness of control methods and ensuring the area is not reinfested after several years by dormant viable seed.

The Service, the state of North Dakota, and other partners have not yet developed and universally adopted criteria for mapping invasive plants. Regional invasive species and IPM coordinators in region 6 are in the process of drafting protocols for field mapping of invasive plants for entry and storage in RLGIS. This document will provide guidelines for (1) mapping new and old infestations, (2) minimum mapping units, and (3) the use of a point versus a polygon and canopy cover. These guidelines will incorporate the minimum standards outlined in “The North American Invasive Plant Mapping Standards,” approved by North American Weed Management Association, May 7, 2002.

Once a baseline inventory has been completed for Service lands in North Dakota, the focus shifts to more scientific surveys to provide quantifiable data. The Service will conduct surveys every 3–5 years on priority areas to provide information about effectiveness of treatment, response to an IPM strategy, or results of grassland restoration.

Invasive Plants Objective 3

For the next 15 years, annually restore 3% of refuge lands to grasslands that are more resilient to invasive plants.

Strategies

- Apply early detection, rapid response strategies to attack new infestations before they become large and costly to treat.
- Use the GIS to predict areas at greatest risk of new infestations.
- Conduct a surveillance program for new infestations of invasive plants every 2 years.
- Every 5 years, complete surveys for invasive plants, Global Positioning System (GPS)-map locations, create a baseline map, and collaborate with partners to map records for neighboring lands.
- Monitor change over time by collecting RLGIS cover-type data for all invasive plant species.
- GPS-map and store in RLGIS the anecdotal observations of infestations made by Service staffs while conducting other work activities.
- Respond promptly to all landowner or other public complaints.
- Map sites of invasive plant treatment each year in RLGIS.
- Monitor infestation rates and effectiveness of control efforts.
- Share GIS layers of invasive plant infestations with partners.
- Attain help with invasive plants (applications and monitoring) by pursuing additional money through partnerships, grants, and invasive plant programs.
- Communicate with and educate local, state, and federal agencies and the public about invasive plant issues. In a timely manner, make known information about new infestations, effective or ineffective treatment methods, and new treatment options.
- Coordinate invasive plant control by meeting at least once per year with county weed boards, representatives from weed management areas, and other partners to share information and discuss control strategies.
- Address public complaints about invasive plants on Service-owned lands, while using IPM strategies.
- Ensure all seed used to restore habitat is certified weed-free. Avoid purchasing seed from sources known to have violated the weed-free seed regulation.
- Begin habitat management treatments to develop habitat that will be more resilient to invasive plants.

Rationale

Leafy spurge (993,644 acres), Canada thistle (956,335 acres), and absinth wormwood (452,594 acres) are the

most widespread and common species infesting lands across North Dakota, as reported by county and city weed boards (North Dakota Department of Agriculture 2006). These problem plants can displace native vegetation over large areas and have the ability to form nearly monotypic stands in the absence of management actions and, therefore, threaten native biodiversity (Watson 1985, Bedunah 1992, Trammell and Butler 1995, Svedarsky and Van Amburg 1996, Hutchison 1992). Due to the large acreage of infestation, these three species have been the priority invasive plants on Service lands.

The first step to control is to prevent the introduction, reproduction, and spread of invasive plants. Many of the newer invasive plant and “watch” species were introduced via seed imported from states and countries that have invasive plants. The most common sources are the states of California, Oregon, and Washington and the country of Argentina (Ken Eraas, North Dakota Department of Agriculture, personal communication, 2007); seed from these locations should be avoided. Wherever possible, all grass seed should be bought from seed grown in North Dakota to minimize the introduction or spread of new invasive plant species.

Farming can be used to rejuvenate DNC and other old cropland areas, fight colonization of invasive plants, prepare ground for grass seeding, and reduce use of nonselective broadleaf herbicides over the long term. Old cropland areas that are heavily infested with Canada thistle or other invasive plants may be completely renovated by temporarily converting these areas to cropland. The crop rotation may include the use of genetically modified varieties of Roundup®-ready corn or soybeans that are sprayed with the nonselective herbicide, glyphosate. By maintaining these fields in crop production for several years, the percentage of viable invasive plant seed in the upper soil layer should be significantly depleted and the germination potential reduced. The Service will replant these fields to a grass and forb mixture designed to meet habitat objectives for individual tracts of land.

Mowing or haying may be used to remove the aboveground growth of invasive plants before flowering and seed production in areas where other treatments may not be available or practical. Neighboring landowners are usually interested in additional forage. Heavily infested areas can often be hayed early to prepare the site for other control practices (for example, biological control agents and chemical control). Two common obstacles to haying for control of invasive plants is (1) excessively rough and uneven ground usually due to pocket gopher activity, and (2) potential to spread the invasive plants via hay transported off Service lands to private lands. (See appendix L, compatibility determinations.)

Grazing by sheep or goats can be used to maintain an invasive plant population at a level that the plant no

longer presents an economic hardship. Grazing may also be used as a pretreatment to prepare for herbicide application. (See appendix L, compatibility determinations.)

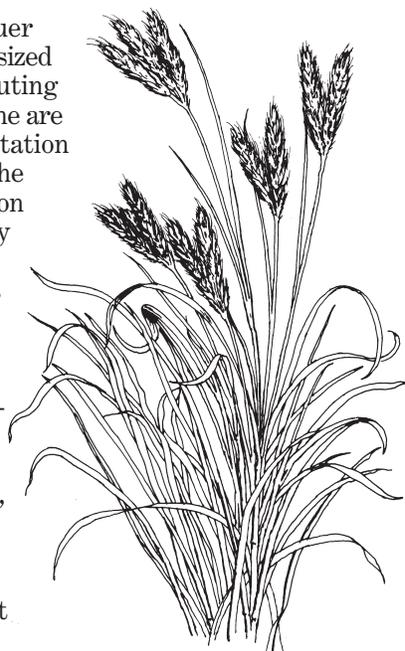
The use of biological control agents—flea beetles (*Apthona* spp.)—for leafy spurge control has shown excellent results. Widespread use of these insects needs to be made by monitoring insectaries for *Apthona* spp. beetles, with redistribution of beetles among leafy spurge patches as needed. The use of other biological control for other invasive plant species needs to be investigated. Releases of the Canada thistle stem mining weevil, seed head weevil, and stem gall fly have shown mixed results. Biocontrol is commercially available for musk thistle, yellow and Dalmatian toadflax, yellow star-thistle, knapweeds, and purple loosestrife.

Old Cropland

This section provides descriptions of declining grassland bird species, old cropland areas, restoration efforts, priority refuge tracts, and the integrity policy.

Declining Grassland Bird Species

According to Conner et al. (2001), the human impacts to the diversity of the biota of the North American grasslands are likely the most significant of all terrestrial ecosystems on the continent. Specifically, the bird species that use grasslands have shown dramatic and consistent declines (Knopf 1994). According to Knopf (1995) and Rich et al. (2004), as an overall group, grassland birds show higher declines than birds of other North American vegetative associations. Breeding Bird Survey data from 1966–96 indicates that populations of 13 species of North American grassland birds declined significantly and, conversely, populations of only 2 species increased (Peterjohn and Sauer 1999). It is hypothesized that major contributing factors to this decline are grassland fragmentation and habitat loss. The native sod conversion to cropland directly impacted wetland and grassland birds by reducing and fragmenting the available breeding cover for grassland-nesting species (Sugden and Beyersbergen 1984, Batt et al. 1989). Further, many grassland- and wetland-dependent birds have few alternatives to the



Native Bluestem Grass

Great Plains (Igl and Johnson 1995), whereas birds associated with woody vegetation appear to have larger distributions across the continent (Johnson et al. 1994).

Another proposed cause for declines of grassland birds is the degradation of existing prairie and wetlands. Current day grazing regimes often do not imitate the processes that were in place 200 years ago, which presents the birds with a different structure and, often, a different vegetative composition. In addition, some areas of native sod have been under a management regime of idleness, which appears to have given an advantage to invasive plant species such as smooth brome and Kentucky bluegrass. These species tend to dominate and overtake native species and degrade the habitat. Wilson and Belcher (1989) found that Eurasian plant species in the North American prairie not only replace the native plant community, but also impact the species composition of wildlife communities that use these plant communities. The woody vegetation now commonplace across the formerly open grasslands also negatively influences grassland songbirds by fragmenting the grasslands, which provides habitat for predator species and attracts forest-edge bird species that may displace the grassland species (Johnson 2006b).

Old Cropland Areas

Many of the uplands in the refuges were previously cultivated and are referred to as old cropland. Traditionally, these areas were reseeded to herbaceous mixtures that included species such as cool-season introduced grasses and legumes (intermediate wheatgrass, tall wheatgrass, alfalfa, or sweetclover) and primarily provided nesting cover for mallards and other ducks. This seed mixture has been referred to as DNC (dense nesting cover). Although a viable mixture that is beneficial on multiple levels, this mixture requires intensive inputs to maintain over the long term. First, DNC has a limited lifespan and provides attractive cover to nesting ducks for perhaps only 6–8 years after seeding and up to 15 years with certain management (Higgins and Barker 1982, Lokemoen 1984). At the end of the DNC life cycle, a field is typically cultivated and farmed for 2–3 years, and then reseeded. This leads to a rotation of seeding–managing–farming–seeding into perpetuity. Oftentimes, fields are not reseeded at the prescribed frequencies, which leave decadent, invasive plant-infested uplands across the landscape that are limited in attractiveness to migratory birds. Further, the need to repeat this rotation on a regular basis negatively affects other ecological factors in the surrounding environment. For example, cultivation increases soil erosion, and herbicide use is increased to prepare the seedbed for each new seeding.

Restoration Efforts

As part of this CCP, the 12 national wildlife refuges will restore priority tracts of old cropland back to native vegetation. The Service will revegetate these

areas with a diversity of native vegetation that, with modest management, is relatively resistant to infestation by invasive species including noxious weeds. This will benefit grassland and wetland birds, because providing habitat that is most similar to the historical vegetative condition likely provides habitat for more grassland-dependent wildlife. According to Howell (1988), re-creating the elements found in the original communities may be the optimal method for ensuring continued species interactions and natural selection. As an example, Baird's sparrow and Sprague's pipit appear to use short, sparse grass structure and mostly associate with native bunchgrasses, rather than the broad-leaved, introduced species used for DNC mixes (Madden et al. 2000). Further, according to Stewart (1975), and Kantrud and Higgins (1992), marbled godwit and willet typically select native grass cover over tame grass cover.

Native prairie areas that have not been cultivated, typically (dependent on management) have a diversity of plant forms including short, rhizomatous grasses, taller bunchgrasses, a low shrub component, and a variety of forbs. This structural diversity is usually lower in fields dominated by introduced vegetation (most commonly, smooth brome, Kentucky bluegrass, and invasive plants such as wormwood or leafy spurge) that have a more homogeneous height across a field (Wilson and Belcher 1989). Grassland-dependent birds adapted to the diverse structure the native prairie provided, whereas DNC-type mixtures limit this diversity and likely attract only bird species that key in on this tall, dense cover.

Another benefit of using native seed mixtures to restore old cropland, as compared with using a DNC mixture, is the longevity. In theory, native seed mixtures should persist into perpetuity under appropriate management including disturbances that imitate the natural regimes that sustained wildlife populations before human intervention. Management of refuges in North Dakota typically involves various tools to imitate the defoliation activities through which prairie plants evolved, including prescribed fire and rotational grazing (see appendix L, compatibility determinations). The frequency of certain activities depends on the particular habitat components, for example, a pristine, native prairie tract may require a burn every 3–5 years and intermittent, rotational grazing of domestic cattle. This is much less activity over time than the rotation required to sustain DNC-seeded fields.

Experimentation with native seeding that took place 10–20 years ago in the Drift Prairie and Red River Valley areas of North Dakota usually included three to five, native warm-season grasses. Current research indicates that this may not be an optimal mixture for success of establishment and management. Tilman (1996) states that biological diversity is dependent on the functionality and sustainability of the ecosystem, lending to the thought that grassland restorations

should attempt to include diverse seed mixtures. Guo and Shaffer (2006) completed their research in North Dakota, which indicated that the saturation rate for one of their study sites was between 16 and 32 species of native plants.



Seeding Refuge Land to Native Grass

Inclusion of forbs in native mixtures appears to be necessary in attempts to restore variables such as nutrient cycling and energy flow (Pokorny et al. 2005). Sheley and Half (2006) indicate that seeding a wide range of forbs increases the likelihood that more niches will be filled and facilitates overall survival of the forbs. The use of multiple forbs may help to overcome the temporal weather variations because at least certain species should germinate and respond to the dynamic weather conditions that annually persist (Sheley and Half 2006). More specifically, varying numbers and combinations of species in differing developmental phases may be a requirement for a native seeded area to achieve the best possible results. It is likely too that, as a stand matures, a diverse mixture may play an important role in the belowground community by providing a well-developed root system for sustainability over time (Guo and Shaffer 2006). Further, another benefit to establishment of native vegetation is the suggestion that species-rich seed mixtures may reduce infestation of invasive plants in restored grasslands (Blumenthal et al. 2003, Carpinelli 2001, Pokorny 2002, Sheley and Half 2006, Tilman 1996). In a study by Pokorny et al. (2005), they determined that native forbs resisted invasion by spotted knapweed better than grasses. The overall theory in the literature indicates that seeding a diverse seed mixture increases the inclusion of various functional groups among plant species. With extremely limited data on the reestablishment of native flora mixtures in North Dakota, there is a need to begin long-term research in this area. Ensuring science-based management for reseeding these areas is of chief importance to the perpetuation of the grassland resources.

Priority Refuge Tracts

Based on data in federal, regional, and state plans and several literature sources, the approximate midrange

of habitat requirements for several grassland bird species is 125 acres. Therefore, refuge tracts that are at least 125 acres in size or part of existing habitat blocks greater than 125 acres will be a priority for restoration. For restoration of grasslands, the amount of edge needs to be minimized by designing circular or square fields (Wyoming Partners in Flight 2002). The literature provides evidence that even such smaller areas provide benefits to grassland birds. One study indicated that landscape-level effects are not strong; rather that local habitat management is important for reproduction of ducks and songbirds (Koper and Schmiegelow 2006). Further, Davis et al. (2006) indicate that patch size effects on reproductive success of songbirds of the mixed-grass prairie were relatively small and variable. These studies may indicate variations in regional abundance or landscape composition among species. Regardless, patterns of area sensitivity probably vary for grassland birds (Davis et al. 2006) and likely restoration efforts will provide appropriate habitat size and composition for certain grassland-dependent birds including grasshopper sparrow, Savannah sparrow, bobolink, Le Conte's sparrow, sedge wren, upland-nesting shorebirds, and various waterfowl.

Integrity Policy

The focus on using native plants to restore refuges is in line with the Improvement Act, which includes an integrity policy that states that Refuge System units are to promote biological integrity, diversity, and environmental health and attempt the restoration of historical conditions on Refuge System lands (Schroeder et al. 2004).

Old Cropland Objective

In an attempt to restore grasslands that resemble presettlement conditions, over the next 15 years reseed a total of 100 acres to native herbaceous mixtures in priority refuge tracts that, 10 years postestablishment, will be comprised of ≥60% native grasses and forbs.

(For this objective, planning team members used their knowledge and expertise to obtain an acreage estimate. This acreage seems achievable based on the adequacy of funding and staff levels included in the CCP. The level of 60% presence of native grasses and forbs across seeded areas considers the management challenges associated with control of invasive plants, while targeting a reasonable percentage for maintaining dominance of seeded species. Monitoring these seeded sites is critical for measuring the acreage and percentage listed in the objective.)

Strategies

- Use appropriate site preparation techniques to ensure a weed-free seedbed, which may include a combination of cropping and chemical fallowing using glyphosate-based herbicide.
- Identify priority restoration sites in refuges based on block sizes ≥125 acres.

- Develop a seed mixture with a nearly equal cool-season to warm-season grass and forb component.
- Drill or broadcast the native seed mixture.
- Use a variety of tools in postseeding management including clipping, prescribed fire, prescribed grazing (see appendix L, compatibility determinations), and necessary IPM strategies.
- Monitor results of vegetation establishment.
- To ensure that grassland restoration efforts are science-based, conduct research on selected newly seeded sites to determine the establishment success of species included in the mixtures. From this data, within 15 years of CCP approval, develop a decision matrix to help with selecting optimal species to use in grassland restorations.
- To ensure effectiveness of native seed mixes containing grasses and forbs, conduct research on wildlife response that focuses on Lepidoptera and grassland-dependent migratory birds (waterfowl, shorebirds, and songbirds) within 10 years of CCP approval.

Rationale

According to Klett et al. (1984), nest initiation rates for mallard, gadwall, and blue-winged teal in North Dakota and South Dakota were as high or higher in native-seeded fields than in seeded fields that lacked natives. In addition, nest success was not significantly different in native-seeded versus tame-grass-seeded study fields (Klett et al. 1984). Therefore, the Service will seed old cropland to a mix of cool-season and warm-season native grasses over time. The number of species in seed mixes is, in part, dependent on annual budgets; however, more important seed mix considerations concern the ratio of cool-season to warm-season species, with a target cool-season to warm-season grass ratio close to 1:1.

Dense Nesting Cover

As described under old cropland, certain refuge tracts of old cropland were seeded back to an herbaceous cover of introduced vegetation known as DNC. Traditionally, these seed mixtures included cool-season introduced grasses and legumes (intermediate wheatgrass, tall wheatgrass, alfalfa, or sweetclover) that establish well under a wide variety of soil, moisture, and climatic conditions that exist across the Prairie Pothole Region (Duebbert et al. 1981). Such a mixture provides nesting cover for generalist birds including upland-nesting ducks (Duebbert et al. 1981), northern harrier, and sedge wren (Johnson et al. 2004). DNC provides attractive nesting cover for about 6–8 years after seeding and up to 15 years with certain management (Duebbert and Frank 1984, Higgins and Barker 1982, Lokemoen 1984). At the end of the DNC life cycle, a field is typically cultivated and farmed for 2–3 years, and then reseeded. This leads to a rotation of seeding–managing–farming–seeding into perpetuity to maintain the intended cover.



USFWS

Canvasback

The refuge tracts included in the following objective are a lower management priority than native prairie and seeded native tracts. Ideally, the Service will seed back these tracts to a native mixture; however, certain situations may limit this opportunity. Often, newly acquired refuge lands have been under a regime of conventional cropland tillage and wetland drainage for decades. Such areas often have varying challenges in terms of soil quality, especially with salinity. Potentially, a cycle or two of a DNC mixture on these sites may improve the soils to a point where seeding a native mixture is more viable. In addition, several logistics must be considered in the decision to seed DNC versus native mixtures. If a site is such a distance from refuge headquarters that adequate management (especially in the establishment phase) of native species is not possible, a DNC mixture may be more appropriate. Further, DNC mixtures are significantly cheaper than native mixtures at least in the short term and, therefore, may be a more appropriate choice simply based on funding availability. If a DNC mixture is used, intermediate wheatgrass and tall wheatgrass are viable grasses to use and alfalfa an appropriate legume. Under no circumstances should smooth brome or sweetclover be used in DNC mixtures.

DNC tracts must also be managed to maintain optimal vigor throughout the seeding's life cycle. Especially within cropland-dominated areas, invasive plant problems will persist and require appropriate treatments to control (see the invasive plant objective). Other management methods such as grazing (see appendix L, compatibility determinations) and fire may also be used in certain situations to stimulate the height and density of DNC mixtures. Additionally, mechanical methods such

as haying may also benefit seedings by removing the litter layer. Finally, the most productive stands of DNC are those that are reseeded approximately every 10–15 years, including appropriate crop rotation frequency as seedbed preparation (Duebber et al. 1981).

Dense Nesting Cover Objective

Over 15 years, maintain perennial cover (DNC and tame grass) on refuge tracts of old cropland that are in preparation for reseeding to native cover or are considered low priority for management in comparison to native sod and native seeded tracts at the refuges.

Strategies

- Use farming activities (see appendix L, compatibility determinations) to provide an appropriate seedbed for seeding.
- Manage seeded areas using tools such as fire, haying and grazing (see appendix L, compatibility determinations), and idling.
- Control invasive plants using IPM strategies (see the invasive plants objective).

Rationale

Old cropland tracts that have not begun the seedbed preparation process will be maintained in an idle state that generally has a predominance of introduced, cool-season grass species. Before seedbed preparation for seeding to native grass, these sites are of relatively low priority. Management efforts can be better directed toward higher priority upland areas such as native prairie, tracts already reseeded to native grass, and tracts being prepared for native reseeding. Some studies have indicated that, despite the presence of introduced, cool-season perennial grass cover, DNC will likely support multiple plant species and generalist birds including upland-nesting ducks (Mark Sherfy, USGS, unpublished data).

Invasive and Planted Woody Vegetation

The plants and animals of the North Dakota grasslands evolved simultaneously and were influenced by fire, climate, and herbivory (animals eating plants) (Weaver 1954, Weaver and Albertson 1956, Milchunas et al. 1988, Vallentine 1990, Flannery 2001). These factors maintained a predominantly grassland ecosystem, with a limited occurrence of woody plants.

North Dakota's grasslands burned frequently, providing an inhospitable environment to trees (Higgins 1986, Severson and Sieg 2006). The growing points of most grassland vegetation are usually protected at the base of the plant, compared with woody vegetation that has elevated growing points that are more vulnerable to injury or fatality from fire. Grassland plants persist and expand with frequent and repetitive burns, whereas woody plants tend to decrease (Vogl 1974). The tall-grass and mixed-grass prairie types that cover North Dakota produce large quantities of fuel that dry quickly and easily burn (Steuter and McPherson 1995). Specifically, Bragg (1982) states that bluestem prairies recover quickly postfire and can even provide enough fuel for multiple burns in a single growing season.

The climate also played a pivotal role in the development of the grasslands, especially considering that periodic droughts would have limited growth and expansion of trees (Weaver and Albertson 1936). Transeau (1935) states that it is important to consider the climatic extremes in North Dakota to understand the distribution of grasslands, rather than focus on the long-term averages. As an example, the drought of the 1930s likely played a significant role in reducing current trees and eliminating the establishment of new woody vegetation. While it is interesting that the recent climate of the area has been capable of supporting trees (Anderson 1990), that could easily change with the onset of a drought.

Finally, records indicate that the two primary grazing animals, bison and elk, likely negatively affected woody vegetation. Considering that heavy and consistent use by bison occurred across eastern North Dakota, activities such as grazing, trampling, and rubbing suppressed tree growth at some level across the grasslands (Severson and Sieg 2006). Elk, although considered primary grazers, shift to eating woody materials as grasses dry and become less available in the winter (Nelson and Leege 1982). In addition, documentation also exists that elk damaged woody vegetation by other behavioral activities, especially associated with the rut (Severson and Sieg 2006). Considering the cumulative damages occurring from ungulates, fire, and drought, it is evident that tree growth and expansion were limited across the grasslands of North Dakota.

Recent research in North Dakota determined that the probability of occurrence of breeding grassland birds decreased notably for 11 of 15 species as the percent of woody vegetation increased. Further, negative effects on grassland birds increased as the height of woody plants increased: brush → tall shrubs → trees. By most accounts, the grasslands became unsuitable for nine grassland bird species as woodland cover exceeded 25% (Grant et al. 2004). Results of a recent experimental study in North Dakota determined that the bobolink, Savannah sparrow, and sedge wren specifically avoided tree plantings (Naugle and Quamen 2007).

It is apparent that nest predators and nest parasites increase near woody habitat edges (Johnson and Temple 1990, Burger et al. 1994); therefore, planting woody vegetation in these formerly treeless grasslands magnifies these problems. Tree plantings in grasslands are important den and foraging sites for grassland bird and egg predators historically uncommon to grasslands (Sargeant 1972, Sargeant et al. 1987, Pedlar et al. 1997, Kuehl and Clark 2002). Gazda et al. (2002) indicate that duck nest success decreases near planted woodlands, mainly because of increased predation by mammal and bird species associated with trees and shrubs. In addition, other sources state that waterfowl and waterbirds actually avoid wetlands where trees and shrubs occur along wetland margins, presumably to evade predation (Rumble and Flake 1983, Shutler et al. 2000). In their study, Johnson and Temple (1990) determined that nest predation rates were lower for five species of grassland songbirds in large grassland areas where nests were more than 148 feet from woody vegetation.

The brown-headed cowbird is a nest parasite whose numbers have increased in recent decades to the detriment of other birds (Shaffer et al. 2003). A cowbird will lay its eggs in the nest of another bird, and the other bird will act as a foster parent to the cowbird young, thus reducing survival of the host bird's young (Lorenzana and Sealy 1999). Studies in the mixed-grass prairie and tall-grass prairie determined that grassland birds nesting close (less than 541 feet [165 meters]) to wooded edges incur higher rates of brood parasitism from cowbirds than nests further away (Johnson and Temple 1990, Romig and Crawford 1995, Patten et al. 2006). Shaffer et al. (2003) documented that brown-headed cowbird parasitizes 24 of the 36 North American grassland birds.

Historically, most of the national wildlife refuges in the state were part of a grassland-dominated system, where fire, grazing, and drought restricted natural tree growth to limited areas (Higgins 1986). Now, planted trees and shrubs occur at many refuges. Although most woody plantings existed before Service ownership of these lands, the Service did some planting after acquisition. Planted trees and shrubs such as green ash, cottonwood, and buffaloberry are native to North America; however, many others are nonnative species such as caragana, Russian olive, and Siberian elm. Most of these plantings are considered unnatural components of historical habitat. Additionally, nonnative species of woody vegetation such as Russian olive and Siberian elm are invasive and readily spread from both Service-owned and non-Service-owned plantings into new areas.

Preventing the encroachment and planting of woody vegetation into grassland systems contributes significantly to the recovery of grassland bird populations (Herkert 1994). Several sources indicate that the elimination and reduction of existing invasive and planted woody vegetation benefits most grassland-dependent bird species (Bakker 2003, Grant

et al. 2004, Patten et al. 2006, Shaffer et al. 2003, Naugle and Quamen 2007, Johnson and Temple 1990, Sovada et al. 2005). Although many woodland bird species might nest in planted woodlands, few are of management concern. This suggests that the loss of planted woodlands will have negligible effects on these species whose populations are stable or expanding. In addition, tree plantings on the prairie fail to provide habitat for forest birds that are of management concern (Kelsey et al. 2006).

Considering all of this data, systematic removal of invasive and planted woody vegetation from Service lands is central to improvement of habitat for grassland-dependent birds. As described in the objective, HAPET developed a matrix of grassland bird conservation areas (Niemuth et al. 2005), which highlights significant blocks of grassland. Sites for tree removal at the refuges are prioritized based on this matrix, with the majority of removal acres existing in the areas with the largest blocks of grass. Reducing fragmentation in these core areas has the potential to provide the most benefit to grassland-dependent birds. In addition, the removal of woody species >3.3 feet tall should target the removal of larger shrubs and trees that are problematic across Service lands, rather than the native, small shrubs such as prairie rose, lead plant, and western snowberry that are an important component of grassland composition.

Invasive and Planted Woody Vegetation Objective

Over a 15-year period, remove ≥ 10 acres of invasive or planted woody vegetation (Russian olive, Siberian elm, saltcedar, and caragana) >3.3 feet tall.

Strategies

- Cut standing trees and shrubs and remove belowground woody material (stumps and roots) using chain saws and a variety of heavy equipment. Where removal of stumps and roots is not viable, treat them with appropriate herbicide.
- Apply herbicides in situations where suckering occurs or is anticipated.
- Pile and burn down woody material.
- Use high-intensity spring or fall fires to initially kill trees within 4 years. Then use fire or herbicides to reduce viability of recurring growth. Continue control of trees and tall shrubs with periodic fire (every 3–6 years) applied from March to November.
- Restore bare areas resulting from woody vegetation removal to perennial grass cover.
- Due to the potential controversial nature of this management, conduct outreach and appropriate education to the associated local communities, politicians, media, and other interested individuals.



Steven Perkins/USDA-NRCS PLANTS Database

Saltcedar is an invasive species that occurs on refuge lands in North Dakota.

- Use appropriate bird survey methods to monitor bird response to removal of woody vegetation.

Rationale

Prior to Euro-American settlement in North Dakota, woody vegetation primarily occurred in riparian or streamside areas, in broken topography occurring in the upper drainages of streams, and in escarpments and sandhills. These areas often had increased soil and foliar moisture, standing water, and relatively steep topography that would have provided protection from fires (Severson and Sieg 2006).

Today, although numerous patches of native woodlands still exist in the northern Great Plains, once large expanses of nearly treeless prairie are now intermixed with cropland and scattered small (less than 5 acres) linear and block-shaped tree plantings (also referred to as windbreaks, shelterbelts, and tree belts). Baer (1989) estimated that these plantings cover 3% of the land area in the state. Tree plantings are designed to reduce soil erosion from croplands (Baer 1989) and are viewed by many as striking landscape features that symbolize settlement of the western United States. However, they further fragment remaining grasslands by creating abrupt boundaries that increase edge effects (O'Leary and Nyberg 2000, Winter et al. 2000, Ribic and Sample 2001). Additionally, the suppression of ecological processes such as fire and grazing has allowed an increase in the encroachment of woody plants into grasslands (Bakker 2003). These factors have been linked to the deterioration of grassland bird populations, which are declining faster and more consistently than any other group of North American birds (Samson and Knopf 1994, Herkert 1995). Research indicates that native grassland birds need large, uninterrupted tracts of treeless grasslands (Herkert 1994, Winter et al. 1999, Bakker et al. 2002). The literature overwhelmingly indicates that invasive and planted trees in prairie landscapes often negatively affect a variety of bird

groups (Bakker 2003). Specifically, trees on the prairie are correlated with negative consequences to ducks (Rumble and Flake 1983), wetland birds other than ducks (Naugle et al. 1999), prairie grouse (Hanowski et al. 2000, Niemuth 2000), grassland songbirds (Winter et al. 2000, Grant et al. 2004), and ring-necked pheasant (Snyder 1984, Schmitz and Clark 1999).

Piping Plover (Priority Species)

Piping plovers (federal threatened species) use habitats at nine of the refuges: Audubon, Chase Lake, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Shell Lake, Stewart Lake, and White Lake.

The piping plover occurs in three distinct populations: Atlantic Coast, Great Lakes, and northern Great Plains. Of the roughly 6,000 piping plovers left in the world, about half breed in the northern Great Plains. Unlike the Atlantic Coast and Great Lakes populations, the northern Great Plains population is declining somewhere between 6% and 12% annually (Larson et al. 2002, Plissner and Haig 2000, Ryan et al. 1993), and is expected to go extinct in 50–100 years unless significant conservation activities are started. The decline and poor prognosis led to the listing of this population as threatened in the U. S. and endangered in Canada in the mid-1980s.

In any given year, 50%–80% of the piping plovers that nest in the United States' portion of the northern Great Plains do so in an eight-county area that stretches from central North Dakota to northeastern Montana (see figure 21, map of the core area for piping plover, in Chapter 3, Refuge Resources and Description). Plovers in this core area breed on barren shorelines associated with alkali lakes and wetlands. Unlike the Missouri River, alkali lake habitat is relatively more stable within and between years and it is free of the social, political, and economic conflicts that plague piping plover recovery along the river. In addition, piping plover productivity is more stable from year to year on alkali lakes, whereas the Missouri River is a “boom or bust” environment for plovers (Adam Ryba, piping plover coordinator, USFWS, North Dakota, personal communication).

Depending on water levels and availability, occasional plover use may occur outside of the core area in the northern Great Plains. However, these occurrences have been rare and no active management has been pursued in these other areas, with the exception of taking part in the International Piping Plover Census.

Piping Plover Objective 1

Over a 15-year period, annually protect piping plover nests found within the refuges and monitor the success of protected nests and hatched young. Strive for fledging rates of >1.24 per pair in the Alkali Lake core area to stabilize the northern Great Plains

population (Larson et al. 2002), in an attempt to reach a population goal of 2,300 breeding pairs in the United States (USFWS 1994a).

Strategies

- Erect wire mesh cages with netted tops over piping plover nests or provide nest protection by electric fence enclosures, or both.
- Monitor the success of protected nests by searching for pip chips in or near the nest bowl; or timing nest visits based on known or suspected nest initiation date, laying rate, and mean incubation period; or both.
- Monitor hatched young to fledging.
- Identify lands sensitive to piping plover nesting for consideration of added protection through land acquisition.

Rationale

The Service listed the northern Great Plains population of piping plovers as threatened in the United States due to a poorly understood decline in abundance. Mabee and Estelle (2000) suggested that nest predation is a major problem limiting piping plover nest success throughout their range.



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The piping plover (top) makes its nest (bottom) on open shoreline.

However, according to Murphy et al. (2003), predators can successfully be deterred from depredation of eggs of piping plovers by placing large (10-foot diameter) mesh enclosures (cages) over individual nests. Recruitment has improved with these cages in the northern Great Plains (Murphy et al. 2003). Service staffs plan to erect these enclosures over piping plover nests that are encountered within the boundaries of the Alkali Lake core area, not limited to Service lands, when permission is granted on private property. Enclosures placed after one or more eggs have been laid in the nest bowl have resulted in <2% nest abandonment in the northwestern portion of the state and northeastern Montana (Adam Ryba, piping plover coordinator, USFWS, North Dakota, personal communication).

Piping Plover Objective 2

Over a 15-year period, annually use a variety of vegetation control methods to eliminate vegetation on known plover beaches in the Alkali Lake core area. Do not conduct vegetation control between May 15 and August 7 (Stewart 1975) or any time that piping plovers are present on the beaches.

Strategies

- Determine percent coverage of vegetation by visual estimation.
- Apply herbicides, mechanical disturbance, or other means to remove upland vegetation.

Rationale

Piping plovers do not generally nest in areas of dense vegetation (Prindiville-Gaines and Ryan 1988). Additionally, Espie et al. (1996) found that depredated piping plover nests in Saskatchewan were closer to vegetation than successful nests. Although many sandy beaches in the refuges are suitable for plover nesting, the beaches will revegetate periodically. Without intervention (herbicide application, prescribed fire, mechanical disturbance), vegetation may expand to become the predominant cover type on these beaches. The refuge staffs will remove (when needed) as much of this vegetation as possible, before and after the piping plover nesting season, to continue to provide quality breeding habitat for piping plover.

Piping Plover Objective 3

Over a 15-year period, continue the International Piping Plover Census for the presence of piping plovers in 100% of the wetland basins across the nine refuges with historical nesting habitat for piping plovers.

Strategies

- Survey wetlands for piping plovers by the most appropriate means (for example, boat, walk the shoreline, view from a vehicle with a spotting scope).
- Conduct surveys between early and mid-June.

Rationale

Beginning in 1991, biologists throughout North America collaborated in a monumental effort known as the International Piping Plover Census (Haig and Plissner 1993). Plovers nest on open gravel patches and avoid areas dominated by mud, heavy cobbles, or dense vegetation (Prindiville-Gaines and Ryan 1988). Both breeding and wintering habitats are censused in an effort to (1) establish benchmark population levels for all known piping plover sites, (2) survey additional potential breeding and wintering sites, and (3) assess the current status of the species relative to past population estimates.

Since 1991, the International Piping Plover Census has been conducted at 5-year intervals (1996, 2001, and 2006) at sites censused in 1991 and a limited number of new sites (Plissner and Haig 2000). In the 2006 census, a total of 1,481 pairs were counted in the United States (Adam Ryba, piping plover coordinator, USFWS, North Dakota, personal communication); the recovery plan goal is 2,300 pairs (USFWS 1994a). Continuation of this effort allows refuge staffs to develop a better understanding of where to use nest protection measures (see piping plover objective 1) in a given year, as well as determine wetlands in need of protection through acquisition (fee title or wetland easement) or designation as piping plover critical habitat.

Whooping Crane (Priority Species)

Each spring and fall, endangered (federally listed) whooping cranes use wetlands and agricultural fields within all the refuges as migratory stopover areas en route to their summer and winter grounds (see figure 22, map of whooping crane sightings, in Chapter 3, Refuge Resources and Description).

Whooping Crane Objective

Over a 15-year period, annually inform the public of migrant whooping cranes stopping in the refuges, in an effort to reduce the risk of an accidental shooting or other disturbances.

Strategies

- Post warning signs in the areas being used by whooping cranes.
- Contact the local media (radio, television, newspapers), upon confirmed observations, where it appears that whooping cranes will stay in the area for multiple days and where hunting activity exists or is likely.
- Actively patrol areas being used by whooping cranes to periodically monitor their whereabouts and inform the public of their presence.
- On a case-by-case basis for each individual occurrence of a whooping crane, consider the merits of a possible voluntary hunting closure on private lands where whooping crane use is occurring regularly. If this is deemed appropriate,

contact the necessary landowner(s) to discuss a possible voluntary closure in accordance with the whooping crane contingency plan (USFWS 2001).

Rationale

The whooping crane is one of the most endangered birds in North America. This species' current population has increased to 509, of which 360 individuals are part of the wild population of whooping cranes.

In addition to occasional whooping cranes, several thousand sandhill cranes stage in the refuges each fall, where they are a relatively popular game species. Because of the often-close interaction between sandhill cranes and whooping cranes and their use of similar habitats, potential exists for a whooping crane to be mistaken for a sandhill crane. In 2004, sandhill crane hunters in Kansas mistakenly shot and killed two whooping cranes near Quivira National Wildlife Refuge. Since 1968, there have been other shooting incidents involving the whooping crane—four in Texas and one in Saskatchewan, Canada (Richard Hinton, Bismarck Tribune, personal communication, 2003). The Service hopes that by informing and educating area hunters about whooping cranes' use of the refuges, it can greatly reduce any risk of an accidental shooting. The Service will consult the whooping crane contingency plan (USFWS 2001) for appropriate actions when dealing with migrant whooping cranes that show potential for remaining in the refuges for multiple days.

Dakota Skipper (Priority Species)

Kellys Slough National Wildlife Refuge is the only 1 of the 12 refuges that is within the range of and has suitable habitat for the Dakota skipper butterfly (federal candidate species). The skipper is a species of concern whose numbers have decreased. Its current distribution straddles the border between tall-grass prairie and mixed-grass prairie. The Dakota skipper occurs in two types of habitat (USFWS 2002):

- Flat, moist, native bluestem prairie in which three species of wildflowers are usually present—stage-wood lily, harebell, and smooth camas.
- Upland (dry) prairie that is often on ridges and hillsides; bluestem grasses and needlegrasses dominate these habitats and three wildflowers are typically present in quality sites—pale purple, upright coneflowers, and blanketflower.

The Dakota skipper's historical range is not known precisely, because extensive destruction of native prairie preceded widespread biological surveys in central North America. Although this butterfly likely occurred throughout a relatively unbroken and vast area of grassland in the north-central United States and south-central Canada, it now occurs only in scattered blanketflower remnants of high-quality native prairie.

Scientists have recorded Dakota skippers from northeastern Illinois to southern Saskatchewan. Dakota skippers now occur no further east than western Minnesota and scientists presume that the species no longer exists in Illinois and Iowa. The most significant remaining populations of Dakota skipper occur in western Minnesota, northeastern South Dakota, north-central North Dakota, and southern Manitoba. Its current distribution straddles the border between tall-grass and mixed-grass prairie ecoregions.



Robert Dana/USFWS

Dakota Skipper Butterfly

Dakota Skipper Objective

At 5-year intervals, reevaluate native prairie portions >80 acres for suitability as Dakota skipper habitat, based on new vegetative species composition data. Manage sites deemed suitable for Dakota skipper (tier 2, after Murphy 2005) in accordance with its habitat needs. Within 5 years of classification, survey sites one or more times to document Dakota skipper presence or absence.

Strategies

- Use data from new belt transects (Grant et al. 2004) to reevaluate vegetative species composition.
- Systematically survey for Dakota skipper using either the checklist or Pollard Walk methods (Royer et al. 1998).
- Contract survey work to qualified lepidopterists.

Rationale

Dakota skipper populations have declined due to widespread conversion of native prairie for agriculture and other uses. This has left the remaining skipper populations isolated from one another in relatively small areas of remnant native prairie. In addition, many of the habitats where the species persists are threatened by overgrazing, conversion to cultivated agriculture, inappropriate fire management and herbicide use, woody plant invasion, road construction, gravel mining, invasive plant species, and historically high water levels (in some areas).

All refuges that have habitat capable of supporting Dakota skippers need to be systematically surveyed in an attempt to document the presence or absence of this species. Periodic reevaluation (every 5 years) of native prairie tracts must be completed to capture changes in vegetative species composition that occur over time as a result of management, climatic changes, or other factors (such as new infestations by invasive plants).

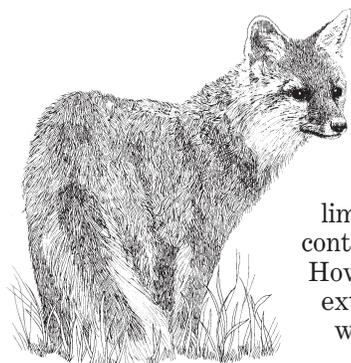
Predator Management

This section describes predator–prey dynamics, related waterfowl nest success, and predator management.

Predator–Prey Dynamics

Across the prairie landscape, grassland and wetland conversions changed the predator–prey relationships and actually bolstered the populations of several waterfowl predators (Sovada et al. 2005). Before settlement, the highest-ranking predator across the landscape was the gray wolf and an occasional grizzly bear. Less abundant were coyote and red fox, while swift fox populations were high.

After settlement, the near elimination of the gray wolf from this area had a profound effect on mesopredators (intermediate predators), especially



The red fox is a primary predator of nesting waterfowl.

canids such as the red fox and coyote. Wolves are 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 prairie, fox and coyote populations grew. Subsequently, the coyote was targeted with

a bounty and populations were driven down. This increased the abundance and distribution of the red fox, which adversely affected waterfowl populations because red fox are a primary predator of nesting waterfowl and eggs (Sargeant et al. 1993, Sovada et al. 1995). Populations of other species that were scarce and narrowly distributed expanded greatly as well, including raccoon and American crow.

Predator species composition is noteworthy because of the impacts on waterfowl survival (Greenwood et al. 1995, Sovada et al. 1995). Franklin's ground squirrel and six carnivores (raccoon, mink, striped skunk, badger, red fox, and coyote) cause most waterfowl depredation (Sargeant and Arnold 1984). Sargeant et al. (1993) determined that predation rates on waterfowl nests early in the nesting season increased simultaneously with the increase in the abundance of red fox, badger, and American crow;

whereas, late in the nesting season, predation increased with the abundance of red fox and striped skunk.

Additionally, fragmentation of the landscape caused by loss of wetland and grassland created edge effect that negatively affected many native species and increased predation. Predators live in areas where their needs are met at a more efficient level than by the surrounding landscape (Charnov 1976, Stephens and Krebs 1986). Relating this to the prairie, patchy grassland habitats that are interspersed throughout agricultural lands provide attractive food sources to predators as compared with the surrounding cropland (Greenwood et al. 1999). Charnov (1976) indicates that predators will spend more time in these isolated grassland patches, even considering the increased effort required to access these areas (for example, predators must traverse crop fields, roads, and human dwellings to get to grasslands).

Waterfowl Nest Success

In the Prairie Pothole Region, nest success of upland-nesting waterfowl declined between 1935 and 1992: nest success in 1935 averaged 30% and by the early 1990s it was around 10%. Likely reasons for the decline include habitat alteration, drought, farming practices, nest predation, overhunting, environmental contaminants, and disease (Beauchamp et al. 1996).

In the late 1980s and early 1990s, this area experienced widespread drought, which reduced the already limited wetland habitat available to waterfowl and caused significant reductions in productivity (Samson et al. 1998). Such conditions resulted in poor nesting efforts and success and low survival rates of young (Austin 1998). Varying precipitation characteristic of the area greatly influenced the number and distribution of waterfowl despite restoration and regulatory practices that were becoming more prominent across the landscape (Batt et al. 1989). As an example, before the drought years, most of the area encountered a wet cycle that began in late 1993 and continued through the 1990s. Most populations of waterfowl appeared to recover quickly at the onset of the wet years, with obvious reasons being (1) the increased quality of readily available wetland habitat (Austin 1998), and (2) the large number of cropland acres (about 4.8 million acres in the Prairie Pothole Region) that were converted to perennial grass through the Conservation Reserve Program (Kantrud 1993). Greenwood and Sovada (1996) indicate that other factors likely contributed to the large and rapid recovery of waterfowl following the drought years. Specifically, low red fox populations likely were a significant factor in the increased nest success in ducks, while duck survival was also enhanced by the low mink numbers (Austin 1998). The landscape conditions were ideal for a boom in waterfowl populations—favorable water conditions, reduced predator pressure, and increased availability of upland cover. However, these conditions that favor increased duck numbers appear to be in synchronization



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A mallard hen and her brood head for water.

for only a short time following the drought years. Habitats highly dominated by agriculture, which are commonplace across the Prairie Pothole Region of North Dakota, may only generate high duck production for 2–3 years out of 10 (Lynch et al. 1963).

Predator Management

In breeding grounds of cropland-dominated landscapes, wildlife managers must deal with predation issues. The major source of mortality for North American waterfowl during the breeding season is predation (Sargeant and Raveling 1992), with greater than 70% of nest failures attributed to predation (Sovada et al. 2001). Various studies indicate that predator removal increases waterfowl nest success (Mense 1996, Garrettson et al. 1996, Zimmer 1996, Hoff 1999, Garrettson and Rohwer 2001). Sovada et al. (2001) state that extensive predator removal will improve waterfowl productivity. Several other studies document intensive predator removal that can increase duck nest success and brood production (Balser et al. 1968, Duebbert and Lokemoen 1980, Sargeant et al. 1995, Garrettson et al. 1996). In situations where habitat protection and management is not enough to maintain and enhance waterfowl nest success, predator management is an acceptable and viable alternative (Sovada et al. 2005).

In addition to predation of waterfowl, predation of songbirds and other nongame birds is an important cause of nest failure (Martin 1988, 1995). Predator communities in fragmented landscapes such as the Prairie Pothole Region do not provide safe nesting sites for songbirds (Dion et al. 2000). An independent group of ornithologists (Berkey et al. 1993) stated that the following species would benefit from predator fence enclosures designed to reduce the impact of medium- to large-sized mammals: sedge wren, common yellowthroat, dickcissel, clay-colored sparrow, lark bunting, Savannah sparrow, song sparrow, bobolink, and red-winged blackbird. Berkey et al. (1993) concluded that predator barriers (fences) are very beneficial to larger nongame migratory birds such as northern harrier, short-eared owl, and American bittern. Additionally, Helmers and Gratto-Trevor

(1996) determined that predation causes a significant impact on shorebird nest success, especially in southern areas of their breeding range. Witmer et al. (1996) indicate that two factors—protection and restoration of habitat and predator management—may curtail listing and extinction rates of bird species.

Predator Management Objective

Annually use at least one predator management technique that, in areas where carried out, will achieve a Mayfield nest success of $\geq 40\%$ for waterfowl, to help increase recruitment of ground-nesting birds at refuges in cropland-dominated areas of North Dakota.

(Several predator management techniques are available for use in North Dakota; therefore, it is reasonable for each refuge to carry out at least one on an annual basis. Details and background on techniques are documented in Dixon and Hollevoet (2005). In addition, most techniques for predator management are intended to provide a significant benefit to many ground-nesting birds. Therefore, $\geq 40\%$ Mayfield nest success is intended; this is well above maintenance levels of dabbling ducks that nest in the area.)

Strategies

- Hire professional trappers to trap selected 36-square-mile predator management blocks.
- Carry out predator management activities in the spring on islands associated with refuges.
- Annually maintain established predator enclosures.
- Install and maintain nesting structures.
- Remove artificial microhabitats such as rock piles, abandoned buildings, downed fences, and miscellaneous junk. Remove invasive and planted trees.

Rationale

Wildlife managers in North Dakota are well aware that management of ground-nesting birds requires the protection and restoration of prairie grasslands and wetlands. However, there has been recent emphasis on identification of effective methods that reduce the negative effects of predation on waterfowl and other grassland-nesting birds. The refuges intend to carry out science-based management that will reduce the effects of predation on grassland-nesting birds.

The Red River Valley, Drift Prairie, and eastern portions of the Missouri Coteau lie within a cropland-dominated landscape. The cropland-dominated landscape is an area altered to such a degree that, despite perpetual habitat protection of refuge lands, consistently maintaining recruitment of migratory birds above maintenance levels is not possible. It is likely that this area consists of less than 20%–40% grassland cover, with the majority of the landscape in agricultural commodity production.

Wildlife Disease

There is a wildlife disease contingency plan specific to each refuge (completed in 2006). Each staff will annually review the refuge plan and update it as new information becomes available. Because of emerging disease threats, Service staffs can no longer rely on past informal disease protocols. Two new diseases that have the potential to affect management at the refuges are highly pathogenic avian influenza (HPAI) and chronic wasting disease (CWD).

Wildlife Disease Objective

Annually review and update disease contingency plans.

Strategies

- Follow the monitoring and response protocols outlined in disease contingency plans.
- Maintain a supply of personnel protective equipment on hand for emergency cleanup operations.
- Cooperate with USDA's Animal and Plant Health Inspection Service (APHIS) wildlife services for HPAI, where possible.
- Continue to support the NDGF with CWD surveillance.

Rationale

Bird disease response is a readily evolving process. Prior to 2006 and the present threat level of HPAI in North American migratory birds, most refuges dealt primarily with two diseases in bird communities: botulism and West Nile virus. Although safe handling practices such as rubber gloves have always been used, human health threats are relatively minor from handling birds with botulism (Friend and Franson 1999) and West Nile virus (Domek 1998). However, the highly pathogenic H5N1 strain of HPAI presents Service staffs and other wildlife resource personnel with unknowns, including possibly serious human health threats.

HPAI (bird flu) is a disease caused by a virus that infects both wild birds (such as shorebirds and waterfowl) and domestic poultry. Each year, there is a bird flu season just as there is an influenza season for humans. As with people, some forms of the influenza are worse than others (USGS 2006). Recently, the H5N1 strain of HPAI has been found in an increasing number of countries in Europe, Asia, and Africa. This strain is not present in the United States, but is likely to spread to this country (Dr. Thomas Roffe, veterinarian, USFWS, Montana, personal communication). There are a number of ways that the H5N1 strain could potentially reach the United States including (1) wild bird migration, (2) illegal smuggling of birds or poultry products, and (3) travel by infected people or people traveling with virus-contaminated articles from areas where H5N1 already exists (USGS 2006).

CWD is a disease of the nervous system in deer and elk that results in distinctive brain lesions. CWD has not been detected in either wild or captive white-tailed deer, mule deer, or elk in North Dakota (Dorothy Fecske, furbearer biologist, NDGF, personal communication). The NDGF has conducted surveillance for this disease since 2002, testing tissue samples from more than 8,500 deer heads (mostly hunter-harvested). Through 2006, all samples were negative (NDGF, news release; April 16, 2007).

CWD has been documented in captive deer and elk in the surrounding states (Minnesota and Montana) and Saskatchewan, Canada (Samson et al. 1998). There is potential for CWD to be present, but undetected, or eventually infect deer and elk in the state. Service staff helped NDGF with CWD surveillance efforts by establishing drop-off sites for white-tailed deer (heads) harvested on or near Service lands during the state's firearm deer season. Service staffs will adhere to protocols in the "Chronic Wasting Plan for U.S. Fish and Wildlife Service Lands in the Dakotas" (USFWS 2004) for all future CWD-related work. This plan acknowledges the NDGF as the lead in all CWD efforts in the state and describes the Service's role as a supporting partner.

MONITORING AND RESEARCH GOAL

Use science, monitoring, and applied research to advance the understanding of natural resources and management within the North Dakota national wildlife refuges.



The refuge staff monitors grassland and restoration efforts.

Monitoring and Research

Habitat goals and objectives are the basis for monitoring and research priorities for the refuges. Goals and objectives emphasize management of vegetative communities as habitat for wildlife. Monitoring and research should be used to predict and validate wildlife response to management. Too often, biological needs of wildlife species and their habitats receive less consideration than socioeconomic and political factors in the decision-making process. Biology should guide management decisions for the Refuge System.

Most factors that influence the dynamics of wildlife populations, especially those of migratory birds, may not be directly influenced at an individual refuge, but can be influenced indirectly through appropriate or inappropriate management of habitat. Because the CCP is a broad umbrella plan that provides general concepts and specific management and operational objectives for Service lands, it is imperative that step-down plans such as inventory and monitoring plans and habitat management plans are produced. The purpose of step-down plans is to provide detail and clear direction to Service managers and other employees who will carry out the strategies described in the CCP. A habitat management plan provides staff with detailed information about various management practices. An inventory and monitoring plan outlines activities for habitat and wildlife and provides detailed information on methodology and analysis.

Monitoring and Research Objective 1

Within 2 years of CCP approval, establish permanent vegetation monitoring transects to collect baseline floristic composition data for all major plant communities in all refuges.

Strategies

- Establish permanent transects to collect baseline data about plant species composition following standardized methodologies (belt transects [Grant et al. 2004]).
- Conduct periodic (every 5 years) surveys to assess vegetative composition and structure of habitats.
- Enter all inventory and survey mapping into RLGIS.

Rationale

A basic inventory of habitats is the first step in development of detailed objectives describing the desired future vegetation conditions. Permanent vegetation transects, following standardized methodologies across all refuges and that can be repeated periodically, are needed to help assess change over time.

Monitoring and Research Objective 2

Within 2 years of gathering baseline floristic composition data (see monitoring and research objective 1), each refuge will complete a habitat management plan.

Strategy

- Refuge staffs will develop specific habitat goals and objects for priority management units based on data from baseline surveys.

Rationale

Following completion of baseline floristic surveys, managers will be able to identify high- and low-priority native prairie tracts, invasive plant infestations, and wetland vegetation composition. The habitat management plans will identify specific habitat objectives for each refuge. Each plan will also provide detailed information about various management practices (such as timing of prescribed fire; timing and intensity of grazing; timing, application rate, and pesticide type for chemical applications; and water level manipulations). If a separate water management plan is not needed, the habitat management plan will provide guidance for management of wetlands and uplands.

Monitoring and Research Objective 3

Within 1 year of CCP approval, identify and prioritize research needs required to meet the goals and objectives.

Strategies

- Develop a research team with responsibility to identify and prioritize research needs within North Dakota or the northern Great Plains.
- Compile annual progress reports that describe current monitoring and research, results to date, and future projects. Include information on what treatment protocols may or may not have been successful in achieving stated objectives and include plans for future treatments.

Rationale

In 2005, the Dakota Working Group's grasslands monitoring team put together a grassland habitat management/monitoring survey to assess management issues and threats to grasslands in Service lands. The survey resulted in identification of smooth brome invasion as the most common threat to native prairie. Following a 2-day technical meeting, the Brome Summit, to discuss the ecology and control strategies for smooth brome, the grasslands monitoring team started the smooth brome research project. This project is a large-scale investigation of the efficacy and effectiveness of various management treatments used to promote recolonization by native species. The project has the potential to involve all refuges and districts in North Dakota and South Dakota that have intact native prairie or native sod

never broken and cropped. The monitoring team successfully competed for USGS Science Support Program funding to complete vegetation inventories of plant communities on native prairie tracts for most refuges and districts in North Dakota and South Dakota during the 2007 and 2008 field seasons. Completion of all inventories will provide a baseline for monitoring changes and evaluating success of management actions, as well as be used to develop a monitoring plan.

Research needs include information about treatment tools, response to various treatments, and wildlife response as a result of treatments. Wildlife population research should focus on assessments of species–habitat relationships.

Monitoring and Research Objective 4

Over the 15-year life of the CCP, begin at least one monitoring or research project every 2 years that investigates needs identified in monitoring and research objective 3, and apply resulting information in efforts to achieve habitat and wildlife goals and objectives.

Strategies

- Develop a research team with responsibility to develop study plans, apply for funding, and begin the selected research.
- Participate in large-scale monitoring and research projects by providing on-the-ground study plots or indirectly by providing equipment or staff for data collection.
- Design and conduct issue-driven research.
- Focus wildlife population research on assessments of species–habitat relationships.
- Promote research and science priorities within the broader scientific community. Ensure that cooperative research addresses information needs identified in habitat management goals and objectives.
- Annually complete progress reports that summarize the current year’s monitoring and research efforts. If applicable, include discussion on past and current techniques that did or did not produce expected results.

Rationale

Knowledge gaps regarding natural resources are many and varied. Investigations must be sufficiently designed, funded, and carried out to reliably address proposed hypotheses or questions. All research needs will need to be prioritized because resources (funding, staff, and equipment) are always limited and oftentimes insufficient. Partnerships will need to be developed for a variety of disciplines from various state and federal agencies and institutions to meet the research goal and objectives. Cooperative efforts will be supported with shared funding, lodging, vehicles, equipment, knowledge, and expertise.

Examples of specific research needs identified during the CCP process include the following:

- Ensure that predator management in blocks does not negatively affect nongame migratory birds: research will determine the nest success of breeding shorebirds and ground-nesting songbirds on controlled and trapped sites within 15 years of CCP approval.
- Ensure functionality of restored temporary and seasonal wetlands: conduct research on appropriate levels of sediment removal in wetlands.
- Ensure that grassland restoration efforts are science based—conduct research on newly seeded sites that focuses on the establishment success of species included in the mixtures. From these data, within 15 years of CCP approval, develop a decision matrix for selection of optimal species to use in grassland restorations.
- Ensure the effectiveness of native seed mixes that contain grasses and forbs—conduct research on wildlife response, focusing on Lepidoptera and grassland-dependent migratory birds (waterfowl, shorebirds, and songbirds) within 10 years of CCP approval.
- Identify restorable prairie tracts using objective criteria that focuses on (1) contemporary composition, emphasizing diversity and prevalence of native plants, and (2) landscape area and connectivity to adjacent grasslands, especially native prairies (large tracts of high-quality native prairie provide the most suitable habitat for grassland birds, especially those species of significant conservation concern)—conduct research in the next decade that investigates threshold levels for infestation of invasive plants.
- Review the list of seven current research needs identified by Naugle et al. (2000), which provides ideas for development of a prioritized research list.

CULTURAL RESOURCES GOAL

Identify and evaluate cultural resources that are on Service-owned lands or are affected by Service undertakings. Protect resources determined to be significant and, when appropriate, interpret resources to connect staff, visitors, and communities to the area’s past.

Cultural Resources Objective 1

Avoid, or when necessary mitigate, adverse effects to significant cultural resources in compliance with section 106 of the National Historic Preservation Act, at all times.

Strategy

- Continue cultural resource review of the refuges’ projects to identify concerns.

Cultural Resources Objective 2

Always successfully integrate the process for section 106 of the National Historic Preservation Act into all applicable refuge projects by notifying the Service's cultural resource staff early in the planning process and, whenever possible, completing the review without delay to the project.

Strategies

- Incorporate the section 106 of the National Historic Preservation Act review in project design as early as possible and complete the process, as applicable.
- Complete a programmatic agreement with the State Historic Preservation Office to expedite project review.

Cultural Resources Objective 3

Within 3 years of CCP approval, rehabilitate the historic stone bathhouse and two stone outhouses at Lake Ilo National Wildlife Refuge.

Strategies

- Find an architectural student to do the research as an independent study.
- Apply for grants to fund construction.

Rationale

The protection and interpretation of cultural resources is important to the public and the Service. Federal laws and policies mandate the consideration and often the protection of significant cultural resources.

VISITOR SERVICES GOAL

Provide visitors with opportunities to enjoy wildlife-dependent recreation where compatible and expand their knowledge and appreciation of the prairie landscape and the National Wildlife Refuge System.

Hunting

Since the late 19th century, hunters concerned about the future of wildlife and outdoor tradition have made countless contributions to the conservation of the nation's wildlife resources. Today, millions of Americans deepen their appreciation and understanding of the land and its wildlife through hunting. Hunting organizations contribute millions of dollars and countless hours of labor to various conservation causes each year.

The Service recognizes that, in many cases, hunting is an important tool for wildlife management. Hunting gives resource managers a valuable tool to control populations of some species that might otherwise exceed the carrying capacity of their habitat and threaten the well-being of other wildlife species and, in some instances, that of human health and safety.



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The Improvement Act identifies hunting as one of the six wildlife-dependent recreational uses of Refuge System lands.

Hunting Objective 1

Where hunting is allowed at Audubon, Chase Lake, Lake Alice, Lake Nettie, and Lake Zahl national wildlife refuges (per refuge and state regulations), provide information about current opportunities for hunters of waterfowl and other resident species. Within 5 years of CCP approval, increase hunting opportunities by opening new areas if determined compatible.

Strategies

- Limit driving access for hunting by closing some roads. Through visitor contact and hunting information, encourage hunters to walk in to hunt.
- Identify new lands where quality hunts could take place and where hunting is compatible with habitat management objectives.
- Work with the state of North Dakota to determine appropriate hunting levels and evaluate the need to limit the number of hunters.
- If deemed necessary due to increasing hunting pressure and crowds, implement a refuge permit system to control the number of hunters.
- Seek out partners (such as Wheeling Sportsmen and Wilderness on Wheels) to help fund universally accessible visitor service facilities such as blinds and trails.

- Work with the state to establish and coordinate hunter days or events for hunters with special needs.
- Identify areas that are suitable for hunters with special needs and provide universal access to select hunting areas.
- Establish criteria for eligibility to use the special needs hunter privileges such as drive-in access.
- Work cooperatively with the NDGF to conduct law enforcement patrols at the refuges to ensure compliance.

Rationale

Hunting currently occurs at Audubon, Chase Lake, Lake Alice, Lake Nettie, and Lake Zahl national wildlife refuges. The popularity of hunting at these refuges is increasing and, as a result, crowding is becoming an issue that affects the quality of the hunting experience. Crowds of hunters lead to unsafe hunting conditions and compromised harvest opportunities. It is important to disperse hunters to avoid crowded hunting areas. Opening day for pheasant hunting is already very crowded at Audubon National Wildlife Refuge; after the first morning, the hunting pressure lessens.

With a growing number of private property acres off limits to hunting, pressure is intensifying on Service lands. The number of nonresident hunters is also increasing. To ensure a good-quality hunting experience, it will be essential to maintain healthy populations of resident wildlife and migratory birds through habitat management. There is a growing demand for hunting opportunities accessible to hunters with special needs, such as hunters with mobility impairments.

Hunting Objective 2

Within 4 years, expand hunting opportunities for youths to include at least one youth hunt in conjunction with NDGF.

Strategies

- Determine which refuges do not have a youth hunt and which could support a youth hunt.
- Only open areas where hunting is deemed compatible.
- Work with the state of North Dakota to establish a refuge weekend youth hunt in conjunction with the NDGF youth hunts for deer and pheasant.

Rationale

It is important to engage young people in wildlife-dependent recreation and engender enthusiasm and support for hunting, wildlife conservation, and the Refuge System to build a conservation ethic. Early season or preseason hunts are best suited for youth since they provide the best harvest opportunities.

Fishing

The Audubon and Lake Ilo national wildlife refuges offer abundant fishing opportunities. Fishing generates tremendous economic benefit through federal taxes on fishing equipment. Revenues paid by anglers are distributed by the Service to North Dakota's state government and spent by state resource agencies on aquatic habitat enhancement, fishing and boating access, education, and invasive species eradication.

Fishing Objective 1

Within 5 years of CCP approval, evaluate the potential effects of open-water fishing on waterfowl and other wildlife and, where compatible, open new areas to open-water fishing.

Strategies

- Determine if there are times of the year when open-water fishing will not conflict with migratory birds and what types of fishing (such as shoreline fishing) will not impact other wildlife.
- Work with the state to maintain healthy fish populations.
- Seek out partnerships to develop facilities such as piers that accommodate anglers with disabilities.

Rationale

Fishing is available summer and winter. Fishing on the ice in winter is far more popular than fishing during warmer weather. Permanent lakes at Audubon and Lake Ilo national wildlife refuges offer fishing for northern pike, perch, walleye and a few other species. These areas are open to fishing according to state regulations and special refuge regulations.

Fishing Objective 2

Within 5 years of CCP approval, establish clear access points for ice fishing to minimize impacts on upland habitat from vehicles and explore opportunities for opening new areas to ice fishing.

Strategies

- Seek partnerships or alternative funding for establishment of access points. Analyze the area to determine which access points will provide convenient access to the ice while minimizing impacts on uplands and wildlife.
- Follow state regulations for establishment of permanent and portable fishing houses.
- Work with the state to maintain healthy fish populations.

Rationale

Ice fishing is currently permitted at Audubon and Lake Ilo national wildlife refuges. Lake Alice National Wildlife Refuge is interested in exploring opportunities for opening the lake to ice fishing.

Fishing Objective 3

Within 5 years of CCP approval, evaluate opportunities for establishing a youth fishing day at additional refuges in cooperation with the North Dakota's free fishing weekend.

Strategy

- Work with the state to establish a youth fishing day in conjunction with the NDGF's youth program.

Rationale

North Dakota has a statewide free fishing weekend and Lake Ilo National Wildlife Refuge participates in cooperation with the state. The opportunity to expand and develop a closer partnership with the state and its fishing outreach to youth will benefit the refuges' goal to introduce youth to the Refuge System.

Wildlife Observation and Photography

Wildlife observation and photography is available to visitors all year at the 12 refuges. Due to the vast distribution of the refuges throughout North Dakota, the public from major cities of the state and Canada seize on the tremendous opportunities for viewing wildlife resources. Because of the relatively small size of many refuges, wildlife observation and photography can usually be done from rural roads or refuge tour routes. Appendix L contains the compatibility determinations for wildlife observation and photography.

Wildlife Observation and Photography Objective

Throughout the life of the CCP, increase opportunities for wildlife observation and photography by expanding the number of observation facilities such as blinds, tour routes, and trails at the refuges.

Strategies

- Host bird identification events in conjunction with International Migratory Bird Day in May and other special events.
- Recruit volunteers for the Christmas bird count and other birding-related events.
- Incorporate refuges as stops into the North Dakota and regional birding drives. Seek out partners to establish and promote birding drives. Provide support materials to guide visitors through the state and direct them to key birding spots.
- Explore new areas to open to wildlife observation and photography where compatible. Where possible, establish universally accessible observation blinds.
- Identify open observation areas to the public through signage and maps.
- Develop website-based observation materials such as bird lists and information, maps, and web cams.

- Where feasible, develop a simple map for each visitor center where visitors can record what they saw and where (for example, a laminated map that people can write on with a dry-erase marker or magnet board).
- Where feasible, provide a computer kiosk where visitors can access birding information (for example, songs, using Thayer birding software).

Rationale

Wildlife observation and photography are wildlife-dependent recreational uses listed in the Improvement Act. In fiscal year 2007, wildlife photography alone accounted for more than 26,000 visits to North Dakota's refuges and districts. Facilities that support these activities include visitor centers, interpretive displays, auto routes, overlooks and observation platforms, and informational kiosks.



Phalarope Chicks Nesting in Wetland Grasses

Environmental Education and Interpretation

Parents, educators and civic groups have been visiting refuges for an educational outdoor experience for many years. Special use permits are available in support of education, and educators are encouraged to use refuges as outdoor classrooms. Educational opportunities are available to public and private schools and home-schools, as well as Scout groups and other interested parties. Appendix L contains the compatibility determinations for environmental education and interpretation.

Environmental Education and Interpretation Objective

Throughout the life of the CCP, develop exhibits, pamphlets, and expanded programming where appropriate to promote public awareness of and advocacy for the Refuge System, refuge resources, and refuge management activities that conserve habitat and wildlife.



Gary Eshinger/USFWS

Monarch Butterfly on Switchgrass

Strategies

- Develop materials such as exhibits and pamphlets, as well as educational programs, that explain the region's conservation priorities and the refuges' resources.
- At refuges without any visitor use infrastructure, develop at least minimal information such as signage and an information kiosk. For some refuges, information kiosks off-site in outlying communities may be a viable option.
- Ensure refuges are signed and that directional signage is in place. Collaborate with the highway department to develop and position signage.
- Complete annual reviews and, if necessary, updates of informational and educational products for the refuges.
- Promote programming that incorporates the Children in Nature initiative in both structured and unstructured ways. Encourage family visits and family awareness of the refuges.
- Work with the North Dakota tourism department to promote the refuges and their resources.
- Keep each refuge website up-to-date.
- Conduct information sharing with the media (for example, local newspapers), chambers of commerce, congressional contacts, and tourism outlets. Focus outreach on wildlife, conservation, and community groups.
- Educate educators, Scout leaders, and others so they can educate their students and group members.
- Seek out partnerships with the Department of Public Instruction to encourage expansion of environmental education programs among local

schools. Build on existing relationships with schools for both on-site and off-site programming. Promote education at an early age about natural resources and national wildlife refuges.

- Build on the state's Outdoor Wildlife Learning Site program (Audubon National Wildlife Refuge has an Outdoor Wildlife Learning Site).
- Expand educational and interpretive programming to foster greater visitor awareness and appreciation of refuge habitats.
- Continue to coordinate and promote the junior Duck Stamp program.

Rationale

Targeting teachers within the commuting areas of the refuges is an efficient means of promoting awareness of the refuges and developing support for the Refuge System. The teachers educate the students who, in turn, explain to their families about intact ecosystems and the refuges.

The internet is an increasingly popular source of information and can serve as an excellent and efficient tool for keeping the public informed about programs and resources at the refuges.

Visitor Service Facilities

Environmental education and interpretation are two of the six wildlife-dependent recreational uses listed in the Improvement Act. The refuges and districts in North Dakota received more than 385,000 visitors during fiscal year 2007. Interpretative programs and special events help foster an appreciation, support, and understanding of refuge-specific topics and the Refuge System.

Some refuges have self-guided exhibits, interpretive panels, and brochures to provide educational and interpretive information. Facilities used to support visitor services include visitor center exhibits. However, some contact stations are ill-equipped to handle any exhibits or provide for in-house educational opportunities.

Visitor Service Facilities Objective

Establish a minimum level of visitor use facilities and information: within 10 years of CCP approval, all refuges should have, at a minimum, an entrance sign and information kiosk.

- At Audubon National Wildlife Refuge, within 5 years of CCP approval, design and construct an education center to house exhibits, classrooms, visitor information, and office space.
- At Audubon National Wildlife Refuge, within 3 years of CCP approval, design and construct an amphitheater adjacent to the current educational classroom, construct two observation decks along the auto tour route, and upgrade the Outdoor Wildlife Learning site's trail and interpretive facilities.

- At Chase Lake National Wildlife Refuge, within 5 years of CCP approval, replace or upgrade visitor facilities.
- At Lake Alice National Wildlife Refuge, within 5 years of CCP approval, replace or upgrade visitor service facilities such as information kiosks.
- At Lake Ilo National Wildlife Refuge, within 2 years of CCP approval, replace the fishing pier with an accessible pier and replace the courtesy dock for anglers.

Strategies

- Inventory all refuges to determine the type and location of existing facilities.
- Identify appropriate locations to provide facilities such as hook-ups and amenities to support volunteers.

Rationale

Spread throughout the state, many of the refuges are accessible from metropolitan areas such as Bismarck, Fargo, Grand Forks, and Minot. In addition, the refuges have numerous visitors from the Canadian provinces of Saskatchewan and Manitoba.

The refuges have potential for outreach and education through establishment of new facilities and update of existing facilities. An education center will draw a broader visitor base to Audubon National Wildlife Refuge and expand opportunities to educate people about refuges and resources.

PARTNERSHIPS GOAL

A diverse network of partners join with the North Dakota national wildlife refuges to support research, accomplish habitat conservation, and foster awareness and appreciation of the prairie landscape.

Partnerships

The 12 national wildlife refuges reach across much of the North Dakota landscape and have the potential to affect neighbors and communities. Communication is vital through various outlets, as well as on an individual basis. Refuge staffs participate in local events and activities that maintain and support the refuges' programs.

The Service assigns personnel to the Partners for Fish and Wildlife Program (Partners Program), which is an internal Service partner that works with neighboring private landowners. This program helps with restoration and enhancement of habitat to benefit federal trust species, while also helping Refuge System units through a landscape-scale approach to conservation. The Partners Program provides technical assistance to private landowners to give them the information they need to apply for other habitat improvement programs. In addition, program personnel work with private landowners

interested in perpetual conservation easements with the Service to maintain wetland and grassland ecosystems for future generations. Private lands adjacent to Refuge System lands benefit species that require larger landscapes for their survival. These partnerships benefit many sensitive fish and wildlife species.

Partnerships Objective

Join a wide range of partners to support and promote awareness of the Refuge System and foster an appreciation of the grassland, prairie pothole ecosystem. Maintain and, where appropriate, build the North Dakota Education Team, a statewide approach to environmental education.

Strategies

- Work with partners to develop and maintain a statewide approach to environmental education (North Dakota Education Team). If possible, increase the number of Service representatives on the team within 5 years.
- Maintain and build on partnerships with county wildlife clubs. Work with these clubs to maintain trails and interpretive sites.
- Maintain and build on partnerships with county sporting groups. Work with these groups to help with improvements.

Rationale

Many of the refuges' wildlife, habitat, and visitor service programs will not continue without the support from partners. Without partners, many of the habitat protection, restoration, and enhancement projects will go unfunded. Over time, the diversity of wildlife species will begin to decline as habitat became degraded.

OPERATIONS GOAL

Efficiently employ staff, partnerships, and volunteers and secure funding in support of the Refuge System's mission.

Staff and Volunteers

Operations and visitor services staffs maintain, enhance, and monitor wildlife-dependent operations and recreational opportunities for a diverse audience. Within the 12 refuges, staffs are limited and often shared with other units such as wetland management districts. The demand on the refuges' wildlife resources is increasing through such visitor activities as bird watching, photography, educational activities, and general outdoor appreciation.

Those that volunteer for the Service generally do so in the area of visitor services. Visitor services require extensive Service staff time to coordinate, develop, and maintain. Volunteers ease some of those time requirements.

Volunteers for the refuges are

- individuals who want to give back to their communities;
- parents who want to be good stewards of the land and set examples for their children;
- retired people willing to share their wealth of knowledge;
- concerned citizens of all ages who want to learn more about conservation;
- passionate people who enjoy the outdoors and want to spread the word about America's greatest natural treasures.

Staff and Volunteers Objective

Within 3 years of CCP approval, identify strategic locations to station outdoor recreation planners to coordinate programming among North Dakota's national wildlife refuges and wetland management districts.

Within 5 years of CCP approval, increase law enforcement staffing to oversee the expanded programs and continue to work with NDGF to enforce regulations.

Within 2 years of CCP approval, recruit volunteers to help with annual events, visitor services, and biological, maintenance and administrative programs.

Strategies

- Work with the North Dakota working group to locate the strategic locations for positioning additional staff.
- Research methods for recruiting volunteers. Determine what other refuges have done to attract and retain volunteers. If possible, tap into existing volunteer networks to recruit volunteers. Determine incentives or benefits for volunteers (for example, privileged access, amenities, and interagency annual parks pass).
- Develop “friends of the refuge” groups to help the refuges (except Audubon and Chase Lake national wildlife refuges, which already have friends groups).

Rationale

The Improvement Act identifies six wildlife-dependent recreational uses—hunting, fishing, wildlife observation

and photography, and environmental education and interpretation—that receive enhanced consideration over other general public uses in planning and management of the refuges. Other uses can occur but must support a wildlife-dependent recreational use or not conflict with these uses. No use of a refuge can detract from accomplishing the purposes of the refuge or the mission of the Refuge System. North Dakota's refuges and districts received more than 385,000 visitors that enjoyed the some of the wildlife-dependent recreational uses the Refuge System offered.

4.3 Funding and Staff

Goals, objectives, and strategies described in this chapter are based on full, adequate funding and staff. The Service is currently reviewing a staffing model that will revise the basis by which a refuge determines its needed staff. The Service anticipates that, by the time of CCP implementation, the new staffing model will be in effect and all refuges will have a new staff level goal.

A national team of Refuge System professionals developed this staffing model to determine the level of staff needed to most effectively operate and manage the variety of field stations in the Refuge System. The staffing model uses 15 factors that drive workload, including the following: total number of acres, number of easement contracts, number of acres actively managed, level of invasive species, endangered species, biological management and monitoring, wilderness management, visitor services, and maintenance needs. Data for the model was drawn from the Service's “Annual Report of Lands,” “Refuge Annual Performance Plan,” “Real Property Inventory,” and other Service data sources.

4.4 Step-down Management Plans

The CCP for the 12 refuges is intended to be a broad umbrella plan (1) that outlines general concepts and objectives for habitat, wildlife, visitor services, cultural resources, and partnership; and (2) that guides refuge management for the next 15 years. Step-down management plans provide detail needed to carry out specific actions authorized by the CCP. Tables 7–17 list the step-down management plans associated with each refuge (except for Stump Lake National Wildlife Refuge, which is currently under water).



4.5 Monitoring and Evaluation

Adaptive management is a flexible approach to long-term management of biotic resources. The results of ongoing monitoring activities and other information are evaluated to guide adaptive management over time. Adaptive management is a process by which projects are carried out within a framework of scientifically driven experiments to test the predictions and assumptions outlined in the final CCP (see figure 23, the adaptive management process).

To apply adaptive management, specific survey, inventory, and monitoring protocols will be adopted for each of the 12 refuges. The habitat management strategies will be systematically evaluated to determine management effects on wildlife populations. This information will be used to refine approaches and determine how effectively the objectives are being accomplished. If monitoring and evaluation indicate undesirable effects for target and nontarget species or communities, the management projects will be altered accordingly. Subsequently, the CCP will be revised.

Table 7. Step-down Management Plans for Audubon National Wildlife Refuge, North Dakota.

<i>Plan Type</i>	<i>Completion Year</i>	<i>Revision Year</i>
Fire management plan	1999	2008
Fishing plan	1960	—
Grassland management plan	1981	—
Habitat work plan (annual)	2007	2008
Hunting plan	1992	—
IPM plan	2002	2008
Law enforcement plan	—	2013
Predator management plan	1988	2010
Safety plan	2006	2011
Sign plan	1984	—
Visitor services plan	2006	2009
Water management plan (annual)	2007	2008
Water management plan (long range)	1983	—

Table 8. Step-down Management Plans for Chase Lake National Wildlife Refuge, North Dakota.

<i>Plan Type</i>	<i>Completion Year</i>	<i>Revision Year</i>
Fire management plan	2001	2008
Grassland management plan	—	2011
Habitat work plan (annual)	2008	2009
IPM plan	2005	2010
Law enforcement plan	—	2013
Predator management plan	2004	2010
Safety plan	2006	2011
Visitor services plan	2005	2015
Water management plan (annual)	2007	2008

Table 9. Step-down Management Plans for Kellys Slough National Wildlife Refuge, North Dakota.

<i>Plan Type</i>	<i>Completion Year</i>	<i>Revision Year</i>
Fire management plan	2002	2008
Grassland management plan	—	2010
Habitat work plan (annual)	2007	2008
IPM plan	2005	2010
Law enforcement plan	—	2012
Predator management plan	2004	2010
Safety plan	1986	2010
Sign plan	—	2010
Visitor services plan	1993	2015
Water management plan (annual)	—	2015
Water management plan (long range)	—	2015

Table 10. Step-down Management Plans for Lake Alice National Wildlife Refuge, North Dakota.

<i>Plan Type</i>	<i>Completion Year</i>	<i>Revision Year</i>
Fire management plan	2002	2008
Grassland management plan	—	2010
Habitat work plan (annual)	2007	2008
Hunting plan	—	2010
IPM plan	2005	2010
Law enforcement plan	—	2012
Predator management plan	2004	2010
Safety plan	1986	2010
Sign plan	—	2010
Visitor services plan	1993	2015
Water management plan (annual)	—	2015
Water management plan (long range)	—	2015

Table 11. Step-down Management Plans for Lake Ilo National Wildlife Refuge, North Dakota.

<i>Plan Type</i>	<i>Completion Year</i>	<i>Revision Year</i>
Fire management plan	1999	2008
Fishing plan	1969	—
Grassland management plan	1981	—
Habitat work plan (annual)	2007	2008
IPM plan	2002	2008
Law enforcement plan	—	2013
Predator management plan	1988	2010
Safety plan	2006	2011
Sign plan	1984	—
Visitor services plan	2006	2009
Water management plan (annual)	2007	2008
Water management plan (long range)	1983	—



Table 12. Step-down Management Plans for Lake Nettle National Wildlife Refuge, North Dakota.

<i>Plan Type</i>	<i>Completion Year</i>	<i>Revision Year</i>
Fire management plan	1999	2008
Grassland management plan	1981	—
Habitat work plan (annual)	2007	2008
Hunting plan	1979	—
IPM plan	2002	2008
Law enforcement plan	—	2013
Predator management plan	1988	2010
Safety plan	2006	2011
Sign plan	1984	—
Visitor services plan	2004	2009
Water management plan (annual)	2007	2008
Water management plan (long range)	1983	—

Table 13. Step-down Management Plans for Lake Zahl National Wildlife Refuge, North Dakota.

<i>Plan Type</i>	<i>Completion Year</i>	<i>Revision Year</i>
Fire management plan	2000	2008
Grassland management plan	2007	2008
Habitat work plan (annual)	2007	2008
Hunting plan	2000	—
IPM plan	—	2008
Law enforcement plan	—	2013
Predator management plan	2004	2010
Safety plan	1995	2011
Sign plan	1987	—
Visitor services plan	—	2012

Table 14. Step-down Management Plans for McLean National Wildlife Refuge, North Dakota.

<i>Plan Type</i>	<i>Completion Year</i>	<i>Revision Year</i>
Fire management plan	1999	2008
Grassland management plan	1981	—
Habitat work plan (annual)	2007	2008
IPM plan	2002	2008
Law enforcement plan	—	2013
Predator management plan	1988	2010
Safety plan	2006	2011
Sign plan	1984	—
Visitor services plan	2004	2009
Water management plan (annual)	2007	2008
Water management plan (long range)	1983	—

Table 15. Step-down Management Plans for Shell Lake National Wildlife Refuge, North Dakota.

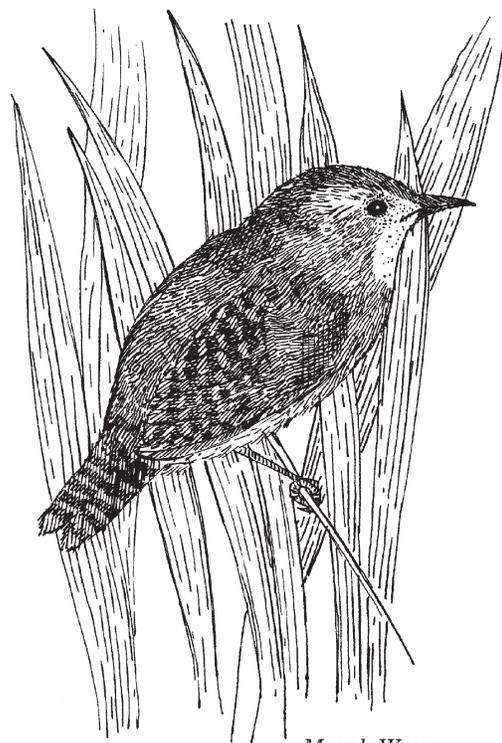
<i>Plan Type</i>	<i>Completion Year</i>	<i>Revision Year</i>
Fire management plan	2000	2008
Grassland management plan	2007	2008
Habitat work plan (annual)	2007	2008
IPM plan	—	2008
Law enforcement plan	—	2013
Predator management plan	2004	2010
Safety plan	1995	2011
Sign plan	1987	—
Visitor services plan	1999	2012

Table 16. Step-down Management Plans for Stewart Lake National Wildlife Refuge, North Dakota.

<i>Plan Type</i>	<i>Completion Year</i>	<i>Revision Year</i>
Fire management plan	1999	2008
Grassland management plan	1981	—
Habitat work plan (annual)	2007	2008
IPM plan	2002	2008
Law enforcement plan	—	2013
Predator management plan	1988	2010
Safety plan	2006	2011
Sign plan	1984	—
Visitor services plan	2004	2009
Water management plan (annual)	2007	2008
Water management plan (long range)	1983	—

Table 17. Step-down Management Plans for White Lake National Wildlife Refuge, North Dakota.

<i>Plan Type</i>	<i>Completion Year</i>	<i>Revision Year</i>
Fire management plan	1999	2008
Grassland management plan	1981	—
Habitat work plan (annual)	2007	2008
IPM plan	2002	2008
Law enforcement plan	—	2013
Predator management plan	1988	2010
Safety plan	2006	2011
Sign plan	1984	—
Visitor services plan	2004	2009
Water management plan (annual)	2007	2008
Water management plan (long range)	1983	—



Marsh Wren
© Cindie Brunner

4.6 Plan Amendment and Revision

The Service will annually review the final CCP to determine the need for revision. A revision will occur if and when significant information becomes available. The final CCP will be supported by detailed step-down management plans to address the completion of

specific strategies in support of the refuges' 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, the Service will evaluate the final CCP every 5 years and revise it after 15 years.

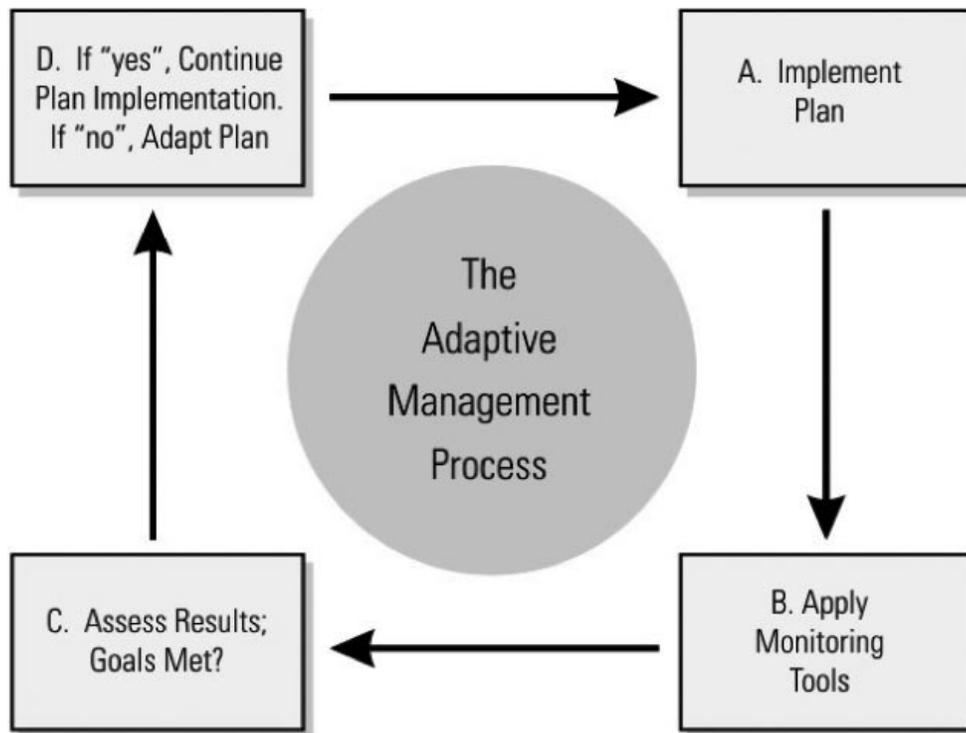


Figure 23. The adaptive management process.

Glossary

abiotic—Pertaining to nonliving things.

accessible—Pertaining to physical access to areas and activities for people of different abilities, especially those with physical impairments.

adaptive management—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 carried out within a framework of scientifically driven experiments to test predictions and assumptions inherent in a management plan. Analysis of results helps managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.

Administration Act—National Wildlife Refuge System Administration Act of 1966.

alternatives—Different sets of objectives and strategies or means of achieving refuge purposes and goals, helping fulfill the Refuge System mission and resolving issues.

amphibian—Class of cold-blooded vertebrates including frogs, toads or salamanders.

APHIS—Animal and Plant Health Inspection Service; agency of the U.S. Department of Agriculture.

avifauna or avifaunal biome—A physiographic area defined by the Partners in Flight program that represents all the living components needed by a group of birds.

baseline—Set of critical observations, data, or information used for comparison or a control.

biological control, also biocontrol—Reduction in numbers or elimination of unwanted species by the introduction of natural predators, parasites, or diseases.

biological diversity, also biodiversity—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 (“U.S. Fish and Wildlife Service Manual” 052 FW 1.12B). The National Wildlife Refuge System’s focus is on endemic species, biotic communities, and ecological processes.

biological integrity—Composition, structure, and function at the genetic, organism, and community levels consistent with natural conditions and the biological processes that shape genomes, organisms, and communities.

biomass—Total amount of living material, plants and animals, above and below the ground in a particular habitat or area.

biotic—Pertaining to life or living organisms.

breeding habitat—Habitat used by migratory birds or other animals during the breeding season.

canopy—Layer of foliage, generally the uppermost layer, in a vegetative stand; midlevel or understory vegetation in multilayered stands. Canopy closure (*also* canopy cover) is an estimate of the amount of overhead vegetative cover.

CAR—Community at risk.

CCP—See *comprehensive conservation plan*.

CFR—See *Code of Federal Regulations*.

cfs—Cubic feet per second.

climax—Community that has reached a steady state under a particular set of environmental conditions; a relatively stable plant community; the final stage in ecological succession.

Code of Federal Regulations (CFR)—Codification of the general and permanent rules published in the *Federal Register* by the executive departments and agencies of the federal government. Each volume of the CFR is updated once each calendar year.

community—Area or locality in which a group of people lives and shares the same government.

compatible use—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 Refuge System or the purposes of the refuge (“Draft U.S. Fish and Wildlife 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 Refuge System, and to meet other relevant mandates (“Draft U.S. Fish and Wildlife Service Manual” 602 FW 1.5).

concern—See *issue*.

conservation—Management of natural resources to prevent loss or waste. Management actions may include preservation, restoration, and enhancement.

conservation easement—Perpetual agreement entered into by a landowner and the Service by which a landowner gives up or sells one or more of the rights on their property for conservation purposes, with terms set by the Service. In return for a single lump-sum payment, the landowner agrees not to drain, burn, level, or fill habitats covered by the easement. Conservation easements generally prohibit the cultivation of grassland and wetland habitats while still permitting the landowner traditional grazing uses. A single-habitat conservation easement is often referred to as either a wetland easement or a grassland easement.

conspicuous—An individual belonging to the same species as another.

cool-season grass—Grass that begins growth earlier in the season and often become dormant in the summer; will germinate at lower temperatures (65–85°F). Examples are western wheatgrass, needle and thread, and green needlegrass.

cooperative agreement—Legal instrument used when the principal purpose of the transaction is the transfer of money, property, services or anything of value to a recipient in order to accomplish a public purpose authorized by federal statute and substantial involvement between the Service and the recipient is anticipated.

coordination area—Wildlife management area made available to a state, by “(A) cooperative agreement between the United States Fish and Wildlife Service and the state fish and game agency pursuant to Section 4 of the Fish and Wildlife Coordination Act (16 USC 664); of (B) by long-term leases or agreements pursuant to the Bankhead–Jones Farm Tenant Act (50 Stat. 525; 7 USC 1010 et seq.).” States manage coordination areas, but they are part of the Refuge System. CCPs are not required for coordination areas.

coteau—A hilly upland including the divide between two valleys; a divide; the side of a valley.

coulee—A deep ravine or gulch with sloping sides, often dry, that has been formed by running water.

cover, also cover type, canopy cover—Present vegetation of an area.

cultural resources—Sites, buildings, structures, and objects that are the result of human activities and are more than 50 years old: prehistoric, historic, and architectural sites, artifacts, historic records, and traditional cultural properties including traditional use areas for Native Americans that may or may not have material evidence.

cultural resource inventory—Professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined area. Inventories may involve various levels including background literature search (class 1), sample inventory of project site distribution and density over a larger area (class 2), or comprehensive field examination to identify all exposed physical manifestation of cultural resources (class 3).

CWCS—Comprehensive wildlife conservation strategy.

CWD—Chronic wasting disease.

CWPP—Community wildfire protection plan.

database—Collection of data arranged for ease and speed of analysis and retrieval, usually computerized.

deciduous—Pertaining to any plant organ or group of organs that is shed annually; perennial plants that are leafless for sometime during the year.

defoliation—Removing of vegetative parts; to strip vegetation of leaves; removal can be caused by weather, mechanical, animals, and fire.

demography—Quantitative analysis of population structure and trend.

dense nesting cover (DNC)—Composition of grasses and forbs that allows for a dense stand of vegetation that protects nesting birds from the view of predators, usually consisting of one to two species of wheatgrass, alfalfa, and sweetclover.

district—See *wetland management district*.

disturbance—Significant alteration of habitat structure or composition. May be natural (for example, fire) or human-caused events (for example, timber harvest).

DNC—See *dense nesting cover*.

DOI—U.S. Department of the Interior.

drawdown—Manipulating water levels in an impoundment to allow for the natural drying-out cycle of a wetland.

duck, dabbling—Duck that mainly feeds on vegetable matter by upending on the water surface, or by grazing, and only rarely dives.

duck, diving—Duck that mainly feeds by diving through the water.

EA—See *environmental assessment*.

ecological succession—Orderly progression of an area through time from one vegetative community to another in the absence of disturbance. For example, an area may proceed from grass-forb through aspen forest to mixed-conifer forest.

ecosystem—Dynamic and interrelating complex of plant and animal communities and their associated nonliving 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—Plant rooted in shallow water and having most of the vegetative growth above water such as cattail and hardstem bulrush.

endangered species, federal—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—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.

endemic species—A plant or animal that occurs naturally in a certain geographic region and whose distribution is relatively limited to a particular area.

environmental assessment (EA)—Concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action and 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).

environmental education—Education aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution.

environmental health—Natural composition, structure, and functioning of the physical, chemical, and other abiotic elements, and the abiotic processes that shape the physical environment.

EO—Executive order.

extinction—Complete disappearance of a species from the earth; no longer existing.

fauna—All the vertebrate and invertebrate animals of an area.

federal land—Public land owned by the federal government, including lands such as national forests, national parks, and national wildlife refuges.

federally listed species—Species listed under the federal Endangered Species Act of 1973, as amended, either as endangered, threatened, or species at risk (formerly candidate species).

fee title—Acquisition of most or all of the rights to a tract of land.

finding of no significant impact (FONSI)—Document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a federal action will have no significant effects on the human environment and for which an environmental impact statement will not be prepared (40 CFR 1508.13).

fire regime—Description of the frequency, severity, and extent of fire that typically occurs in an area or vegetative type.

flora—All the plant species of an area.

FMP—Fire management plan.

FONSI—See *finding of no significant impact*.

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.

forest—Group of trees with their crown overlapping (generally forming 60%–100% cover).

fragmentation—The alteration of a large block of habitat that creates isolated patches of the original habitat that are interspersed with a variety of other habitat types; the process of reducing the size and connectivity of habitat patches, making movement of individuals or genetic information between parcels difficult or impossible.

FTE—See *full-time equivalent*.

full-time equivalent (FTE)—One or more job positions with tours of duty that, when combined, equate to one person employed for the standard government work-year.

Geographic Information System (GIS)—Computer system capable of storing and manipulating spatial data; a set of computer hardware and software for analyzing and displaying spatially referenced features (points, lines and polygons) with nongeographic attributes such as species and age.

GIS—See *Geographic Information System*.

glacial till—Unstratified sediment (clay, sand, and rocks) deposited by melting glaciers or ice sheets.

Global Positioning System (GPS)—System that, 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 U.S. Fish and Wildlife Service Manual” 620 FW 1.5).

GPS—See *Global Positioning System*.

GS—General Schedule (pay rate schedule for certain federal positions).

guild—A group of species that use a common resource base in a similar fashion within an ecological community. A guild can be generally defined (for example, grassland birds) or specifically defined (for example, seed-eating small mammals).

habitat—Suite of existing environmental conditions required by an organism for survival and reproduction; the place where an organism typically lives and grows.

habitat conservation—Protection of animal or plant habitat to ensure that the use of that habitat by the animal or plant is not altered or reduced.

habitat disturbance—Significant alteration of habitat structure or composition; may be natural (for example, wildland fire) or human-caused events (for example, timber harvest and disking).

habitat type, also vegetation type, cover type—Land classification system based on the concept of distinct plant associations.

HAPET—Habitat and Population Evaluation Team.

hemi-marsh—The emergent phase of a seasonal or semipermanent wetland where the ratio of open-water area to emergent vegetation cover is about 50:50, and vegetation and open-water areas are highly interspersed.

herbivore—Animal feeding on plants.

herbivory—The eating of plants, especially ones that are still living.

HPAI—Highly pathogenic avian influenza.

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

Improvement Act—National Wildlife Refuge System Improvement Act of 1997.

integrated pest management (IPM)—Methods of managing undesirable species such as invasive plants; education, prevention, physical or mechanical methods

of control, biological control, responsible chemical use, and cultural methods.

“interseed”—Mechanical seeding of one or several plant species into existing stands of established vegetation.

introduced species—A nonnative plant or animal species that is intentionally or accidentally released into an ecosystem where it was not previously adapted.

introduction—Intentional or unintentional escape, release, dissemination, or placement of a species into an ecosystem as a result of human activity.

invasive plant, also noxious weed—Species that is nonnative to the ecosystem under consideration and whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health.

involute sanctuary—Place of refuge or protection where animals and birds may not be hunted.

IPM—See *integrated pest management*.

ISST—Invasive species strike team.

issue—Any unsettled matter that requires a management decision; for example, 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 U.S. Fish and Wildlife Service Manual” 602 FW 1.5).

lacustrine—Relating to, formed in, living in, or growing in lakes.

local agencies—Municipal governments, regional planning commissions, or conservation groups.

macrophyte—Plant, especially a marine plant, that is large enough to be visible to the naked eye.

management alternatives—See *alternatives*.

management plan—Plan that guides future land management practices on a tract of land. See *cooperative agreement*.

mechanical control—Reduction in numbers or elimination of unwanted species through the use of mechanical equipment such as mowers and clippers.

microhabitat—Habitat features at a fine scale; often identifies a unique set of local habitat features.

migration—Regular extensive, seasonal movements of birds between their breeding regions and their wintering regions; to pass usually periodically from one region or climate to another for feeding or breeding.

migratory bird—Bird species that follow a seasonal movement from their breeding grounds to their wintering grounds. Waterfowl, shorebirds, raptors, and songbirds are all migratory birds.

migratory game bird—Bird species, regulated under the Migratory Bird Treaty Act and state laws (legally hunted, including ducks, geese, woodcock, and rails).

mission—Succinct statement of purpose or reason for being.

mitigation—Measure designed to counteract an environmental impact or to make an impact less severe.

mixed-grass prairie—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.

monitoring—Process of collecting information to track changes of selected parameters over time.

monotypic—Having only one type or representative.

moraine—Mass of earth and rock debris carried by an advancing glacier and left at its front and side edges as it retreats.

NABCI—North American Bird Conservation Initiative.

national wildlife refuge—Designated area of land, water, or an interest in land or water within the Refuge System, but does not include coordination areas; a complete listing of all units of the Refuge System is in the current “Annual Report of Lands Under Control of the U.S. Fish and Wildlife Service.”

National Wildlife Refuge System (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, and waterfowl production areas.

National Wildlife Refuge System Improvement Act of 1997 (Improvement Act)—Sets the mission and the administrative policy for all refuges in the Refuge System; defines a unifying mission for the Refuge System; establishes the legitimacy and appropriateness of the six priority public uses (hunting, fishing, wildlife observation, 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 Refuge System; 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—Species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

NDGF—North Dakota Game and Fish Department.

Neotropical migrant, also Neotropical migratory bird—Bird species that breeds north of the United States–Mexico border and winters primarily south of this border.

NEPA—National Environmental Policy Act.

nest success—Percentage of nests that successfully hatch one or more eggs of the total number of nests started in an area.

NHPA—National Historic Preservation Act.

nongovernmental organization—Any group that does not include federal, state, tribal, county, city, town, local, or other governmental entities.

North American Waterfowl Management Plan—North American Waterfowl Management Plan, signed in 1986, recognizes that the recovery and perpetuation of waterfowl populations depends on restoring wetlands and associated ecosystems throughout the United States and Canada. It established cooperative international efforts and joint ventures comprised of individuals; corporations; conservation organizations; and local, state, provincial, and federal agencies drawn together by common conservation objectives.

notice of intent—Notice that an environmental impact statement will be prepared and considered (40 CFR 1508.22); published in the *Federal Register*.

noxious weed, also invasive plant—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 (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 United States and to public health.

NRCS—Natural Resources Conservation Service; agency of the U.S. Department of Agriculture.

objective—Concise statement of what is to be achieved, when and where it is to 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, time-specific, and measurable.

Partners in Flight (PIF) program—Western Hemisphere program designed to conserve Neotropical migratory birds and officially endorsed by numerous federal and state agencies and nongovernmental organizations; also known as the Neotropical Migratory Bird Conservation Program.

partnership—Contract or agreement entered into by two or more individuals, groups of individuals, organizations or agencies in which each agrees to furnish a part of the capital or some in-kind service, such as labor, for a mutually beneficial enterprise.

patch—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.

phenology—The relationship between plant or animal development and climatic conditions.

PIF—See *Partners in Flight program*.

PL—Public law.

planning team—Team that prepares the comprehensive conservation plan. Planning teams are interdisciplinary in membership and function. A team generally consists of a planning team leader; refuge manager and staff biologist; staff specialists or other representatives of Service programs, ecosystems or regional offices; and state partner wildlife agencies as appropriate.

planning team leader—Typically a professional planner or natural resource specialist knowledgeable of the requirements of National Environmental Policy Act and who has planning experience. The planning team leader manages the refuge planning process and ensures compliance with applicable regulatory and policy requirements.

planning unit—Single refuge, an ecologically or administratively related refuge complex, or distinct unit of a refuge. The planning unit also may include lands currently outside refuge boundaries.

plant association—Classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community.

plant community—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 (ponderosa pine or bunchgrass).

PPJV—Prairie Pothole Joint Venture.

predation—Mode of life in which food is primarily obtained by the killing or consuming of animals.

prescribed fire—Skillful application of fire to natural fuels under conditions such as weather, fuel moisture, and soil moisture 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.

priority public use—See *wildlife-dependent recreational use*.

pristine—Typical of original conditions.

private land—Land that is owned by a private individual, a group of individuals, or a nongovernmental organization.

private landowner—Any individual, group of individuals, or nongovernmental organization that owns land.

private organization—Any nongovernmental organization.

proposed action—Alternative proposed to best achieve the purpose, vision, and goals of a refuge (contributes to the Refuge System mission, addresses the significant issues, and is consistent with principles of sound fish and wildlife management). The draft comprehensive conservation plan.

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—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.

public land—Land that is owned by the local, state, or federal government.

purpose of the refuge—Purpose 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 or district subunit (“Draft U.S. Fish and Wildlife Service Manual” 602 FW 1.5).

recruitment—The process of bringing hatch-year young into the adult population.

Refuge Operations Needs System—National database that contains the unfunded operational needs of each refuge. Projects included are those required to carry out approved plans and meet goals, objectives, and legal mandates.

refuge purpose—See *purpose of the refuge*.

Refuge System—See *National Wildlife Refuge System*.

region 6—Mountain–Prairie Region of the U.S. Fish and Wildlife Service, which administers Service programs in Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Wyoming, and Utah.

rest—Free from biological, mechanical, or chemical manipulation, in reference to refuge lands.

restoration—Artificial manipulation of a habitat to restore it to something close to its natural state. Involves taking a degraded grassland and reestablishing habitat for native plants and animals. Restoration usually involves the planting of native grasses and forbs, and may include shrub removal and the use of prescribed fire.

rhizomatous—A plant having rhizomes.

rhizome—A continuously growing, horizontal, underground stem that produces roots and sends shoots upward at intervals (for example, many iris species).

riparian area or **riparian zone**—Area or habitat that is transitional from terrestrial to aquatic ecosystems including streams, lakes, wet areas, and adjacent plant communities and their associated soils that 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 all plant life growing on the land adjoining a stream and directly influenced by the stream.

RLGIS—Refuge Lands Geographic Information System.

“roundouts”—Odd shapes in boundaries of Refuge System lands that are straightened by the purchase of land tracts.

runoff—Water from rain, melted snow, or agricultural or landscape irrigation that flows over the land surface into a waterbody.

sandhills—Sand dunes created by wind and wave action following the melting of large glaciers about 8,000–10,000 years ago. Soils are sand and silt. Local relief exceeds 80 feet in some places.

scoping—Process of obtaining information from the public for input into the planning process.

sediment—Material deposited by water, wind, and glaciers.

Service—See *U.S. Fish and Wildlife Service*.

Service Asset Maintenance Management System—National database that contains the unfunded maintenance needs of each refuge; projects include those required to maintain existing equipment and buildings, correct safety deficiencies for the implementation of approved plans, and meet goals, objectives, and legal mandates.

shelterbelt—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 such as a plover or a snipe that frequent the seashore or mud flat areas.

sound professional judgment—Finding, determination, or decision that is consistent with principles of sound fish and wildlife management and administration, available science and resources, and adherence to the requirements of the National Wildlife Refuge System Administration Act and other applicable laws.

spatial—Relating to, occupying, or having the character of space.

special status species—Plants or animals that have been identified through 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; the Service’s 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—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 (“National Wildlife Refuge System 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 that have documented or apparent population declines, small or restricted populations, or dependence on restricted or vulnerable habitats. Species that: (1) are documented or have apparent population declines; (2) are small or restricted populations; or (3) depend on restricted or vulnerable habitats.

stand—Any homogenous area of vegetation with more or less uniform soils, landform, and vegetation. Typically used to refer to forested areas.

step-down management plan—Plan that provides the details necessary to carry out management strategies identified in the comprehensive conservation plan (“Draft U.S. Fish and Wildlife Service Manual” 602 FW 1.5).

strategy—Specific action, tool, or technique or combination of actions, tools, and techniques used to meet unit objectives (“Draft U.S. Fish and Wildlife Service Manual” 602 FW 1.5).

submergent—Vascular or nonvascular hydrophyte, either rooted or nonrooted, that lies entirely beneath the water surface, except for flowering parts in some species.

succession—See *ecological succession*.

SWG—state wildlife grant.

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—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.

trust resource—Resource that, through law or administrative act, is held in trust for the people by the government. A federal trust resource is one for which trust responsibility is given in part to the federal government through federal legislation or administrative act. Generally, federal trust resources are those considered to be of national or international importance no matter where they occur, such as endangered species and species such as migratory birds and fish that regularly move across state lines. In addition to species, trust resources include cultural resources protected through federal historic preservation laws, nationally important and threatened habitats, notably wetlands, navigable waters, and public lands such as state parks and national wildlife refuges.

trust species—See *trust resource*.

understory—Any vegetation whose canopy (foliage) is below, or closer to the ground than canopies of other plants.

upland—Dry ground; other than wetlands.

USC—United States Code.

USDA—U.S. Department of Agriculture.

U.S. Fish and Wildlife Service (Service, USFWS)—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 that distributes 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 and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

USFWS—See *U.S. Fish and Wildlife Service*.

U.S. Geological Survey (USGS)—Federal 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—Concise statement of what the planning unit should be, or what the Service hopes to do, based primarily on the Refuge System mission, specific refuge purposes, and other mandates. In addition, the vision statement is tied to the maintenance and restoration of biological integrity, diversity, and environmental health of each refuge and the Refuge System.

visual obstruction—Pertaining to 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)—Measurement of the density of a plant community; the height of vegetation that blocks the view of predators to a nest.

VOR—See *visual obstruction reading*.

wading birds—Birds having long legs that enable them to wade in shallow water. Includes egrets, great blue herons, black-crowned night-herons, and bitterns.

warm-season grass—Grass that begins growth later in the season (early June); require warmer soil temperatures to germinate and actively grow when temperatures are warmer (85–95°F). Examples are Indiangrass, switchgrass, and big bluestem.

waterfowl—Category of birds that includes ducks, geese, and swans.

watershed—Geographic area within which water drains into a particular river, stream or body of water. A watershed includes both the land and the body of water into which the land drains.

wetland—Land transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water.

wetland management district (district)—Administrative unit that provides oversight in a multicounty area for all of the U.S. Fish and Wildlife Service's small land tracts.

WG—Wage Grade schedule (pay rate schedule for certain federal positions).

wilderness—“A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain” (Wilderness Act of 1964 Section 2c [PL 88-577]). This legal definition places wilderness in the untrammelled or primeval end of the environmental modification spectrum. Wilderness is roadless lands, legally classified as component areas of the National Wilderness Preservation System, and managed to protect its qualities of naturalness, solitude, and opportunity for primitive types of recreation.

wildfire—Free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs in wildlands (“U.S. Fish and Wildlife Service Manual” 621 FW 1.7).

wildland fire—Every wildland fire is either a wildfire or a prescribed fire (“U.S. Fish and Wildlife Service Manual” 621 FW 1.3).

wildlife-dependent recreational use—Use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation. These are the six priority public uses of the Refuge 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.

wildlife management—Practice of manipulating wildlife populations either directly through regulating the numbers, ages, and sex ratios harvested, or indirectly by providing favorable habitat conditions and alleviating limiting factors.

woodland—Open stands of trees with crowns not usually touching, generally forming 25%–60% cover.

WUI—Wildland–urban interface.

Appendix A

Key Legislation and Policies

Administration of units of the National Wildlife Refuge System is governed by (1) bills passed by the U.S. Congress and signed into law by the president of the United States, and (2) by regulations developed by the various branches of the government. Following are brief descriptions of some of the most pertinent laws and statutes establishing legal parameters and policy direction for the Refuge System.

In alphabetical order of the name of the act, order, or regulation.

Americans with Disabilities Act (1992): Prohibits discrimination in public accommodations and services.

Antiquities Act (June 8, 1906; 16 USC 431–3; 34 Stat. 225): Authorizes the president to designate as national monuments objects or areas of historic or scientific interest on lands owned or controlled by the United States. Requires that a permit be obtained for examination of ruins, excavation of archaeological sites, and the gathering of objects of antiquity on lands under the jurisdiction of the Secretaries of Interior, Agriculture, and Army, and provided penalties for violations.

Archaeological Resources Protection Act (Public Law [PL] 96-95; October 31, 1979; 16 USC 470aa–II; 93 Stat. 721): Largely supplants the resource protection provisions of the Antiquities Act for archaeological items. Establishes detailed requirements for issuance of permits for any excavation for or removal of archaeological resources from federal or Indian lands. Establishes civil and criminal penalties for the unauthorized excavation, removal, or damage of any such resources; for any trafficking in such resources removed from federal or Indian land in violation of any provision of federal law; and for interstate and foreign commerce in such resources acquired, transported, or received in violation of any state or local law. In addition, PL 100-588 (November 3, 1988; 102 Stat. 2983) lowers the threshold value of artifacts triggering the felony provisions of the act from \$5,000 to \$500, makes attempting to commit an action prohibited by the act a violation, and requires the land managing agencies to establish public awareness programs regarding the value of archaeological resources to the nation.

Architectural Barriers Act (1968): Requires federally owned, leased, or funded buildings and facilities to be accessible to persons with disabilities.

Archeological and Historic Preservation Act (PL 86-523; June 27, 1960; 16 USC 469–469c; 74 Stat. 220 [as amended by PL 93-291; May 24, 1974; 88 Stat. 174]): Carries out the policy established by the Historic Sites Act; directs federal agencies to notify the Secretary of the Interior whenever they find a federal or federally assisted, licensed, or permitted project may cause loss or destruction of significant scientific, prehistoric, or archaeological data. Authorizes use of appropriated, donated, and transferred money for the recovery, protection, and preservation of such data.

Clean Water Act (1977): Requires consultation with the U.S. Army Corps of Engineers for major wetland modifications.

Criminal Code of Provisions of 1940 (as amended, 18 USC 41): States the intent of Congress to protect all wildlife within federal sanctuaries, refuges, fish hatcheries, and breeding grounds. Provides that anyone (except in compliance with rules and regulations promulgated by authority of law) who hunts, traps, or willfully disturbs any such wildlife, or willfully injures, molests, or destroys any property of the United States on such land or water, shall be fined up to \$500 or imprisoned for not more than 6 months or both.

Emergency Wetland Resources Act of 1986: Authorizes the buy of wetlands from Land and Water Conservation Fund monies, removing a prior prohibition on such acquisitions. Requires the Secretary to establish a national wetlands priority conservation plan, requires the states to include wetlands in their comprehensive outdoor recreation plans, and transfers to the Migratory Bird Conservation Fund amount equal to import duties on arms and ammunition.

Endangered Species Act of 1973 and recent amendments (16 USC 1531–43, 87 Stat. 884; as amended): Provides for conservation of threatened and endangered species of fish, wildlife, and plants by federal action and by encouraging state programs. Specific provisions include the listing and determination of critical habitat for endangered and threatened species and consultation with the Service on any federally funded or licensed project that could affect any of these agencies; prohibition of unauthorized taking, possession, sale, transport, etc., of endangered species; an expanded program

of habitat acquisition; establishment of cooperative agreements and grants-in-aid to states that establish and maintain an active, adequate program for endangered and threatened species; assessment of civil and criminal penalties for violating the act or regulations.

Environmental Education Act of 1990 (PL 101-619; November 16, 1990; 20 USC 5501–10; 104 Stat. 3325):

Establishes the Office of Environmental Education within the Environmental Protection Agency to develop and administer a federal environmental education program. Responsibilities of the office include developing and supporting programs to improve understanding of the natural and developed environment and the relationships between humans and their environment; supporting the dissemination of educational materials; developing and supporting training programs and environmental education seminars; managing a federal grant program; and administering an environmental internship and fellowship program. Requires the office to develop and support environmental programs in consultation with other federal natural resource management agencies including the Service.

EO 11644—Use of Off-road Vehicles on Public Lands (1972): Provides policy and procedures for regulating off-road vehicles.

EO 11988—Floodplain Management (May 24, 1977):

Prevents federal agencies from contributing to the “adverse impacts associated with occupancy and modification of floodplains” and the “direct or indirect support of floodplain development.” In the course of fulfilling their respective authorities, federal agencies “shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains.”

EO 11990—Protection of Wetlands.

EO 12996—Management and General Public Use of the National Wildlife Refuge System (1996):

Defines the mission, purpose, and priority public uses of the Refuge System; presents four principles to guide management of the system.

EO 13007—Indian Sacred Sites (1996): Directs federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where appropriate, maintain the confidentiality of sacred sites.

Federal Noxious Weed Act (1990): Requires the use of integrated management systems to control or contain undesirable plant species, and an interdisciplinary approach with the cooperation of other federal and state agencies.

Federal Records Act (1950): Requires the preservation of evidence of the government’s

organization, functions, policies, decisions, operations, and activities, as well as basic historical and other information.

Federal Water Pollution Control Act of 1972, Section 401 (PL 92-500, USC 1411, 86 Stat. 816.33):

Requires any applicant for a federal license or permit to conduct any activity that may result in a discharge into navigable waters to obtain a certification from the state in which the discharge originates or will originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over navigable waters at the point where the discharge originates or will originate, that the discharge will comply with applicable effluent limitations and water quality standards. Requires that a certification obtained for construction of any facility must also pertain to subsequent operation of the facility.

Federal Water Pollution Control Act of 1972, Section 404 (PL 92-500, 86 Stat. 816):

Authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits, after notice and opportunity for public hearing, for discharge of dredged or fill material into navigable waters of the United States, including wetlands, at specified disposal sites. Requires that selection of disposal sites be in accordance with guidelines developed by the Administrator of the Environmental Protection Agency in conjunction with the Secretary of the Army. States that the Administrator can prohibit or restrict use of any defined area as a disposal site whenever she/he determines, after notice and opportunity for public hearings, that discharge of such materials into such areas will have an unacceptable adverse effect on municipal water supplies, shellfish beds, fishery areas, wildlife, or recreational areas.

Fish and Wildlife Act of 1956 (16 USC 742a–742j, 70 Stat. 1119; as amended):

Establishes a comprehensive fish and wildlife policy and directs the Secretary of the Interior to provide continuing research and extension and conservation of fish and wildlife resources.

Fish and Wildlife Conservation Act of 1980 (PL 96366; September 29, 1980; 16 USC 2901–11; as amended 1986, 1988, 1990, and 1992):

Creates a mechanism for federal matching funding of the development of state conservation plans for nongame fish and wildlife. States that subsequent amendments to this law require that the Secretary monitor and assess migratory nongame birds, determine the effects of environmental changes and human activities, identify birds likely to be candidates for endangered species listing, and identify conservation actions that would prevent this from being necessary. In 1989, Congress also directed the Secretary to identify lands and waters in the Western Hemisphere, the protection, management, or acquisition of which would foster conservation of migratory nongame birds. All of these activities are intended to assist the Secretary

in fulfilling the Secretary's responsibilities under the Migratory Bird Treaty Act and the Migratory Bird Conservation Act, and provisions of the Endangered Species Act implementing the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere.

Fish and Wildlife Coordination Act (1958): Allows the U.S. Fish and Wildlife Service to enter into agreements with private landowners for wildlife management purposes.

Fish and Wildlife Improvement Act of 1978: Improves the administration of fish and wildlife programs and amends several earlier laws including the Refuge Recreation Act, the National Wildlife Refuge System Administration Act, and the Fish and Wildlife Act of 1956. Authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. Authorizes the use of volunteers for Service projects and appropriations to carry out volunteer programs.

Historic Sites, Buildings and Antiquities Act (August 21, 1935; 16 USC 461–2, 464–7; 49 Stat. 666; known as the Historic Sites Act [as amended by PL 89-249; October 9, 1965; 79 Stat. 971]): Declares it a national policy to preserve historic sites and objects of national significance, including those located at refuges and districts. Provides procedures for designation, acquisition, administration, and protection of such sites. Provides for designation of National Historic and Natural Landmarks.

Land and Water Conservation Fund Act of 1965: Provides money from leasing bonuses, production royalties, and rental revenues for offshore oil, gas, and sulphur extraction to the Bureau of Land Management, the USDA Forest Service, the U.S. Fish and Wildlife Service, and state and local agencies for purchase of lands for parks, open space, and outdoor recreation.

Migratory Bird Conservation Act of 1929 (16 USC 715–715d, 715e, 715f–r): Establishes the Migratory Bird Conservation Commission, which consists of the Secretaries of the Interior (chair), Agriculture, and Transportation; two members from the House of Representatives; and an ex-officio member from the state in which a project is located. States that the commission approves acquisition of land and water, or interests therein, and sets the priorities for acquisition of lands by the Secretary of the Interior for sanctuaries or for other management purposes. Requires that, to acquire lands or interests therein, the state concerned must consent to such acquisition by legislation. Such legislation has been enacted by most states.

Migratory Bird Conservation Act of 1929 (16 USC 715s, 45 Stat. 1222, as amended): Authorizes acquisition, development, and maintenance of migratory bird refuges; cooperation with other agencies in conservation; and investigations and

publications on North American birds. Authorizes payment of 25% of net receipts from administration of national wildlife refuges to the country or counties in which such refuges are located.

Migratory Bird Hunting and Conservation Stamp Act of 1934 (March 16, 1934; 16 USC 718–718h; 48 Stat. 51; known as the Duck Stamp Act; as amended):

Requires each waterfowl hunter 16 years of age or older to possess a valid federal hunting stamp. Authorizes the requirement of an annual stamp for the hunting of waterfowl; proceeds go toward the purchase of habitat for waterfowl and other wildlife. Duck stamps are also bought (1) for entry into some refuges, (2) by conservationists, and (3) for stamp collections. Receipts from the sale of the stamp are deposited in a special Treasury account known as the Migratory Bird Conservation Fund and are not subject to appropriations.

Migratory Bird Treaty Act of 1918 (16 USC 703–11; 50 CFR, subchapter B; as amended): Implements treaties with Great Britain (for Canada) and Mexico for protection of migratory birds whose welfare is a federal responsibility. Provides for regulations to control taking, possession, selling, transporting, and importing of migratory birds and provides penalties for violations. Enables the setting of seasons and other regulations (including the closing of areas, federal or nonfederal) related to the hunting of migratory birds.

National and Community Service Act of 1990 (PL 101-610; November 16, 1990; 42 USC 12401; 104 Stat. 3127): Authorizes several programs to engage citizens of the United States in full and part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Provides for grants to states for the creation of programs for citizens over 17 years of age. Programs must be designed to fill unmet educational, human, environmental, and public safety needs. Initially, participants will receive postemployment benefits of up to \$1,000 per year for part-time participants and \$2,500 for full-time participants.

Several provisions are of particular interest to the Service:

American Conservation and Youth Service Corps: As a federal grant program established under subtitle C of the law, the corps offers an opportunity for young adults between the ages of 16 and 25, or in the case of summer programs, between 15 and 21, to engage in approved human and natural resources projects that benefit the public or are carried out on federal or Indian lands. To be eligible for assistance, natural resources programs will focus on improvement of wildlife habitat and recreational areas, fish culture, fishery assistance, erosion, wetlands protection, pollution control, and similar projects. A

stipend of not more than 100% of the poverty level will be paid to participants. A commission established to administer the Youth Service Corps will make grants to states, the Secretaries of Agriculture and Interior, and the Director of ACTION to carry out these responsibilities.

Thousand Points of Light: Creates a nonprofit Points of Light Foundation to administer programs to encourage citizens and institutions to volunteer to solve critical social issues, discover new leaders, and develop institutions committed to serving others.

National Environmental Policy Act of 1969 (PL 91-190; January 1, 1970; 42 USC 4321–47; 83 Stat. 852 [as amended by PL 94-52; July 3, 1975; 89 Stat. 258] [as amended by PL 94-83; August 9, 1975; 89 Stat. 424]): Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and the implementation of all actions, federal agencies must integrate the act with other planning requirements, and to prepare appropriate documents to facilitate better environmental decision making (40 CFR 1500). Declares national policy to encourage a productive and enjoyable harmony between humans and their environment.

Section 102 of that act directs that “to the fullest extent possible the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this act, and all agencies of the Federal Government shall ... insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision making along with economic technical considerations.”

Section 102(2)c of NEPA requires all federal agencies, with respect to major federal actions significantly affecting the quality of the human environment, to submit to the Council on Environmental Quality a detailed statement of the environmental impact of the proposed action; any adverse environmental effect that cannot be avoided should the proposal be carried out; alternatives to the proposed action; the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity; any irreversible and irretrievable commitments of resources that would be involved in the proposed action, should it be carried out.

National Historic Preservation Act of 1966 (PL 89-665; October 15, 1966; 16 USC 470–470b, 470c–n; 80 Stat. 915; and repeatedly amended): Provides for preservation of significant historical features (buildings, objects, and sites) through a

grants-in-aid program to the states. Establishes the National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation (16 USC 468–468d). Establishes the Advisory Council on Historic Preservation, which was made a permanent independent agency in PL 94-422 (September 28, 1976; 90 Stat. 1319). That act creates the Historic Preservation Fund. Directs federal agencies to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register.

National Wildlife Refuge System Administration Act of 1966 (PL 89-669; 16 USC 668dd–ee; 80 Stat. 929; as amended): Defines the Refuge System as including wildlife refuges, areas for protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, and waterfowl production areas. Authorizes the Secretary to permit any use of an area provided such use is compatible with the major purposes for which such area was established. States that purchase considerations for rights-of-way go into the Migratory Bird Conservation Fund for the acquisition of lands. By regulation, up to 40% of an area acquired for a migratory bird sanctuary may be opened to migratory bird hunting unless the Secretary finds that the taking of any species of migratory game birds in more than 40% of such area would be beneficial to the species. Requires an act of Congress for the divestiture of lands in the system, except for (1) lands acquired with Migratory Bird Conservation Commission money, and (2) lands that can be removed from the system by land exchange, or if brought into the system by a cooperative agreement, then pursuant to the terms of the agreement.

National Wildlife Refuge System Improvement Act of 1997 (PL 105-57; October 9, 1997; Amendment to the National Wildlife Refuge System Administration Act of 1966): Sets the mission and the administrative policy for all units in the 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, photography, environmental education, and interpretation); establishes a formal process for determining appropriateness and compatibility; establishes the responsibilities of the Secretary of the Interior for managing and protecting the Refuge System; and requires a CCP for each refuge by the year 2012. Also amended portions of the Refuge Recreation Act and the National Wildlife Refuge System Administration Act of 1966.

Key provisions include the following:

- A requirement that the Secretary of the Interior ensures maintenance of the biological integrity, diversity, and environmental health of the Refuge System.

- The definition of compatible wildlife-dependent recreation as “legitimate and appropriate general public use of the [National Wildlife Refuge] System.”
- The establishment of hunting, fishing, wildlife observation, photography, environmental education, and interpretation as “priority public uses” where compatible with the mission and purpose of individual national wildlife refuges.
- The refuge managers’ authority to use sound professional judgment in determining which public uses are compatible at national wildlife refuges and whether or not they will be allowed (a formal process for determining “compatible use” is currently being developed).
- The requirement of open public involvement in decisions to allow new uses of national wildlife refuges and renew existing ones, as well as in the development of CCPs for national wildlife refuges.

National Wildlife Refuge Regulations (50 CFR 25-35, 43 CFR 3103.2 and 3120.3–3): Provides regulations for administration and management of national wildlife refuges including mineral leasing, exploration, and development.

Rights-of-way General Regulations (50 CFR 29.21; 34 FR 19907, December 19, 1969): Provides for procedures for filing applications. Provides terms and conditions under which rights-of-way over, above, and across lands administered by the Service may be granted.

Wilderness Preservation and Management (50 CFR 35; 16 USC 1131-1136; 43 USC 1201; 78 Stat. 890): Provides procedures for establishing wilderness units under the Wilderness Act of 1964 at units of the Refuge System.

National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act of 1998 (PL 105-242, 112 Stat. 1575): Encourages the use of volunteers to assist the Service in the management of refuges within the Refuge System. Facilitates partnerships between the Refuge System and nonfederal entities to promote public awareness of the resources of the Refuge System and public participation in the conservation of those resources. Encourages donations and other contributions by persons and organizations to the Refuge System.

North American Wetlands Conservation Act (PL 101-233; December 13, 1989; 16 USC 4401–12; 103 Stat. 1968): Provides for the conservation of North American wetland ecosystems, waterfowl and other migratory birds, fish, and wildlife that depend on such habitats. Establishes a council to review project proposals and provided funding for the projects. Provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, United States, and

Mexico. Converts the Pittman–Robertson account into a trust fund, with the interest available without appropriation through the year 2006 to carry out the programs authorized by the act, along with an authorization for annual appropriation of \$15 million plus an amount equal to the fines and forfeitures collected under the Migratory Bird Treaty Act. Available money may be expended, upon approval of the Migratory Bird Conservation Commission, for payment of not to exceed 50% of the United States share of the cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100% of the cost of projects on federal lands). At least 50% and no more than 70% of the money received is to go to Canada and Mexico each year.

Refuge Recreation Act of 1962: Authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the areas’ primary purposes. Authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish- and wildlife-oriented recreational development or protection of natural resources. Authorizes the charging of fees for public uses.

Refuge Recreation Act of 1966 (PL 87-714, 16 USC 460k et seq., 76 Stat. 653–4): Authorizes appropriate, incidental, or secondary recreational use at conservation areas administered by the Secretary of the Interior for fish and wildlife purposes.

Refuge Recreation Act of 1969 [16 USC 460k–k4], as amended.

Refuge Revenue Sharing Act, Section 401 (June 15, 1935; 16 USC 715s; 49 Stat. 383): Provides for payments to counties in lieu of taxes, using revenues derived from the sale of products from refuges. Related legislation follows:

PL 88-523 (August 30, 1964; 78 Stat. 701): Makes major revisions by requiring that all revenues received from refuge products such as animals, timber and minerals, or from leases or other privileges, be deposited in a special Treasury account and net receipts distributed to counties for public schools and roads.

PL 93-509 (December 3, 1974; 88 Stat. 1603): Requires that monies remaining in the fund after payments be transferred to the Migratory Bird Conservation Fund for land acquisition under provisions of the Migratory Bird Conservation Act.

PL 95-469 (October 17, 1978; 92 Stat. 1319): Expands the revenue-sharing system to include national fish hatcheries and Service research stations. Includes in the Refuge Revenue Sharing Fund receipts from the sale of salmonid carcasses. Establishes payments to counties as follows:

On acquired land, the greatest amount calculated on the basis of 75 cents per acre, $\frac{3}{4}$ of 1% of the appraised value, or 25% of the net receipts produced from the land.

On land withdrawn from the public domain, 25% of net receipts and basic payments under PL 94-565 (31 USC 1601–1607, 90 Stat. 2662), payment in lieu of taxes on public lands.

This amendment also authorizes appropriations to make up any difference between the amount in the fund and the amount scheduled for payment in any year. The stipulation that payments be used for schools and roads was removed, but counties were required to pass payments along to other units of local government within the county that suffer losses in revenues due to the establishment of Service areas.

Refuge Revenue Sharing Act of 1978 (PL 95-469; October 17, 1978; amended 16 USC 715s; 50 CFR, part 34):

Changes the provisions for sharing revenues with counties in a number of ways. Makes revenue sharing applicable to all lands administered by the Service, whereas previously it was applicable only to areas in the Refuge System. Makes payments available for any governmental purpose, whereas the old law restricted the use of payments to roads and schools. For lands acquired in fee simple, provides a payment of 75 cents per acre, $\frac{3}{4}$ of 1% of fair market value or 25% of net receipts, whichever is greatest, whereas the old law provided a payment of $\frac{3}{4}$ of 1% adjustment cost or 25% of net receipts, whichever was greater. Makes reserve (public domain) lands entitlement lands under PL 94-565 (16 USC 1601–1607) and provides for a payment of 25% of net receipts. Authorizes appropriations to make up any shortfall in net receipts, to make payments in the full amount for which counties are eligible. The old law provided that if net receipts were insufficient to make full payment, payment to each county would be reduced proportionality.

Refuge Trespass Act of June 28, 1906 (18 USC 41, 43 Stat. 98; 18 USC 145): Provides the first federal protection for wildlife at national wildlife refuges. Makes it unlawful to hunt, trap, capture, willfully disturb, or kill any bird or wild animal, or take or destroy the eggs of any such birds, on any lands of

the United States set apart or reserved as refuges or breeding grounds for such birds or animals by any law, proclamation, or executive order, except under rules and regulations of the Secretary. The act also protects government property on such lands.

Refuge Trespass Act of June 25, 1948 (18 USC 41, Stat. 686; Section 41 of the Criminal Code, Title 18):

Consolidates the penalty provisions of various acts from January 24, 1905 (16 USC 684–687, 33 Stat. 614) through March 10, 1934 (16 USC 694–694b, 48 Stat. 400) and restates the intent of Congress to protect all wildlife within federal sanctuaries, refuges, fish hatcheries, and breeding grounds. Provides that anyone (except in compliance with rules and regulations promulgated by authority of law) who hunts, traps, or willfully disturbs any wildlife on such areas, or willfully injures, molests, or destroys any property of the United States on such lands or waters, shall be fined, imprisoned, or both.

Rehabilitation Act of 1973 (October 1, 1973; 29 USC 794 [as amended by PL 93-112, Title 5; 87 Stat. 355]):

Prohibits discrimination on the basis of handicap under any program or activity receiving federal financial assistance.

Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948:

Provides that, upon determination by the Administrator of the General Services Administration, real property no longer needed by a federal agency can be transferred without reimbursement to the Secretary of the Interior if the land has particular value for migratory birds, or to a state agency for other wildlife conservation purposes.

U.S. Department of the Interior Order No. 3226

(January 19, 2001): Directs bureaus and offices of the Department to analyze the potential effects on climate change when undertaking long-range planning, when setting priorities for scientific research, and when making major decisions about use of resources.

Wilderness Act of 1964 (PL 88-577; September 3,

1964): Directs the Secretary of the Interior, within 10 years, to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within the Refuge System and National Park Service for inclusion in the National Wilderness Preservation System.

Laws and Executive Orders that Regulate Recreational Use on the Refuge System

Alaska National Interest Lands Conservation Act of 1980 (16 USC 410 hh3233 and 43 USC 1602–1784)

Alaska Native Claims Settlement Act (43 USC 1601–24)

Antiques Act of 1906 (16 USC 431–3)

Archaeological and Historic Preservation Act of 1960 (16 USC 469–469c), as amended

Archaeological Resources Protection Act of 1979 (16 USC 470aa–mm)

Comprehensive Environmental Responses, Compensation and Liability Act of 1980

Endangered Species Act of 1973 (16 USC 1531–44), as amended

Executive Order 11593—Protection and Enhancement of the Cultural Environment

Executive Order 11593—Protection of Historical, Archaeological, and Scientific Properties

Executive Order 11644—Use of Off-road Vehicles on Public Lands

Executive Order 11988—Floodplain Management

Executive Order 11990—Protection of Wetlands

Executive Order 12372—Intergovernmental Review of Federal Program

Executive Order 12962—Recreational Fisheries

Executive Order 12996—Management and General Public Use of the National Wildlife Refuge System

Executive Order 13006—Locating Federal Facilities on Historic Properties in Our Nation’s Central Cities

Executive Order 13007—Indian Sacred Sites

Executive Order 13287—Preserve America

The Fish and Wildlife Act of 1956 (16 USC 742f [a] [4]), as amended

Fish and Wildlife Conservation Act (16 USC 2901–11), as amended

The Fish and Wildlife Coordination Act (16 USC 661[1]–662[c])

Fish and Wildlife Improvement Act of 1978 (16 USC 7421)

Historic Sites, Building and Antiquities Act of 1935 (16 USC 461–2, 464–7)

Land and Water Conservation Fund (16 USC 460[1–4]–[1–11]), as amended

Migratory Bird Conservation Act of 1929 (16 USC 715–715d, 715e, 715f–r), as amended

National Wildlife Refuge System Administration Act of 1966 (16 USC 668dd–669ee), as amended

National Wildlife Refuge System Improvement Act of 1997

Natural Historic Preservation Act of 1966 (16 USC 470–470b, 470c–n), as amended

Refuge Recreation Act of 1962 (16 USC 460k–k4), as amended

Refuge Recreation Act of 1969 (16 USC 460k–k4), as amended

Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970, as amended

Wild and Scenic Rivers Act (16 USC 1271–87), as amended

Wilderness Act of 1964 (16 USC 1131–6)

Appendix B

Preparers and Contributors

This document is the result of extensive, collaborative, and enthusiastic efforts by the members of the planning team for the 12 North Dakota national wildlife refuges. Many others contributed insight and support.

Planning Team

The planning team comprises the project leaders for the Refuge System units that administer the refuges, a biology subteam, a visitor services subteam, and extended team members—all listed below.

REFUGE SYSTEM PROJECT LEADERS

<i>Team Member</i>	<i>Position</i>	<i>Work Unit</i>
David Gillund	Project leader	Lostwood Wetland Management District Complex
Kim Hanson	Project leader	Arrowwood National Wildlife Refuge Complex
Roger Hollevoet	Project leader	Devils Lake Wetland Management District Complex
Lloyd Jones	Project leader	Audubon National Wildlife Refuge Complex

BIOLOGY SUBTEAM

<i>Team Member</i>	<i>Position</i>	<i>Work Unit</i>
Dave Azure	Deputy project leader	Arrowwood National Wildlife Refuge Complex
Cami Dixon	Wildlife biologist	Devils Lake Wetland Management District Complex
Mike Goos	Wetland management district manager	Audubon National Wildlife Refuge Complex
Tim Kessler	Wetland management district manager	Crosby Wetland Management District
Paulette Scherr	Wildlife biologist	Arrowwood National Wildlife Refuge Complex
Richard Schroeder	Wildlife biologist, retired	USGS–Biological Survey, Fort Collins, CO

VISITOR SERVICES SUBTEAM

<i>Team Member</i>	<i>Position</i>	<i>Work Unit</i>
Travis Carpenter	Deputy wetland management district manager	Kulm Wetland Management District
Stacy Hoehn	Refuge operations specialist	Valley City Wetland Management District
Jackie Jacobson	Outdoor recreation planner	Audubon National Wildlife Refuge Complex
Shapins Associates	Consultants	Boulder, CO
Cindy Souders	Outdoor recreational program specialist	USFWS regional office, Lakewood, CO
Chad Zorn	Wetland management district manager	Valley City Wetland Management District

EXTENDED TEAM MEMBERS

<i>Team Member</i>	<i>Position</i>	<i>Work Unit</i>
Jim Alfonso	Deputy project leader	Devils Lake Wetland Management District Complex
Mike Artmann	Wildlife biologist and GIS specialist	USFWS regional office, Lakewood, CO
Natoma Buskness	Refuge manager	Chase Lake National Wildlife Refuge
John Esperance	Planning team leader	USFWS regional office, Lakewood, CO
Mike Estey	Wildlife biologist and GIS specialist	USFWS HAPET, Bismarck, ND
Paul Halko	Refuge manager	Devils Lake Wetland Management District (south unit)
Randy Kreil	Division chief	NDGF
Greg Link	Assistant division chief	NDGF
Chuck Loesch	Wildlife biologist and GIS specialist	USFWS HAPET, Bismarck, ND
Neil Niemuth	Wildlife biologist and GIS specialist	USFWS HAPET, Bismarck, ND
Ron Reynolds	Project leader	USFWS HAPET, Bismarck, ND
Neil Shook	Refuge manager	Devils Lake Wetland Management District (north unit)
Kurt Tompkins	Refuge manager	Kellys Slough National Wildlife Refuge

<i>Team Member</i>	<i>Position</i>	<i>Work Unit</i>
Brian Vose	Refuge manager	Lake Alice National Wildlife Refuge
Stu Wacker	Realty field supervisor (retired)	Wetland acquisition office, Bismarck, ND
Gary Williams	Deputy project leader	Audubon National Wildlife Refuge Complex
Kevin Willis	State coordinator	Partners for Fish and Wildlife, Bismarck, ND

Contributors

The Service acknowledges the efforts of the following individuals and organizations toward the completion of this CCP. The diversity, talents, and knowledge they contributed dramatically improved the vision and completeness of this document.

<i>Team Member</i>	<i>Position</i>	<i>Work Unit</i>
Richard Coleman	Assistant regional director, Refuge System	USFWS regional office, Lakewood, CO
Paul Cornes	Refuge supervisor	USFWS regional office, Lakewood, CO
Megan Estep	Chief hydrologist	USFWS regional office, Lakewood, CO
Sheri Fetherman	Chief, division of education and visitor services	USFWS regional office, Lakewood, CO
Wayne King	Refuge biologist	USFWS regional office, Lakewood, CO
Rod Krey	Refuge supervisor (retired)	USFWS regional office, Lakewood, CO
David Linehan	Deputy refuge supervisor	USFWS regional office, Lakewood, CO
Bud Oliveira	Deputy assistant regional director, Refuge System	USFWS regional office, Lakewood, CO
Deb Parker	Writer–editor, division of refuge planning	USFWS regional office, Lakewood, CO
Ron Shupe	Deputy assistant regional director, Refuge System (retired)	USFWS regional office, Lakewood, CO
Michael Spratt	Chief, division of refuge planning	USFWS regional office, Lakewood, CO
Richard Sterry	Regional fire planner	USFWS regional office, Lakewood, CO
Meg VanNess	Regional archaeologist	USFWS regional office, Lakewood, CO

Appendix C

Public Involvement

Public scoping was started for the 12 North Dakota national wildlife refuges with a notice of intent published in the *Federal Register* on February 28, 2007. The notice announced the Service's intent to prepare a CCP for the refuges and obtain suggestions and information on the scope of issues to be considered in the planning process.

Public Scoping

In April 2007, the Service sent the first planning update to interested parties. The update provided information about the refuges' history and resources and the CCP process. In addition, the update invited the public to attend scoping meetings, which the local media also announced. The planning update included a comment form and postage-paid envelope to give the public an opportunity to easily provide written comments.

The Service held public meetings in various locations throughout North Dakota starting on March 26, 2007, and ending on April 11, 2007. After a presentation about the refuges, along with an overview of the CCP and NEPA processes, the refuge staff encouraged the attendees to ask questions and offer comments. Service employees were available after the presentation to answer individuals' questions about the CCP process and refuge management. The public identified biological, social, and economic concerns about refuge management. Throughout the planning process, the planning team developed a mailing list of interested parties (find the mailing list at the end of this appendix).

Public Review of the Draft CCP and EA

The Service considered all input obtained from meetings and correspondence, including emails, in development of the draft CCP and EA. In addition, the Service considered changes to the refuges' current management that were suggested by the public and other groups.

On August 28, 2008, the Service published in the *Federal Register* a notice of availability announcing that the draft CCP and EA was available for a 30-day public review. The Service mailed 94 hard copies of the draft CCP and EA to individuals and groups on the mailing list. In addition, the Service posted the draft plan on the region 6 website and sent out news releases and a planning update.

During the review period, the Service held five public meetings in various locations throughout North Dakota. The public, agencies, and groups commented on the draft CCP and EA in writing and at the public meetings; the Service received three comment letters. The comments helped the Service develop the final CCP, and summaries of these comments and the Service's responses follow.

Public Comments and Service Responses

Comment 1: The Service needs to ensure that national wildlife refuges are managed for all birds, not just waterfowl.

Response 1: Congress passed the National Wildlife Refuge System Improvement Act of 1997 to ensure that the Refuge System is managed as a national system of lands, waters, and interests for the protection and conservation of the nation's wildlife resources. Two main components of the Improvement Act are a strong and singular wildlife conservation mission and the recognition that wildlife-dependent recreational uses involving hunting, fishing, wildlife observation, photography, environmental education, and interpretation are legitimate and appropriate public uses of the Refuge System.

The Service manages national wildlife refuges to benefit migratory birds; however many of the habitat management strategies provide habitat for other species of birds, mammals, insects, and animals. The CCP calls for habitats to be managed for target species—waterfowl, migratory shorebirds, grassland birds, and other priority species.

Comment 2: The Service needs to carefully consider the risks associated with the introduction of biological controls. Release of biological controls, such as predatory insects or genetically engineered plant pathogens, has the potential to increase rather than control the spread of invasive species. For example, an unanticipated spread of a biological control agent might cause undesirable effects that require additional measures to reduce the spread of the original control agent so it did not itself become an invasive species.

Response 2: The Service endorses the recommendation to proceed with caution; integrated pest management is crucial and includes control

measures that balance effectiveness and least risk. Ultimately, the Service considers the control of invasive species through application of a risk–reward model, with emphasis on safeguarding the ecosystem. Using the best information and science available, the Service will thoroughly analyze which agents to use. Refuge staffs will release biological control agents only after careful consideration and not without the formal approval of the Plant Protection and Quarantine office of the USDA–APHIS. This office identifies potential biological agents, studies them for effectiveness, and screens the agents for host specificity to target and nontarget species.

Comment 3: Additional steps proposed for visitor services under alternative C should be added to the preferred alternative B. This could provide long-term benefits to all North Dakota refuges by increasing public awareness about, and appreciation and support for, national wildlife refuges.

Response 3: The Service agrees that adding the steps outlined in alternative C would be beneficial, and they were given serious consideration. However, this final plan retains the same visitor services steps as described for alternative B in the draft CCP. The visitor services goal, considered attainable over the next 15 years, has achievable objectives that incorporate moderate enhancements of visitor services. Given the opportunity and funding, the Service may consider exceeding the expectations associated with this goal.

Comment 4: The Lewis and Clark National Historic Trail is adjacent to the Audubon National Wildlife Refuge near Coleharbor, North Dakota, and needs to be considered during management of this refuge. The National Park Service administers this trail, which follows the routes of the Lewis and Clark Expedition.

Response 4: The Service recognizes the value of the Lewis and Clark National Historic Trail and other nearby sites that the National Park Service administers: Knife River Indian Village Historic Site, Lewis and Clark Interpretive Center, and Fort Mandan Interpretive Site. The staff at Audubon National Wildlife Refuge has a history of coordinating refuge activities to make sure they do not conflict with the mission of the National Park Service at the trail and nearby sites. Furthermore, the refuge will continue to seek opportunities to work cooperatively with the National Park Service and provide interpretation of the trail and the Lewis and Clark Expedition.

The refuge has a self-guided auto tour route that includes an interpretive station about the Lewis and Clark Expedition at the second stop along the route. In addition, the refuge staff has cooperated with others on Challenge Cost Share projects such as the following: provision of viewing binoculars, interpretive panels, and native shrubs; joining with the Missouri River Interpreters group that is associated with the above-mentioned sites; and conducting an active brochure exchange program.

Comment 5: There was no mention of enhancing visitor services or facilities at Chase Lake National Wildlife Refuge.

Response 5: This was an oversight and improvements to the Chase Lake facilities are incorporated in this final version of the CCP.

Mailing List

The mailing list the Service used throughout the planning process follows.

FEDERAL OFFICIALS

U.S. Senator Byron L. Dorgan, Washington DC
 Sen. Dorgan's area director, Bismarck, ND
 U.S. Senator Kent Conrad, Washington DC
 Sen. Conrad's area director, Bismarck, ND
 U.S. Representative Earl Pomeroy, Washington DC
 Rep. Pomeroy's area director, Bismarck, ND

FEDERAL AGENCIES

Bureau of Reclamation, Bismarck, ND
 National Park Service, Omaha, NE
 USDA–APHIS, Bismarck, ND
 USDA–Farm Service Agency, Bottineau, ND
 USDA–Farm Service Agency, Rugby, ND
 USDA–Farm Service Agency, Towner, ND
 USDA–Natural Resources Conservation Service (NRCS), Bismarck, ND
 USDA–NRCS, Bottineau, ND
 USDA–NRCS, Copperstown, ND
 USDA–NRCS, Linton, ND
 USDA–NRCS, Mohall, ND
 USDA–NRCS, Rolla, ND
 USDA–NRCS, Rugby, ND
 USDA–NRCS, Steel, ND
 USDA–NRCS, Valley City, ND
 USFWS, Ecological Services, Bismarck, ND
 USFWS, National Wildlife Refuge System—
 Albuquerque, NM; Anchorage, AK; Arlington, VA;
 Atlanta, GA; Fort Snelling, MN; Hadley, MA;
 Portland, OR; Rawlins, WY; Sacramento, CA;
 Shepherdstown, WV; Washington DC
 USGS–Fort Collins Science Center, Fort Collins, CO

TRIBES

Three Affiliated Tribes, New Town, ND
 Standing Rock Sioux Tribe, Fort Yates, ND
 Spirit Lake Tribal Council, Fort Totten, ND
 Sisseton-Wahpeton Oyate, Agency Village, SD
 Turtle Mountain Band of Chippewa, Belcourt, ND
 White Earth Band of Chippewa, White Earth, MN

STATE OFFICIALS

Governor John Hoeven, Bismarck, ND
 North Dakota state representatives and senators
 (139)

STATE AGENCIES

North Dakota Forest Service, Bismarck, ND
 NDGF, Bismarck, ND
 North Dakota State Historical Preservation Office,
 Bismarck, ND
 North Dakota State Land Board, Bismarck, ND
 North Dakota State University Extension Service,
 Bismarck, ND
 North Dakota State University Extension Service,
 Linton, ND
 North Dakota State University Extension Service,
 Steele, ND
 North Dakota State Water Commission

LOCAL GOVERNMENT

County commissioners (33)
 Mayors (7)
 Resource conservation districts (8)
 Weed board offices (19)

ORGANIZATIONS

American Bird Conservancy, Plains, VA
 American Rivers, Washington DC
 Animal Protection Institute, Sacramento, CA
 Beyond Pesticides, Washington DC
 Defenders of Wildlife, Washington DC
 Duck Unlimited, Great Plains Office, Bismarck, ND
 Fund for Animals, Silver Springs, MD
 Izaak Walton League, Gaithersburg, MD

Murie Audubon Society, Casper, WY
 National Audubon Society, Fargo, ND
 National Audubon Society—Washington DC; New
 York, NY
 National Trappers Association, New Martinsville, WV
 National Wildlife Federation, Reston, VA
 National Wildlife Refuge Association, Washington DC
 National Wild Turkey Federation, Bismarck, ND
 The Nature Conservancy, Minneapolis, MN
 Sierra Club—San Francisco, CA; Sheridan, WY
 Union Pacific Railroad, Omaha, NE
 The U.S. Humane Society, Washington DC
 The Wilderness Society, Washington DC
 Wildlife Management Institute—Fort Collins, CO;
 Corvallis, OR; Washington DC

UNIVERSITIES AND COLLEGES

Bismarck State College
 Minot State University
 Northwestern University

MEDIA

Newspapers (57)
 Radio stations (4)
 TV stations (2)

INDIVIDUALS

Individuals (631)

Appendix D

Section 7 Biological Evaluation

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person:

John Esperance, Region 6, Division of Planning

Telephone Number:

Planning 303/236 4369

Date: August 1, 2008

I. Region: 6

II. Service Activity (Program): Refuges

III. Pertinent Species and Habitat

A. Federally listed species and/or their critical habitat within the action area:

<i>County</i>	<i>Interior Least Tern: E</i>	<i>Whooping Crane: E</i>	<i>Black-footed Ferret: E</i>	<i>Gray Wolf: E</i>	<i>Piping Plover: T</i>	<i>Dakota Skipper: C</i>	<i>Designated Critical Habitat: Piping Plover</i>
Dunn	X	X	X	X	X	X	X
Grand Forks							
McLean	X	X		X	X	X	X
Mountrail	X	X		X	X	X	X
Nelson							
Ramsey							
Slope		X	X	X			
Stutsman		X			X	X	X
Towner							
Williams	X	X		X	X		X

B. Proposed species and/or proposed critical habitat within the action area:

Critical habitat for the piping plover

C. Candidate species within the action area:

None

IV. Station Name, Geographic Area, and Action

A. Stations:

Audubon, Chase Lake, Kellys Slough, Lake Alice, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Shell Lake, Stewart Lake, Stump Lake, and White Lake national wildlife refuges

B. Geographic area:

Twelve national wildlife refuges throughout North Dakota

C. Action:

Issuance and implementation of 12 national wildlife refuge comprehensive conservation plan

V. Location

A. Ecoregion number and name:

The 12 refuges are located within the USFWS Mountain–Prairie Region 6, and specifically in the Hudson Bay and Missouri main stem ecosystems.

B. Counties and state:

See above; within North Dakota

VI. Description of Proposed Action

The National Wildlife Refuge System Improvement Act of 1997 requires the U.S. Fish and Wildlife Service to develop a comprehensive conservation plan by 2012 for each national wildlife refuge. The CCP will guide management of the refuges for the next 15 years.

Eleven of the 12 refuges within the CCP were established under an executive order by President Theodore Roosevelt as a breeding ground for migratory birds and other wildlife. One refuge, Lake Alice National Wildlife Refuge, was established under the authority of the Migratory Bird Conservation Act.

VII. Determination of Effects

A. Explanation of effects of the action on species and critical habitats in items III. A, B, and C:

The CCP process consisted of a series of steps including environmental analysis. Public and partner involvement were encouraged and valued throughout the process. The U. S. Fish and Wildlife Service's planning team developed management alternatives to meet the purposes, vision, and goals of the refuges. Implementation of the CCP will be monitored throughout its 15-year effective period.

All 12 refuges have a primary purpose to provide optimal habitat conditions for the needs of a suite of waterfowl and other migratory birds, native species, and to a lesser extent resident wildlife. To achieve goals and objectives, aggressive wetland and upland habitat management must be conducted. Wetland and upland habitats need to be protected and enhanced through management. Habitat protection needs to be evaluated through a priority system so that different means of protection, either through fee title or easements, can be evaluated.

The species listed in III occur in various numbers and can be observed on the marshes and open water on a number of the refuges described in the CCP. The primary issues related to these species of concern center on: monitoring their populations; monitoring habitat use; identifying, securing, and maintaining essential habitat; and developing habitat conditions in areas that hold potential for these species and that will promote increased recruitment or population protection to secure and increase their populations.

B. Explanation of actions to be implemented to reduce adverse effects:

The actions of the CCP implementation on the 12 refuges are not expected to create adverse effects. The implementation of a more defined management at the refuges may create more suitable habitat for listed species and through monitoring enhance the potential of increasing their populations.

VIII. Effect Determination and Response Requested

A. Listed species/designated critical habitat:

Determination	Response Requested
No effect/no adverse modification	<input type="checkbox"/> Concurrence
May affect, but is not likely to adversely affect species/adversely modify critical habitat	<input checked="" type="checkbox"/> Concurrence
May affect, and is likely to adversely affect species/modify critical habitat	<input type="checkbox"/> Formal Consultation

B. Proposed species/proposed critical habitat:

Determination	Response Requested
---------------	--------------------

No effect on proposed species/no adverse modification of proposed critical habitat (species: none)	<input checked="" type="checkbox"/> Concurrence
--	---

Is likely to jeopardize proposed species or adversely modify proposed critical habitat (species: none)	<input type="checkbox"/> Conference
--	-------------------------------------

John F. Esperance 8/11/08
Date

John Esperance
Supervisory Fish and Wildlife Biologist
Division of Planning
National Wildlife Refuge System
Region 6

IX. Reviewing ESO Evaluation Concurrence Non-Concurrence Formal Consultation Required Conference Required Informal Conference Required

Jeffrey K. Towner 9/26/08
Date

Jeffrey Towner
Field Supervisor
Ecological Services
Bismarck, ND

Appendix E

Environmental Compliance

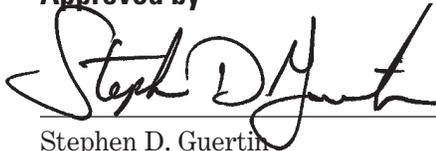
Environmental Action Statement

U.S. Fish and Wildlife Service, Region 6
Lakewood, Colorado

Within the spirit and intent of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record.

I have determined that the action of implementing the "Comprehensive Conservation Plan—North Dakota National Wildlife Refuges" is found not to have significant environmental effects, as determined by the attached "Finding of No Significant Impact" and the environmental assessment as found with the draft comprehensive conservation plan.

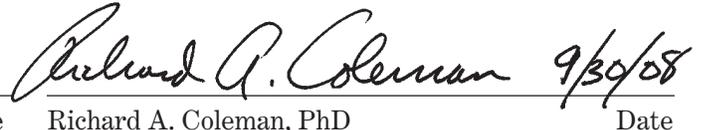
Approved by



Stephen D. Guertin
Regional Director, Region 6
U.S. Fish and Wildlife Service
Lakewood, CO

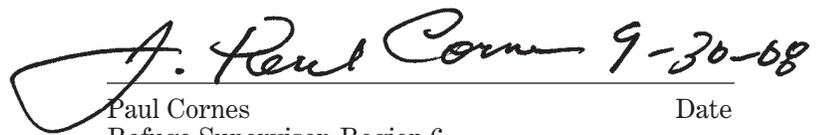
9/30/08
Date

Concurred with by



Richard A. Coleman, PhD
Assistant Regional Director, Region 6
National Wildlife Refuge System
U.S. Fish and Wildlife Service
Lakewood, CO

9/30/08
Date



Paul Cornes
Refuge Supervisor, Region 6
U.S. Fish and Wildlife Service
Lakewood, CO

9-30-08
Date

Submitted by



Kim Hanson
Project Leader
Arrowwood National Wildlife Refuge Complex
(Chase Lake National Wildlife Refuge)
Pingree, ND

9/30/08
Date



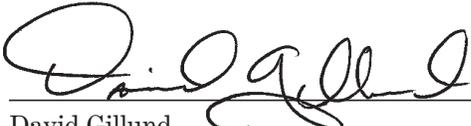
Roger Holleyoet
Project Leader
Devils Lake Wetland Management District Complex
(Kellys Slough, Lake Alice, and Stump Lake
national wildlife refuges)
Devils Lake, ND

9/30/08
Date



Lloyd Jones
Project Leader
Audubon National Wildlife Refuge Complex
(Audubon, Lake Ilo, Lake Nettie, McLean,
Stewart Lake, and White Lake national wildlife
refuges)
Coleharbor, ND

9/30/08
Date



David Gillund
Project Leader
Lostwood Wetland Management District Complex
(Lake Zahl and Shell Lake national wildlife refuges)
Kenmare, ND

9/30/08
Date

Finding of No Significant Impact

U.S. Fish and Wildlife Service, Region 6
Lakewood, Colorado

The U.S. Fish and Wildlife Service assessed three management alternatives for 12 national wildlife refuges (Audubon, Chase Lake, Kellys Slough, Lake Alice, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Shell Lake, Stewart Lake, Stump Lake, and White Lake) in North Dakota as to their effectiveness in achieving the refuges' purposes and their impacts on the human environment.

- **Alternative A, the no-action alternative.** The Service would continue current management.
- **Alternative B, the proposed action.** Wildlife habitat management would enhance wetlands and uplands. The Service would base management objectives for habitat types on the habitat preferences of groups of target species such as waterfowl, migratory shorebirds, grassland birds, and priority species. The Service would set priorities for refuge habitats and would manage high- and medium-priority habitats. Native species would be restored within additional degraded habitats. Invasive species management would be limited to legally listed species and those of ecological concern that occur in high- and medium-priority tracts. Refuge staffs and partners would expand biological surveys and baseline monitoring on high- and medium-priority tracts.

The Service would document and protect cultural resources. Refuge staffs would protect known resources from vandalism, theft, and destruction. The Service would maintain and preserve historical sites.

Educational programs and partner research and inventories would be conducted on a limited basis. Refuge staffs would improve and expand programs for youth and conservation groups. The Service would start or expand environmental education programs for Lake Alice and Kellys Slough national wildlife refuges, and an environmental learning center is planned for Audubon National Wildlife Refuge.

Refuge staffs would develop “friends” groups and expand existing partnerships to address improvement of migratory bird habitat. The refuge staffs would work with local, state, and federal agencies to promote and protect migratory bird habitat within the refuges.

- **Alternative C.** Wildlife habitat management by the refuge staffs would target native prairie and wetland complexes and be more intensive

and widespread. The Service would intensively manage all of the refuges' habitats, with an emphasis on migratory birds. Refuge staffs would do restoration that expands and returns native grasslands to quality native prairie. In addition to waterfowl surveys, the Service would do surveys of other migratory birds and conduct baseline surveys for all of the refuges' habitats. The Service would seek graduate students to do research and monitoring.

The Service would document and protect cultural resources. Refuge staffs would protect known resources from vandalism, theft, and destruction. The Service would maintain and preserve historical sites.

Educational programs and partner research and inventories would be conducted on a limited basis. Refuge staffs would improve and expand programs for youth and conservation groups. The Service would start or expand environmental education programs for Lake Alice and Kellys Slough national wildlife refuges, and an environmental learning center is planned for Audubon National Wildlife Refuge. The Service would develop and expand the level and quality of environmental education and interpretation opportunities to meet a wide range of target audiences. There would be outdoor classroom activities, interpretive exhibits, and displays. The focus on waterfowl and other migratory birds would increase wildlife-viewing opportunities.

The Service would seek new partners to accomplish collaborative programs. Refuge staffs would expand partnerships with universities, develop “friends” groups, and develop partnerships with communities and neighbors to enhance appreciation of and interest in the refuges.

Increased staffs, equipment, and funding would be needed to accomplish the actions in this alternative.

Based on the assessment and comments received, I have selected alternative B as the preferred alternative for implementation.

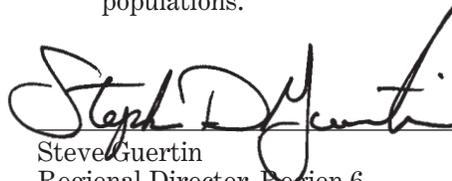
I selected the preferred alternative because it best meets the purposes for which the twelve, previously listed national wildlife refuges in North Dakota were established and is preferable to alternatives A and C in light of physical, biological, economic, and social factors. The preferred alternative will continue to provide public access for wildlife-dependent recreation at refuges that are open to the public.

I find that the preferred alternative is not a major federal action that would significantly affect the quality of the human environment within the meaning of Section 102(2)(C) of the National Environmental Policy Act of 1969. Accordingly, the preparation of an environmental impact statement for the proposed action is not required.

The following is a summary of anticipated environmental effects from implementation of the preferred alternative:

- The preferred alternative will not adversely impact endangered or threatened species or their habitat.
- The preferred alternative will not adversely impact archaeological or historical resources.

- The preferred alternative will not adversely impact wetlands nor does the plan call for structures that could be damaged by or that would significantly influence the movement of floodwater.
- The preferred alternative will not have a disproportionately high or adverse human health or environmental effect on minority or low-income populations.


Steve Guertin
Regional Director, Region 6
U.S. Fish and Wildlife Service
Lakewood, CO


Date

Appendix F

Fire Management Program for National Wildlife Refuges Within the Eastern North Dakota Fire District

The Service has administrative and fire management responsibility for approximately 15,322 acres in fee title in the Chase Lake, Kellys Slough, Lake Alice, Stewart Lake, Stump Lake, and White Lake national wildlife refuges, which are within the Eastern North Dakota Fire District.

The Role of Fire

In ecosystems of the Great Plains, vegetation has evolved under periodic disturbance and defoliation from grazing, fire, drought, and floods. This periodic disturbance is what kept the ecosystem diverse and healthy while maintaining significant biodiversity for thousands of years.

Historically, natural fire and Native American ignitions played an important disturbance role in many ecosystems by removing fuel accumulations, decreasing the impacts of insects and disease, stimulating regeneration, cycling nutrients, and providing a diversity of habitats for plants and wildlife.

When fire or grazing is excluded from prairie landscapes, the fuel loadings increase quickly due to a build-up of thatch and invasion of woody vegetation. This increase in fuel loadings leads to a significant increase in a fire's resistance to control, which threatens firefighter and public safety as well as private and federal properties.

However, properly used fire can

- reduce hazardous fuels buildup in both wildland–urban interface (WUI) and non-WUI environments;

- improve wildlife habitats by reducing the density of vegetation and changing plant species composition;

- sustain or increase biological diversity;

- improve woodland and shrub land by reducing plant density;

- reduce susceptibility of plants to insect and disease outbreaks;

- improve the quality and quantity of livestock forage;

- improve the quantity of water available for municipalities and activities dependent on wetlands for their water supply.

Wildland Fire Management Policy and Guidance

In 2001, the Secretaries of Interior and Agriculture approved an update of the 1995 “Federal Fire Policy.” The 2001 “Federal Wildland Fire Management Policy” directs federal agencies to achieve a balance between fire suppression to protect life, property, and resources and fire use to regulate fuels and maintain healthy ecosystems. In addition, it directs agencies to use the appropriate management response for all wildland fire regardless of the ignition source. This policy provides nine guiding principles that are fundamental to the success of the fire management program:

- Firefighter and public safety is the first priority in every fire management activity.
- The role of wildland fire as an ecological process and natural change agent will be incorporated into the planning process.
- Fire management plans (FMPs), programs, and activities support land and resource management plans and their implementation.
- Sound risk management is a foundation for all fire management activities.
- Fire management programs and activities are economically viable based on values to be protected, costs, and land and resource management objectives.
- FMPs and activities are based on the best available science.
- FMPs and activities incorporate public health and environmental quality consideration.
- Federal, state, tribal, local, interagency, and international coordination and cooperation are essential.
- Standardization of policies and procedures among federal agencies is an ongoing objective.

Land use resource plans such as CCPs should address fire management considerations, guidance, and direction. FMPs are step-down processes from the land use and habitat management plans, with more detail on fire suppression, fire use, and fire management activities.

Management Direction

The Eastern North Dakota Fire District will protect life, property, and other resources from wildland fire by safely suppressing all wildfires. The Service will use prescribed fire as well as manual and mechanical fuel treatments in an ecosystem context to protect federal and private property and for habitat management. The Service will apply fuels reduction activities in collaboration with federal, state, private, and nongovernmental partners. In addition, the Service will set priorities for fuels treatment based on the guidance for prioritization established in the goals and strategies outlined in the “U.S. Fish & Wildlife Service National Wildlife Refuge System Wildland Fire Management Program Strategic Plan 2003–2010” and the “R6 Refuges Regional Priorities FY07–11.”

For WUI treatments, areas with community wildfire protection plans (CWPPs) and communities at risk (CARs) will be the primary focus. The following CARs located near the refuges were identified in the *Federal Register* (August 17, 2001):

- Fort Totten
- St. Michels
- Crow Hill
- Tokio

The development of CWPPs is an ongoing process; Griggs and Traill counties are currently undergoing the process. As of February 2008, the following counties with Service fee-title land have developed CWPPs:

- Barnes County
- Burleigh County
- Kidder County
- Stutsman County

The Service will conduct all aspects of the fire management program in compliance with applicable laws, policies, and regulations. The refuges and wetland management districts within the Eastern North Dakota Fire District will maintain an FMP to accomplish the fire management goals described below. The Service will apply prescribed fire and manual and mechanical fuel treatments in a scientific way under selected weather and environmental conditions.

Fire Management Goals

The goals and strategies of the “U.S. Fish & Wildlife Service National Wildlife Refuge System Wildland Fire Management Program Strategic Plan” are consistent with policies of the U.S. Department of the Interior and the Service, “National Fire Plan” direction, the “President’s Healthy Forest Initiative,” the “10-Year Comprehensive Strategy and Implementation Plan,” guidelines of the National

Wildfire Coordinating Group, initiatives of the Wildland Fire Leadership Council, and “Interagency Standards for Fire and Aviation Operations.”

The “R6 Refuges Regional Priorities FY07–11” are consistent with the refuges’ vision statement for region 6: “To maintain and improve the biological integrity of the region, ensure the ecological condition of the region’s public and private lands are better understood, and endorse sustainable use of habitats that support native wildlife and people’s livelihoods.”

The fire management goals for the refuges and districts in the Eastern North Dakota Fire District are to use prescribed fire and manual and mechanical treatments to (1) reduce the threat to life and property through hazardous fuels reduction treatments, and (2) meet the habitat goals and objectives identified in this CCP.

Fire Management Objective

The objective of the fire management program is to use prescribed fire and manual and mechanical treatment methods to treat between 4,000 and 8,000 acres, on average, per year.

Strategies

The Service will use strategies and tactics that consider public and firefighter safety as well as resource values at risk. Wildland fire suppression, prescribed fire methods, manual and mechanical means, timing, and monitoring are described in more detail within the step-down FMP(s).

All management actions will use prescribed fire and manual or mechanical means to reduce hazardous fuels, restore and maintain desired habitat conditions, control nonnative vegetation, and control the spread of woody vegetation within the diverse ecosystem habitats.

The FMPs will outline the fuels treatment program for the refuges. The Service will develop site-specific prescribed fire burn plans, following the “Interagency Prescribed Fire Planning and Implementation Procedures Reference Guide” (2006) template.

Prescribed fire temporarily reduces air quality by reducing visibility and releasing components through combustion. The refuges will meet the Clean Air Act emission standards by adhering to the “North Dakota State Implementation Plan” requirements during all prescribed fire activities.

Fire Management Organization, Contacts, and Cooperation

Region 6 of the Service, using the approach of fire management districts, will establish qualified fire management technical oversight for the refuges. Under this approach, fire management staff will be determined by established modeling systems

based on the fire management workload of a group of Service lands (such as refuges and waterfowl production areas) and possibly that of interagency partners. The fire management workload consists of historical wildland fire suppression as well as historical and planned fuels treatments.

Dependent on budgets, fire management staff and support equipment may be located at the administrative station or at other locations within the fire management

district and shared between all units. The Service will conduct fire management activities in a coordinated and collaborative manner with federal and nonfederal partners.

A new FMP will be developed for the entire Eastern North Dakota Fire District, which includes the six refuges listed above, as well as the other refuges and districts within this fire district.

Appendix G

Fire Management Program for National Wildlife Refuges Within the Western North Dakota Fire District

The Service has administrative and fire management responsibility for approximately 24,665 acres in fee title in the Audubon, Lake Ilo, Lake Nettie, Lake Zahl, McLean, and Shell Lake national wildlife refuges, which are within the Western North Dakota Fire District. The Service has no fire management responsibility for the approximate 292,440 acres of wetland and grassland easements it administers.

The Role of Fire

In ecosystems of the Great Plains, vegetation has evolved under periodic disturbance and defoliation from grazing, fire, drought, and floods. This periodic disturbance is what kept the ecosystem diverse and healthy while maintaining significant biodiversity for thousands of years.

Historically, natural fire and Native American ignitions played an important disturbance role in many ecosystems by removing fuel accumulations, decreasing the impacts of insects and disease, stimulating regeneration, cycling nutrients, and providing a diversity of habitats for plants and wildlife.

When fire or grazing is excluded from prairie landscapes, the fuel loadings increase quickly due to a build-up of thatch and invasion of woody vegetation. This increase in fuel loadings leads to a significant increase in a fire's resistance to control, which threatens firefighter and public safety as well as private and federal properties.

However, properly used fire can

- reduce hazardous fuels buildup in both WUI and non-WUI environments;
- improve firefighter ability to suppress unwanted wildfire;
- improve native prairie habitats by reducing competition from invasive plant species and maintaining native vegetative composition;
- reduce the encroachment of woody vegetation in prairie ecosystems;
- sustain or increase biological diversity;
- reduce susceptibility of plants to insect and disease outbreaks.

Wildland Fire Management Policy and Guidance

In 2001, the Secretaries of Interior and Agriculture approved an update of the 1995 "Federal Fire Policy." The 2001 "Federal Wildland Fire Management Policy" directs federal agencies to achieve a balance between fire suppression to protect life, property, and resources and fire use to regulate fuels and maintain healthy ecosystems. In addition, it directs agencies to use the appropriate management response for all wildland fire regardless of the ignition source. This policy provides nine guiding principles that are fundamental to the success of the fire management program:

- Firefighter and public safety is the first priority in every fire management activity.
- The role of wildland fire as an ecological process and natural change agent will be incorporated into the planning process.
- FMPs, programs, and activities support land and resource management plans and their implementation.
- Sound risk management is a foundation for all fire management activities.
- Fire management programs and activities are economically viable based on values to be protected, costs, and land and resource management objectives.
- FMPs and activities are based on the best available science.
- FMPs and activities incorporate public health and environmental quality consideration.
- Federal, state, tribal, local, interagency, and international coordination and cooperation are essential.
- Standardization of policies and procedures among federal agencies is an ongoing objective.

Land use resource plans such as CCPs should address fire management considerations, guidance, and direction. FMPs are step-down processes from the land use and habitat management plans, with more detail on fire suppression, fire use, and fire management activities.

Management Direction

The fire management goal for the national wildlife refuges is to use prescribed fire and manual, biological, and mechanical treatments to (1) reduce the threat to life and property through hazardous fuels reduction treatments, and (2) meet the habitat goals and objectives identified in this CCP.

The refuges will protect life, property, and other resources from wildland fire by reducing the threat and severity of wildland fires through fuels reduction projects and safely suppressing all wildfires on Service lands. The Service will use prescribed fire as well as manual, biological, and mechanical fuel treatments to protect federal and private property by reducing hazardous fuels and to manage wildlife habitat. The Service will apply fuels reduction activities in collaboration with federal, state, private, and nongovernmental partners. In addition, the Service will set priorities for fuels treatment based on the guidance for prioritization established in the goals and strategies outlined in the “U.S. Fish & Wildlife Service National Wildlife Refuge System Wildland Fire Management Program Strategic Plan 2003–2010” and the “R6 Refuges Regional Priorities FY07–11.”

For WUI treatments, areas with CWPPs and CARs will be the primary focus. As of February 2008, no CARs as identified in the *Federal Register* are located within the Western North Dakota Fire District. Any additions or deletions to the CAR list are the responsibility of the state through coordination with interagency partners. The development of CWPPs is an ongoing process. As of February 2008, the following counties located within the Western North Dakota Fire District have developed CWPPs:

- Bottineau County
- McHenry County
- Mountrail County
- Williams County

The Service will conduct all aspects of the fire management program in compliance with applicable laws, policies, and regulations. On approval of the final CCP, the Service will develop an FMP for all refuge lands covered by the CCP. The FMP may require a separate EA if refuge managers deem necessary. The FMP may be done as (1) an FMP that covers the national wildlife refuges, (2) an FMP that covers the fire management district, or (3) an interagency FMP.

The Service will apply prescribed fire and manual, biological, and mechanical fuel treatments using the best available scientific guidance, given the existing weather and environmental conditions.

FIRE MANAGEMENT RATIONALE AND CONSIDERATIONS

Fire frequency in western and central North Dakota has been estimated to historically occur every 5–7 years (Barker and Whitman 1988). European settlement of North Dakota led to fire suppression or exclusion across the landscape. With this fire suppression and exclusion, woody vegetation encroached into both wetland and upland habitats.

The long-term goal of fire management across the Western North Dakota Fire District is to apply fire to the landscape at an interval that will maintain healthy native plant communities that are naturally resistant to catastrophic wildfire. Due to the suppression and exclusion of fire over the past several decades, a more aggressive approach is needed to address the buildup of hazardous fuel across the prairie.

Current fire occurrence at the refuges has not been frequent enough to completely control invading shrubs and trees and reduce accumulated thatch. Monitoring of vegetation on Service lands in the Great Plains has shown that three to four prescribed fire treatments are usually needed to successfully reduce woody plant encroachment. Experience has shown prescribed fire to be much more efficient than mechanical or biological methods for reducing and removing woody plant encroachment and accumulated thatch. In addition to initial restoration, continued maintenance through periodic prescribed fires (once every 5–7 years) and biological treatments are needed on remaining areas.

A significant problem facing the refuges in achieving fire management goals is the limited amount of qualified personnel available to plan and conduct prescribed fire and other fuels treatments. With additional staff and funding, the desired application of prescribed fire is to treat 15%–20% of the total burnable acreage with fire each year, which will return the historical fire regime to the landscape.

Prescribed fire temporarily reduces air quality by reducing visibility and releasing components through combustion. The Western North Dakota Fire District will meet the Clean Air Act emission standards by adhering to North Dakota Department of Health requirements during all prescribed fire activities.

The refuge staffs will work with partners to develop demonstrations, written information, and other methods of communicating to the public the benefits of prescribed fire. The Service will seek additional cooperative ventures for firefighter training and development of interagency agreements.

Fire Management Organization and Coordination

Region 6 of the Service, using the approach of fire management districts, will establish qualified fire

management technical oversight for the refuges. Under this approach, fire management staff will be determined by established modeling systems (such as Firebase), based on the fire management workload of a group of Service lands (such as refuges, waterfowl production areas, and fish hatcheries) and possibly that of interagency partners. The fire management workload consists of historical wildland fire suppression as well as historical and planned fuels treatments.

Dependent on budgets, fire management staff and support equipment may be located at the administrative station or at other locations within the fire management district and shared between all units. The Service will conduct fire management activities in a coordinated and collaborative manner with federal and nonfederal partners.



Appendix H

Bird Species of the Refuges

Species	USFWS Endangered Species List	North Dakota Species of Conservation Priority	Rare North Dakota Species	Birds of Conservation Concern				Species of Management Concern in Region 6	Game Birds Below Desired Condition	USFWS Migratory Bird Management Focal Species	PPJV Implementation Plan	PIF North American Landbird Conservation Plan	PIF Physiographic Area (PA) 37 Mixed-grass Prairie Plan	PIF PA 38 West River ES (No Plan)	PIF PA 40 Tall-grass Prairie Plan	North American Waterbird Conservation Plan	Northern Prairie and Parklands Waterbird Plan	U.S. Shorebird Plan, Northern Plains/Prairie Potholes National and Regional Priority	Breeding Bird Survey Declining Species in North Dakota (1980–2005)	Breeding Bird Survey Declining Species in “Black” Prairie (1966–2005)	Breeding Bird Survey Declining Species in Drift Prairie (1966–2005)	Breeding Bird Survey Declining Species in Glaciated Missouri Plate (1966–2005)	Breeding Bird Survey Declining Species in Great Plains Roughlands (1966–2005)	National Audubon Society Watch List for North Dakota	Birds of the Prairie Pothole Region That Warrant Attention
				BCR 11	BCR 17	Region 6	National																		
Citation Number (See end of table. *)	1	2	3	4				5		6	7	8	9	10	11	12	13	14					15	16	
horned grebe		1								m		4				H									
eared grebe																M									
pie-billed grebe												4	5												X
western grebe										m						H									
American white pelican		1														M									
double-crested cormorant							X		X																
American bittern		1		X			X			m		2	7			H									X
great blue heron																M						X			
snowy egret															H										
green heron			S3																						
black-crowned night-heron																M									
white-faced ibis							X								L										
trumpeter swan								X	X					1											
wood duck								X	X					2											
American wigeon								X	X																
mallard								X	X	w															
gadwall										w															
northern pintail		2						X	X	w															
northern shoveler										w															
cinnamon teal			S3																						
blue-winged teal										w								X							
canvasback		2					X	X																	
redhead		2						X																	
lesser scaup								X	X																
ringneck								X																	
common goldeneye			S3																						
hooded merganser			S3											1											
northern harrier		2		X		X	X	X		1		2													X
Swainson’s hawk		1		X		X	X	X		1	1														
ferruginous hawk		1		X	X	X	X		X	1		6													X
golden eagle		2	S3		X	X																			
bald eagle		2	S1				X			1		5	6												
merlin			S2																						
American kestrel																		X							

Species	USFWS Endangered Species List	North Dakota Species of Conservation Priority	Rare North Dakota Species	Birds of Conservation Concern				Species of Management Concern in Region 6	Game Birds Below Desired Condition	USFWS Migratory Bird Management Focal Species	PPJV Implementation Plan	PIF North American Landbird Conservation Plan	PIF Physiographic Area (PA) 37 Mixed-grass Prairie Plan	PIF PA 38 West River ES (No Plan)	PIF PA 40 Tall-grass Prairie Plan	North American Waterbird Conservation Plan	Northern Prairie and Parklands Waterbird Plan	U.S. Shorebird Plan, Northern Plains/Prairie Potholes National and Regional Priority	Breeding Bird Survey Declining Species in North Dakota (1980–2005)	Breeding Bird Survey Declining Species in “Black” Prairie (1966–2005)	Breeding Bird Survey Declining Species in Drift Prairie (1966–2005)	Breeding Bird Survey Declining Species in Glaciated Missouri Plate (1966–2005)	Breeding Bird Survey Declining Species in Great Plains Roughlands (1966–2005)	National Audubon Society Watch List for North Dakota	Birds of the Prairie Pothole Region That Warrant Attention
				BCR 11	BCR 17	Region 6	National																		
Citation Number (See end of table. *)	1	2	3	4				5		6	7	8	9	10	11	12	13	14					15	16	
common snipe																			X						
Wilson’s phalarope		1		X	X	X	X	X		s		2		7			X						X	X	
Bonaparte’s gull															M										
Franklin’s gull		1								m		3		3	M	H								X	
Caspian tern									X							M									
common tern							X		X							M									
least tern	E	2	S1				X	X	X			5			H									X	
black tern		1					X		X	m		4		7		H			X					X	
mourning dove									X																
black-billed cuckoo		1		X	X	X	X	X	X	l		4		1					X	X			X		
short-eared owl		2		X	X	X	X		X	l	l	3												X	
burrowing owl		2		X	X	X	X		X	l		6										X		X	
northern saw-whet owl									X																
red-headed woodpecker		2		X		X	X		X	l	l	3		2				X	X						
yellow-bellied sapsucker									X																
northern flicker										l				4				X	X	X		X			
pileated woodpecker			S3																						
olive-sided flycatcher							X		X		l														
willow flycatcher										l	l	4													
eastern kingbird												4													
western kingbird												4													
loggerhead shrike		2		X		X	X		X	l		6		7										X	
warbling vireo												4													
Philadelphia vireo			S3																						
Bell’s vireo			S3			X	X			l	l	l											X		
American crow								X		l															
horned lark										l								X		X		X			
northern rough-winged swallow																		X							
bank swallow																		X							
house wren										l				5											
sedge wren		2					X		X	l		4		1										X	
marsh wren										l		4		2					X						
veery								X												X					

Species	USFWS Endangered Species List	North Dakota Species of Conservation Priority	Rare North Dakota Species	Birds of Conservation Concern				Species of Management Concern in Region 6	Game Birds Below Desired Condition	USFWS Migratory Bird Management Focal Species	PPJV Implementation Plan	PIF North American Landbird Conservation Plan	PIF Physiographic Area (PA) 37 Mixed-grass Prairie Plan	PIF PA 38 West River ES (No Plan)	PIF PA 40 Tail-grass Prairie Plan	North American Waterbird Conservation Plan	Northern Prairie and Parklands Waterbird Plan	U.S. Shorebird Plan, Northern Plains/Prairie Potholes National and Regional Priority	Breeding Bird Survey Declining Species in North Dakota (1980–2005)	Breeding Bird Survey Declining Species in “Black” Prairie (1966–2005)	Breeding Bird Survey Declining Species in Drift Prairie (1966–2005)	Breeding Bird Survey Declining Species in Glaciated Missouri Plate (1966–2005)	Breeding Bird Survey Declining Species in Great Plains Roughlands (1966–2005)	National Audubon Society Watch List for North Dakota	Birds of the Prairie Pothole Region That Warrant Attention
				BCR 11	BCR 17	Region 6	National																		
Citation Number (See end of table. *)	1	2	3	4				5		6	7	8	9	10	11	12	13	14					15	16	
wood thrush							X		X														X		
Sprague’s pipit		1	S3	X	X	X	X	X	X	1	1	1								X			X	X	
chestnut-sided warbler			S3																						
ovenbird								X																	
dickcissel		2			X	X	X			1	1	3		3				X	X						
American tree sparrow										(1)	1														
clay-colored sparrow										1		4		7										X	
Brewer’s sparrow		3	S3		X	X	X																X		
Baird’s sparrow		1		X	X	X	X	X	X	1	1	1	X					X					X	X	
grasshopper sparrow		1		X	X	X	X	X	X	1	1	2		2				X	X				X	X	
Le Conte’s sparrow		2		X	X	X	X			1		1												X	
Henslow’s sparrow				X			X				1														
Nelson’s sharp-tailed sparrow		1		X		X	X			1	1	1		1									X	X	
vesper sparrow										1		4		5					X				X		
lark bunting		1						X		1	1	3	X					X						X	
Harris’ sparrow							X			(1)	1														
white-throated sparrow			S3																						
swamp sparrow			S3																						
McCown’s longspur		3	S2	X	X	X	X	X		1	1	1	X										X	X	
chestnut-collared longspur		1		X	X	X	X	X	X	1	1	4	X					X		X			X		
Smith’s longspur							X			(1)	1														
Lapland longspur										(1)	1														
western meadowlark										1									X	X					
bobolink		2				X		X	X	1		3		1										X	
brown-headed cowbird																			X	X					
yellow-headed blackbird										1									X						
red-winged blackbird										1															
rusty blackbird									X	(1)	1														
Total Number of Species	5	45	24	29	21	32	41	25	10	45	64	22	44	5	27	5	13	16	10	16	7	2	9	9	28

Species	USFWS Endangered Species List	North Dakota Species of Conservation Priority	Rare North Dakota Species	Birds of Conservation Concern				Species of Management Concern in Region 6	Game Birds Below Desired Condition	USFWS Migratory Bird Management Focal Species	PPJV Implementation Plan	PIF North American Landbird Conservation Plan	PIF Physiographic Area (PA) 37 Mixed-grass Prairie Plan	PIF PA 38 West River ES (No Plan)	PIF PA 40 Tall-grass Prairie Plan	North American Waterbird Conservation Plan	Northern Prairie and Parklands Waterbird Plan	U.S. Shorebird Plan, Northern Plains/Prairie Potholes National and Regional Priority	Breeding Bird Survey Declining Species in North Dakota (1980–2005)	Breeding Bird Survey Declining Species in “Black” Prairie (1966–2005)	Breeding Bird Survey Declining Species in Drift Prairie (1966–2005)	Breeding Bird Survey Declining Species in Glaciated Missouri Plate (1966–2005)	Breeding Bird Survey Declining Species in Great Plains Roughlands (1966–2005)	National Audubon Society Watch List for North Dakota	Birds of the Prairie Pothole Region That Warrant Attention
				BCR 11	BCR 17	Region 6	National																		
Citation Number (See end of table. *)	1	2	3	4				5	6	7	8	9	10	11	12	13	14					15	16		

*Citations

- 1 USFWS Endangered Species List <http://ecos.fws.gov/tess_public/StateListing.do?state=ND&status=listed> E=endangered, T=threatened
- 2 Comprehensive Wildlife Conservation Strategy
Table 1. North Dakota’s 100 Species of Conservation Priority:
Level 1=Species having a high level of conservation priority in North Dakota or across their range, or a high rate of constituting the core of the species’ breeding range, but non-state-wildlife-grant funding is not readily available to them.
Level 2=Species having a moderate level of conservation priority or a high level of conservation priority, but a substantial amount of non-state-wildlife-grant funding is available to them.
Level 3=Species having a moderate level of conservation priority, or a high level of conservation priority, but a substantial amount of non-state-wildlife-grant funding is available to them.
- 3 Rare North Dakota Species (North Dakota Natural Heritage Inventory 2002)
Natural Heritage Global Ranks:
G1=Critically imperiled. Critically imperiled globally because of extreme rarity or because of some factor of its biology making it especially vulnerable to extinction.
G2=Imperiled. Imperiled globally because of rarity or because of other factors demonstrably making it very vulnerable to extinction or elimination throughout its range.
G3=Vulnerable. Vulnerable globally either because it is very rare and local throughout its range, found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extinction or elimination throughout its range.
Natural Heritage State Ranks:
S1=Critically imperiled. Critically imperiled in the state because of extreme rarity or because of some factor of its biology making it especially vulnerable to extirpation from the state.
S2=Imperiled. Imperiled in the state because of rarity or because of other factors making it very vulnerable to extirpation from the state.
S3=Vulnerable. Vulnerable in the state either because it is rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation.
- 4 Birds of Conservation Concern USFWS 2002.
- 5 USFWS Species of Management Concern 2005 <<http://www.fws.gov/migratorybirds/reports/specon/tblconts.html>>
- 6 Prairie Pothole Joint Venture 2005 Implementation Plans
Waterfowl Plan: Focal species=w
Shorebird Plan: Conservation priority of regularly occurring shorebird species where the region is highly important to the population=s
Waterbird Plan: Conservation assessment of high in BCR 11=m
Landbird Plan: Native landbird species for which ≥25% of the continental population occurs in BCR 11 and Watch List=l or (l) for wintering
- 7 PIF North American Landbird Conservation Plan
Part 1, Table 1. PIF Species of Continental Importance for the United States and Canada
Part 2, Table 7. Species of Continental Importance in the Prairie Avifaunal Biome
- 8 PIF Bird Conservation Plan for the Northern Mixed-grass Prairie (Physiographic Area 37)—June 25, 1999
Table 1. Partners in Flight Priority Species
- 9 PIF Bird Conservation Plan for the Northern Tallgrass Prairie (Physiographic Area 40)—August 4, 1998
Table 1. Partners in Flight Priority Species
- 10 PIF West River Executive Summary (Physiographic Area 38) (no plan)
List of priority bird populations
- 11 North American Waterbird Conservation Plan, version 1
Table 2. Conservation Status and Distribution of Colonial Waterbirds
- 12 Northern Prairie and Parklands Waterbird Conservation Plan—2004
Table 7. Conservation Vulnerability Rankings (High [H] and Moderate [M] Concern)
- 13 U.S. Shorebird Plan and Northern Plains/Prairie Potholes Regional Shorebird Plan
Table 2. National and Regional Priority Score ≥4
- 14 USGS North American Breeding Bird Survey Trend Results <<http://www.mbr-pwrc.usgs.gov/bbs/reglist05.html>>
- 15 National Audubon Society Watch List for North Dakota <<http://audubon2.org/webapp/watchlist/viewWatchlist.jsp>>
- 16 Conservation Planning in the Prairie Pothole Region of the United States: Integration Between an Existing Waterfowl Plan and an Emerging Non-game Bird Model (David N. Pashley and Rick Warhurst)
Table 1. Birds of the Prairie Pothole Region That Warrant Conservation Attention

Appendix I

Primary and Secondary Bird Species of the North Dakota Prairie

The characteristic breeding birds are categorized according to relative abundance, as follows:

- Primary species that are often common or abundant.
- Secondary species that are usually fairly common.
- Tertiary, or minor, species that are uncommon or rare.

The primary and secondary bird species in North Dakota are listed by habitat type below.

Mixed-grass Prairie

PRIMARY SPECIES

gadwall
mallard
northern pintail
blue-winged teal
northern shoveler
American coot
black tern
mourning dove
horned lark
western meadowlark
red-winged blackbird
yellow-headed blackbird
brown-headed cowbird
Savannah sparrow
clay-colored sparrow
chestnut-collared longspur

SECONDARY SPECIES

eared grebe
pied-billed grebe
American bittern
black-crowned night-heron
American wigeon
green-winged teal
canvasback
redhead
ruddy duck
Swainson's hawk
red-tailed hawk
northern harrier
sharp-tailed grouse
ring-necked pheasant
gray partridge
sora

killdeer
upland plover
willet
marbled godwit
American avocet
Wilson's phalarope
Franklin's gull
ring-billed gull
black-billed cuckoo
northern flicker
eastern kingbird
western kingbird
willow flycatcher
bank swallow
barn swallow
cliff swallow
common crow
house wren
marsh wren
brown thrasher
gray catbird
American robin
cedar waxwing
yellow warbler
common yellowthroat
house sparrow
bobolink
common grackle
American goldfinch
lark bunting
Baird's sparrow
grasshopper sparrow
vesper sparrow
song sparrow
great horned owl

Tall-grass Prairie

PRIMARY SPECIES

mourning dove
horned lark
common crow
western meadowlark
common grackle
brown-headed cowbird

SECONDARY SPECIES

red-tailed hawk
American kestrel
killdeer

black-billed cuckoo
 great horned owl
 northern flicker
 eastern kingbird
 western kingbird
 barn swallow
 blue jay
 house wren
 brown thrasher
 gray catbird
 American robin
 cedar waxwing
 starling
 warbling vireo
 yellow warbler
 common yellowthroat
 house sparrow
 bobolink
 red-winged blackbird
 Baltimore oriole
 American goldfinch
 dickcissel
 Savannah sparrow
 vesper sparrow
 clay-colored sparrow
 song sparrow

Turtle Mountains

PRIMARY SPECIES

mallard
 blue-winged teal
 broad-winged hawk
 red-tailed hawk
 ruffed grouse
 yellow-bellied sapsucker
 northern flicker
 least flycatcher
 common crow
 American robin
 veery
 red-eyed vireo
 yellow warbler
 American redstart
 red-winged blackbird
 brown-headed cowbird
 Baltimore oriole
 rose-breasted grosbeak
 clay-colored sparrow

SECONDARY SPECIES

common loon
 red-necked grebe

eared grebe
 horned grebe
 pied-billed grebe
 double-crested cormorant
 American bittern
 American wigeon
 green-winged teal
 northern shoveler
 canvasback
 redhead
 ring-necked duck
 ruddy duck
 Cooper's hawk
 northern harrier
 sora
 American coot
 killdeer
 spotted sandpiper
 Wilson's phalarope
 black tern
 mourning dove
 black-billed cuckoo
 great horned owl
 common nighthawk
 belted kingfisher
 ruby-throated hummingbird
 hairy woodpecker
 eastern kingbird
 willow flycatcher
 tree swallow
 purple martin
 barn swallow
 black-capped chickadee
 house wren
 long-billed marsh wren
 short-billed marsh wren
 brown thrasher
 gray catbird
 cedar waxwing
 warbling vireo
 northern waterthrush
 common yellowthroat
 mourning warbler
 bobolink
 western meadowlark
 yellow-headed blackbird
 common grackle
 American goldfinch
 Savannah sparrow
 vesper sparrow
 chipping sparrow
 song sparrow

Appendix J

North Dakota's Threatened and Endangered Species

<i>Group</i>	<i>Common Name</i>	<i>Scientific Name</i>	<i>Status</i>
Plants	western prairie fringed orchid	<i>Platanthera praeclara</i>	threatened
Insects	Dakota skipper	<i>Hesperia dacotae</i>	candidate
Birds	interior least tern	<i>Sterna antillarum</i>	endangered
	whooping crane	<i>Grus americana</i>	endangered
	piping plover	<i>Charadrius melodus</i>	threatened
Fishes	pallid sturgeon	<i>Scaphirhynchus albus</i>	endangered
Mammals	black-footed ferret	<i>Mustela nigripes</i>	endangered
	gray wolf	<i>Canis lupus</i>	endangered

Appendix K

Priority-setting Example for Native Prairie Portions of Fee-title Lands

The following is an example of a refuge-specific step-down plan (from J. Clark Salyer Wetland Management District) for setting priorities for native prairie portions of fee-title lands. The example is based on vegetative data collected by the district staff using the belt-transect method.

(Example) Grassland Objective 1

By 3 years after CCP approval, use current vegetation inventory data and landscape considerations to prioritize each grassland tract with ≥ 55 acres of native prairie as either high or low management priority. Identify areas that are in the most pristine condition and areas with the highest restoration potential.

CRITERIA FOR HIGH-PRIORITY UNITS

Floristic composition: Vegetation is characterized by $>30\%$ mean frequency of pristine, native herbaceous types (plant groups 41–43, and 46–48 (Grant et al. 2004), plus native herbaceous-dominated vegetation with Kentucky bluegrass as the main subdominant (plant group 53).

Floristic potential: Vegetation is characterized by $<30\%$ mean frequency of smooth brome-dominated vegetation (plant groups 61–62).

Landscape context: (1) The unit is contiguous with the best examples of local native prairie habitat; or (2) the unit is adjacent to other high-priority, prairie tracts or tracts of native prairie adjacent to district lands under non-Service ownership (especially important if the unit has relatively little native prairie, that is <40 acres).

CRITERIA FOR LOW-PRIORITY UNITS

Floristic composition: Vegetation is characterized by $<30\%$ mean frequency of pristine, native herbaceous types (plant groups 41–43 and 46–48 (Grant et al. 2004), plus native herbaceous-dominated vegetation with Kentucky bluegrass as the main subdominant (plant group 53).

Floristic potential: Vegetation is characterized by $>30\%$ mean frequency of smooth brome-dominated vegetation (plant groups 61–62).

Landscape context: The unit is small (<100 acres) and/or is not contiguous with significant native prairie habitat.

RATIONALE

Target threshold percentages for determining high-priority units and low-priority units is subjective and based on district lands' grassland intactness or resources. Staff at J. Clark Salyer Wetland Management District used recent inventory data to set threshold percentages for floristic composition and floristic potential. As staff increases, threshold levels could be lowered as more time and resources are dedicated to restoration. Recent inventory data suggest that relatively intact native herbaceous flora is uncommon in the district—about 13% of tracts are dominated by native grasses and forbs. Native warm-season grasses are especially uncommon. Under appropriate management, warm-season grasses can displace introduced cool-season grasses such as smooth brome or Kentucky bluegrass, if the former are sufficiently abundant ($>20\%$ frequency) (Todd Grant, biologist, USFWS, North Dakota, personal communication).

(Example) Grassland Objective 2

On high-priority units, use precisely timed disturbance (principally fire and grazing) to restore or maintain vegetation to the following standards:

- Composition on each unit includes (1) $>75\%$ pristine native and native-dominated/bluegrass-subdominant vegetation (plant groups 41–43, 46–48, and 53), (2) $<30\%$ smooth brome-dominated vegetation (plant groups 61–62), and (3) $<20\%$ low shrub-dominated vegetation (plant groups 11–17) (based on percentage frequency of occurrence on belt transects, per Grant et al. 2004).
- Native trees and tall shrubs are absent or nearly so, comprising $<0.1\%$ land cover on each unit; nonnative or planted vegetation is rare.
- Leafy spurge is decreased by $>50\%$ on each unit, to $<1\%$ frequency (frequencies per belt transects; most high-priority units currently have little to no spurge), absinth wormwood is actively controlled, and yellow toadflax and other newly appearing species of noxious weed that pose a threat to the drift prairie are eliminated within 5 years of initial detection.

STRATEGIES

- Defoliate, typically by livestock grazing or fire, at least 2 of every 3 years. An ideal management sequence over 5 years might be BGGGR (burn, graze, graze, graze, rest), and then reinitiate the sequence. The area covered by trees, tall shrubs, and low shrubs would be incrementally reduced with this burning frequency.
- Primarily use prescribed fire when smooth brome plants are at least in the four- to five-leaf stage, but not yet showing an inflorescence, this generally occurs during a narrow mid-May through early June window (may vary by area). A less preferred option is to burn in fall in anticipation of a negative, winter drought effect on smooth brome and Kentucky bluegrass.
- Graze mainly during May through August or September, via a rotation approach with many (7–10) relatively small grazing cells (for example, 40–60 acres) per unit and short grazing periods (4–7 days per cell). Adjust stocking rates to facilitate regrowth of individual smooth brome plants at least once within a grazing period, but move livestock to the next cell before native plants are regrowth. Season-long grazing may be acceptable when logistics preclude rotational grazing.
- Apply early season, high-intensity grazing that targets brome grass.
- Annually survey for noxious weeds on native prairie tracts.

RATIONALE

This objective focuses on the restoration of floristic composition. Smooth brome, Kentucky bluegrass, and other introduced plants are prevalent in native prairie across North Dakota. Kentucky bluegrass tends to increase under prolonged rest or with grazing, but decreases with fire especially when burning occurs during stem elongation or in dry years. Smooth brome also increases under rest, but (in contrast to Kentucky bluegrass) appears sensitive to repeated grazing but unaffected or variably affected by prescribed fire. A strategy to improve competitive abilities of native herbaceous plants should match the types, timing, and frequencies of disturbances under which these plants evolved. Target threshold percentage goals for the high-priority units are subjective and based on the district's grassland intactness and staff resource levels. The district staff used recent inventory data to set the threshold percentages for floristic composition and floristic potential. It is anticipated these threshold levels are based on grassland intactness specific to J. Clark Salyer Wetland Management District and will not change due to staff or resources.

At the district, smooth-brome-dominated plant groups may be less dominant than Kentucky-bluegrass-dominated plant groups. This may not be true in other

districts in North Dakota. Smooth brome may be less competitive than native plants or Kentucky bluegrass in the relatively poor sandy soils of McHenry and Pierce counties, where the majority of the waterfowl production areas are located within J. Clark Salyer Wetland Management District. Of the two invasive grass species, smooth brome generally seems more difficult to control once established and more significantly alters the quality and structure of native prairie. Therefore, restoration management should focus on strategies to reduce brome.

(Example) Grassland Objective 3

On low-priority prairie units, apply disturbance (principally fire or grazing) every 5–8 years to remove plant litter, restore plant vigor, reverse woody plant expansion, and provide a mix of structural types that include (1) relatively short–sparse vegetation for species such as northern pintail, killdeer, horned lark, and Brewer's blackbird, (2) moderately short vegetation for species such as blue-winged teal and upland sandpiper, and (3) tall–dense vegetation for species such as mallard, short-eared owl, Le Conte's sparrow, and bobolink.

Although varying widely across units, total area (the sum of all units) should have the following characteristics:

- One-fourth of the area in 0- to 1-year postdisturbance, one-fourth in 2–3 years postdisturbance, and one-half in 4–6+ years postdisturbance—corresponding roughly to a structure of <2 inches VOR, 2–3.9 inches VOR, and >3.9 inches VOR (mean VORs in early spring, per Robel et al. 1970).
- Native trees and tall shrubs compose <0.2% land cover on each tract and all nonnative woody vegetation and planted, native woody vegetation is eliminated from at least half of the units.
- Leafy spurge frequency is maintained at <2% frequency, absinth wormwood is actively controlled and yellow toadflax and other newly appearing species of noxious weed that pose a threat to native prairie are eliminated within 5 years of initial detection.

RATIONALE

This objective focuses on providing vegetation structural diversity, emphasizing structure that is moderately short to tall–dense. Given current and projected staff and funding, low-priority native prairie tracts are unlikely to be restored to a state where native herbaceous vegetation is a widely noticeable or otherwise common vegetative component. However, with modest effort, the prevalent, introduced cool-season grasses and scattered low shrub can be managed to provide a mix of postdisturbance structural types attractive to a broad array of waterfowl and other grassland bird species.

These units can provide structural diversity in vegetative height and density, while preserving extensive grasslands used by species of birds that require large undisturbed grassland patches. Effects associated with edge-dominated, highly fragmented grassland are also reduced.

Appendix L

Compatibility Determinations for Wildlife-dependent Recreational Uses, Grazing, Haying, and Farming

Refuge Names

Audubon National Wildlife Refuge
Chase Lake National Wildlife Refuge
Lake Alice National Wildlife Refuge
Lake Ilo National Wildlife Refuge
Lake Nettie National Wildlife Refuge
Lake Zahl National Wildlife Refuge
McLean National Wildlife Refuge
Kellys Slough National Wildlife Refuge
Shell Lake National Wildlife Refuge
Stewart Lake National Wildlife Refuge

Establishing and Acquisition Authorities

- Audubon National Wildlife Refuge (USC 664—Fish and Wildlife Coordination Act)
- Chase Lake National Wildlife Refuge (EO 932)
- Lake Alice National Wildlife Refuge (USC 715d—Migratory Bird Conservation Act)
- Lake Ilo National Wildlife Refuge (EO 8154)
- Lake Nettie National Wildlife Refuge (EO 8155)
- Lake Zahl National Wildlife Refuge (EO 8158)
- McLean National Wildlife Refuge (USC 715d—Migratory Bird Conservation Act)
- Kellys Slough National Wildlife Refuge (EO 8650)
- Shell Lake National Wildlife Refuge (EO 8166)
- Stewart Lake National Wildlife Refuge (EO 8662)

Purposes

“As a refuge and breeding ground for migratory birds and other wildlife.” Executive Orders

“For use as an inviolate sanctuary, or for any other management purpose, for migratory birds.”
USC 715d—Migratory Bird Conservation Act

“Shall be administered by [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon.”
16 USC 664—Fish and Wildlife Coordination Act

National Wildlife Refuge System Mission

The mission of the System 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.

Description of Use: Recreational Hunting

The Service will continue to provide recreational hunting and expand programs at Audubon, Chase Lake, Lake Alice, Lake Nettie, and Lake Zahl national wildlife refuges. These five refuges are open to recreational public hunting in accordance with state seasons and regulations established for each refuge.

Audubon National Wildlife Refuge—The Service will continue to allow recreational hunting of deer, ring-necked pheasant, sharp-tailed grouse, and partridge.

Chase Lake National Wildlife Refuge—The Service will continue to allow recreational hunting of deer.

Lake Alice National Wildlife Refuge—The Service will continue to allow recreational hunting of deer, ring-necked pheasant, sharp-tailed grouse, partridge, and waterfowl.

Lake Nettie National Wildlife Refuge—The Service will continue to allow recreational hunting of deer.

Lake Zahl National Wildlife Refuge—The Service will continue to allow recreational hunting of deer, ring-necked pheasant, sharp-tailed grouse, and partridge.

Availability of Resources

Sufficient resources are available to maintain the existing recreational hunting program. The NDGF helps the refuges with law enforcement coverage.

Anticipated Impacts of Use

During annual reviews of hunting programs, the refuge staffs evaluate what effect the diversion of funding and staff has on their abilities to manage habitat. Because the Service will direct the limited funding and staff

first toward habitat management, there may be a resulting decrease in hunting opportunities or facilities. Restrictions on the timing of seasons and areas open to hunting ensures that hunting activities do not interfere with the purposes of the refuges or attainment of Refuge System objectives.

Temporary disturbance to wildlife will occur near the activity. Hunting will remove animals that are surplus to populations. A temporary decrease in populations of wild animals may help ensure that carrying capacity (especially for big-game species) is not exceeded. There will be no negative effects on threatened and endangered species.

The restriction of vehicle use to designated purposes, times, and established roads, trails, and parking lots will protect habitats from damage and minimizes disturbance to wildlife. Closed areas will provide sanctuary for game and nongame species, minimize conflicts between hunters and other visitors, and provide safety zones around communities and administrative areas.

There will be no negative effects on cultural resources.

Determination

Recreational hunting is a compatible wildlife-dependent recreational use at Audubon, Chase Lake, Lake Alice, Lake Nettie, and Lake Zahl national wildlife refuges.

Stipulations Necessary to Ensure Compatibility

- Require the use of nontoxic shot, in accordance with current regulations for hunting migratory birds and upland game.
- Limit use of motorized vehicles to designated parking areas, access trails, and public roads.
- Prohibit all-terrain vehicles.
- Prohibit camping, overnight use, and fires.
- Require that hunting be conducted in accordance with federal and state regulations.
- Promote sound hunting practices for hunter safety and quality experiences.
- Prohibit collecting, injuring, disturbing, destroying, or harming any animal or plant except legally taken game animals.
- Prohibit search for or disturbance or collection of prehistoric or historic artifacts.
- Require that trash, including shell casings, be packed out so the areas remain clean, natural, and enjoyable.

Justification

The Improvement Act identified hunting at national wildlife refuges as a wildlife-dependent recreational use. Hunting is a legitimate wildlife management tool that can be used to manage populations. Hunting harvests a small percentage of the renewable resources, which is in accordance with wildlife objectives and principles.

Based on the biological impacts anticipated above and in the EA, it is determined that recreational hunting at Audubon, Chase Lake, Lake Alice, Lake Nettie, and Lake Zahl national wildlife refuges will not detract from the purposes for which these refuges were established or their habitat goals and objectives.

There will be no negative effects on cultural resources or threatened and endangered species.

Mandatory 15-year Reevaluation Date: 2023

Description of Use: Recreational Fishing

The Service will continue to provide recreational fishing at designated areas at Lake Audubon and Lake Ilo national wildlife refuges. The primary game fish found at both refuges are northern pike, walleye, and perch. Fishing visitation is dependent on success, which weather cycles influence. Generally, fishing is good during wet cycles and poor during extended dry periods due to the marginal nature of the wetlands and lakes involved (shallow depths and harsh winters subject wetlands of marginal depths to frequent winterkill of fish resources).

Audubon National Wildlife Refuge—The Service permits only ice fishing at the refuge, when ice covers the water. Anglers must remove fish houses from the refuge by March 15; however, anglers can continue to use portable fish houses if they are removed daily. The refuge closes to ice fishing March 31. All vehicles, including snowmobiles and all-terrain vehicles, must stay on public roads and use designated ice access points only. There are six designated points where vehicles may access the ice; ice access points are marked with brown signs.

Lake Ilo National Wildlife Refuge—Portions of Lake Ilo are open to fishing and boating in accordance with state and refuge regulations. The Service allows fishing and wildlife-oriented boating from May 1 through September 30. Signs, marker buoys, and the refuge map designate areas open to fishing and boating. Fishing from the shoreline is open year-round in areas open to public fishing on Lake Ilo. Ice fishing is open from October 1 through March 31. Boat motors are restricted to idle speed only. An accessible fishing pier is located in Lake Ilo Park, and a boat ramp and courtesy dock are available on the north shore. The Lake Ilo dam spillway, emergency spillway, and islands are closed to all public use.

Availability of Resources

Both refuges have adequate administrative and managerial staffs to maintain their fishing programs.

The refuges need annual funding for seasonal workforce salaries and for supplies to maintain fishing facilities (including mowing, painting, repair, litter pickup, restroom cleaning, and periodic pumping of vaulted toilets). In addition, funding is needed for a maintenance

worker's salary and equipment to maintain fishing areas and facilities.

Funding is needed for law enforcement staff salaries, fuel costs, repair and maintenance of patrol vehicles, and associated costs to support the law enforcement program. Routine law enforcement patrols occur year-round. Both refuges also receive assistance from local, state district wardens.

To carry out improvements or expand fishing opportunities, refuge staffs will describe the details in step-down management plans and address these activities through future funding requests.

Anticipated Impacts of Use

Fishing and other human activities cause disturbance to wildlife. Restriction of fishing to designated areas will minimize disturbance to migratory birds and other wildlife. In areas of relatively low use by migratory birds, such as large permanent lakes, fishing programs can provide recreation and have relatively little effect on the refuges' other objectives and programs. There will be no negative effects on cultural resources or threatened and endangered species.

Determination

Recreational fishing is a compatible wildlife-dependent recreational use at Audubon and Lake Ilo national wildlife refuges.

Stipulations Necessary to Ensure Compatibility

- Require that fishing follow state and federal regulations.
- Confine fishing to designated areas.
- Monitor existing use to ensure that facilities are adequate and disturbance to wildlife continues to be minimal.

Justification

The Improvement Act identified fishing at national wildlife refuges as a wildlife-dependent recreational use. Based on the biological impacts anticipated above and in the EA, it is determined that recreational fishing at Audubon and Lake Ilo national wildlife refuges will not detract from the purposes for which these refuges were established or their habitat goals and objectives.

Mandatory 15-year Reevaluation Date: 2023

Description of Use:

Wildlife Observation and Photography

The Service will continue to provide opportunities that support wildlife-dependent recreation at Audubon, Chase Lake, Lake Alice, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Kellys Slough, Shell Lake, and Stewart Lake national wildlife refuges. Auto tour routes, hiking trails, and wildlife observation pullouts facilitate wildlife observation and photography at these refuges. In

addition, the CCP includes placement of portable blinds to improve the viewing access at areas with exceptional wildlife-viewing opportunities.

Availability of Resources

The Service will update existing program aspects, such as refuge signs and brochures, with available resources. Implementation of new facilities will be closely tied to funding requests through the Refuge Operation Needs System and Service Asset Maintenance Management System.

Anticipated Impacts of Use

Wildlife observation and photography can cause disturbance to wildlife; however, restricted access to designated areas will minimize the disturbance to migratory birds and other wildlife. In areas of low use by migratory birds, nonconsumptive recreation can have little effect on the refuges' other objectives and programs. There will be no negative effects on cultural resources or threatened and endangered species.

Determination

Wildlife observation and photography are compatible wildlife-dependent recreational uses at Audubon, Chase Lake, Lake Alice, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Kellys Slough, Shell Lake, and Stewart Lake national wildlife refuges.

Stipulations Necessary to Ensure Compatibility

- Restrict vehicles to designated roads and trails.
- Monitor use, regulate access, and maintain necessary facilities to prevent habitat degradation and minimize wildlife disturbance.

Justification

Wildlife observation and photography are wildlife-dependent recreational uses listed in the Improvement Act. Through these uses, visitors will gain knowledge and an appreciation of fish and wildlife, which will lead to increased public stewardship of wildlife and their habitats. Increased public stewardship will support and complement the Service's actions in achieving the purposes of the refuges and the mission of the Refuge System.

Based on the biological impacts anticipated above and in the EA, it is determined that wildlife observation and photography at the ten refuges listed above will not detract from the purposes for which these refuges were established or their habitat goals and objectives.

Mandatory 15-year Reevaluation date: 2023

Description of Use:

Environmental Education and Interpretation

The Service will continue to provide opportunities for environmental education and interpretation at Audubon, Chase Lake, Lake Alice, Lake Ilo, Lake Nettie, Lake

Zahl, McLean, Kellys Slough, Shell Lake, and Stewart Lake national wildlife refuges. Environmental education consists of activities conducted by refuge staffs, volunteers, and teachers. Interpretation occurs in less formal activities with refuge staffs and volunteers or through exhibits, educational trunks, signs, programs, and brochures. Currently, environmental education and interpretation activities are conducted at refuge offices and off-site locations where activities and programs are presented.

The CCP continues current uses as well as improves environmental education and interpretation for all visitors through the following improvements:

- Conduct visitor services events such as teacher workshops and waterfowl identification on a 3-year rotation among the refuges.
- Develop “friends of the refuge” groups.
- Improve and expand programs for youth and conservation groups on a 3-year rotation among the refuges.
- Conduct limited outreach to wildlife groups, conservation and community groups, and teachers and students.
- Annually conduct media outreach.
- Annually review brochures and publications; complete updates as needed.
- Construct a new administration and learning center for Audubon National Wildlife Refuge.
- Initiate and expand environmental education programs for Kellys Slough and Lake Alice national wildlife refuges.
- Restore public use facilities and construct new kiosks and interpretive panels at Lake Alice National Wildlife Refuge.

Availability of Resources

The Service will update existing program aspects, such as refuge signs and brochures, with available resources. Implementation of new facilities will be closely tied to funding requests through the Refuge Operation Needs System and Service Asset Maintenance Management System.

Anticipated Impacts of Use

Minimal disturbance to wildlife and habitat will result from these uses at the current and CCP levels. Some disturbance to wildlife will occur in areas frequented by visitors. There will be littering and minor damage to vegetation; increased maintenance will be necessary. Location and time limitations placed on environmental education and interpretation activities ensures that these activities have only minor impacts on wildlife and do not detract from the primary purposes of the refuges. There will be no negative effects on cultural resources or threatened and endangered species.

Determination

Environmental education and interpretation are compatible wildlife-dependent recreational uses at Audubon, Chase Lake, Lake Alice, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Kellys Slough, Shell Lake, and Stewart Lake national wildlife refuges.

Stipulations Necessary to Ensure Compatibility

- Allow environmental education and interpretation only in designated areas or under the guidance of refuge personnel, volunteers, or trained teachers to ensure minimal disturbance to wildlife, minimal damage to vegetation, and minimal conflicts between groups.
- Annually review environmental education and interpretation programs to ensure related activities are compatible.

Justification

Environmental education and interpretation are wildlife-dependent recreational uses listed in the Improvement Act. Through environmental education and interpretation, visitors will gain knowledge and an appreciation of fish, wildlife, and their habitats, which will lead to increased public awareness and stewardship of natural resources. Increased appreciation for natural resources will support and complement the Service’s actions in achieving the purposes of the refuge and the mission of the Refuge System.

Based on the biological impacts anticipated above and in the EA, it is determined that environmental education and interpretation the ten refuges listed above will not detract from the purposes for which these refuges were established or their habitat goals and objectives.

Mandatory 15-year Reevaluation date: 2023

Description of Use: Research

The Service will continue to provide opportunities for research at Audubon, Chase Lake, Lake Alice, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Kellys Slough, Shell Lake, and Stewart Lake national wildlife refuges.

The refuges receive periodic requests to conduct scientific research. Some requests are specific to an individual refuge and others are part of landscape-level projects that require authorization from multiple refuges. In addition, the refuges often collaborate with other agencies and private partners to conduct field research and studies that advance the attainment of the refuges’ goals and objectives.

Other than situations that involve emerging threats to human health and safety (which will be addressed in a separate disease contingency plan), priority will

be given to research proposals that support a refuge's purposes, goals, and objectives. This includes, for example, studies that contribute to the enhancement, protection, use, preservation, and management of native wildlife populations and their habitats; studies will include cultural resources. Research applicants will submit proposals that outline the following:

- objectives of the study
- justification for the study
- detailed methodology and schedule
- potential effects on refuge wildlife and habitat, including short- and long-term disturbance, injury, or mortality
- personnel required
- costs to the refuge, if any
- end products such as reports and publications

Refuge staffs, the regional office branch of refuge biology, and others will review research proposals as appropriate. Evaluation criteria include, but are not limited to, the following:

- Research that will contribute to priority management activities has higher priority than other requests.
- The Service may not grant research that will conflict with higher priority research, monitoring, or management.
- The Service will be less likely to approve research projects that can be done off-site.
- The Service will likely not grant research that causes undue disturbance or is intrusive; the Service will weigh the level and type of disturbance when evaluating a request.
- The Service will determine if any effort has been made to minimize disturbance through study design, including considering adjusting location, timing, scope, number of permittees, study methods, and number of study sites.
- The Service may deny a proposal when it is impossible for the refuge staff to monitor researcher activity.
- The Service will consider and agree with the length of the project before approval. Projects will not be open-ended, and the Service will do annual reviews (as a minimum).

As more and more health threats arise (for example, West Nile virus, CWD, and bird flu) research may be essential to prevent, or at least manage, disease outbreaks. Access to researchers and partners may be mandated in order to monitor and assess the prevalence, transmission, control, and specific characteristics of these and other potential threats to human health. In some cases, the refuge staffs may become involved in the research and monitoring. In other cases, other agency personnel may take

the lead to develop and follow standard operating procedures, which will reduce the role of a refuge's staff. However, close coordination will assure that any operation minimizes the impact to trust resources and their habitats.

In general, the Dakota Working Group coordinates proposals that involve multiple refuges. The Service reviews and authorizes proposals with one of the following:

- Letter—if studies are simple, shorter than 1 year, and only require access.
- Special use permit—if studies are more complex, will take longer than 1 year, and have the potential to disturb, stress, or remove vegetation or individuals of a wildlife population.

Refuge staff will coordinate all operations essential to maintenance of human health and safety through an approved disease contingency plan. These threats are an exception to the normal process of authorization of research at refuges.

Availability of Resources

Direct costs to administer research activities are primarily in the form of staff time and transportation. Current staffs will likely be adequate to manage small and short-term research projects. The Service will only accept proposals if funding and personnel are available to adequately monitor all research activities.

Anticipated Impacts of Use

Minimal impact to wildlife and habitats is expected with research studies, because most researchers need to enter areas that are normally closed to the public and may collect samples or handle wildlife. A special use permit will include conditions to ensure that impact to wildlife and habitats are kept to a minimum. There will be no negative effects on cultural resources or threatened and endangered species.

Determination

Research is a compatible use at Audubon, Chase Lake, Lake Alice, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Kellys Slough, Shell Lake, and Stewart Lake national wildlife refuges.

Stipulations Necessary to Ensure Compatibility

- Demonstrate that the research is necessary (critical to survival of a species, enhance restoration activities of native species, help in control of invasive species, or provide valuable information to guide future refuge activities) if proposed research methods will negatively affect refuge resources (habitat or wildlife). The researcher identifies the issues in advance of the effect.
- Do not permit highly intrusive or manipulative research in order to protect native wildlife populations and habitats in which they live.

- Conduct research that does not involve birds outside of the breeding season of bird species in all possible circumstances.
- Suspend or modify conditions or terminate on-refuge research that is permitted and in progress, should unacceptable impacts or issues arise or be noted.

Justification

Research projects will contribute to the enhancement, protection, use, preservation, and management of native wildlife populations and their habitats at the refuges. Because of the potential negative effects that research activities can have on the Service's ability to achieve the refuges' purposes, there will be sufficient restrictions on the researcher to ensure that disturbance is kept to a minimum.

Mandatory 15-year Reevaluation Date: 2023

Description of Use: Prescribed Grazing

The Service will continue to use prescribed grazing at Audubon, Chase Lake, Lake Alice, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Kellys Slough, Shell Lake, and Stewart Lake national wildlife refuges.

Prescribed grazing is the use of livestock, usually cattle, to remove standing vegetation, reduce vegetative litter, suppress woody vegetation or invasive plants, open up vegetation-choked wetlands, and open up areas to sunlight and encourage native grass seeding and growth.

Prescribed grazing is carefully timed and usually of short duration (2–4 weeks) to target certain species for grazing impacts in order to benefit other species for growth after the competing vegetation has been removed. The frequency and duration of prescribed grazing at any refuge will be based on site-specific evaluations of the grassland under management. The prescribed grazing period generally will take place between April and September. Early spring grazing (mid-April through late May) targets cool-season invasive species and encourages warm-season native grasses and forbs. Midseason grazing (June and July), especially on nonnative grasslands, stimulates fall regrowth. Late-season grazing (August and September) removes litter and encourages spring growth of cool-season natives or other cool-season species.

Fence construction and maintenance (often, temporary electric fence) and control and rotation of the livestock are the responsibility of cooperating private party. The regional office determines the market rate grazing fees, but may include standard deductions for fence construction and maintenance, frequent livestock rotations, construction of water gaps, and hauling or providing additional water in dry pastures.

Availability of Resources

Developing grazing plans and special use permits and monitoring compliance and biological effects requires some Service resources. Most grazing management costs—fencing labor, monitoring and moving the livestock, and hauling water—are provided by the cooperators or permittees. Evaluation of the grasslands for grazing prescriptions and grassland response is part of each refuge's grassland management responsibilities.

The Service may use some alternative form of grassland management such as prescribed burning or haying where areas are not treated with prescribed grazing. Management of grasslands through permitted haying has comparable costs to management through a prescribed grazing program. Managed mowing is more expensive since the Service assumes all labor costs. Prescribed fire can be an effective grassland management tool, but there are personnel and weather limitations on a burning program, as well as the fact that some tracts are not suited to use of prescribed fire. In addition, there is an ecological benefit to rotation of grassland management techniques such as grazing, burning, and haying, at different seasons, rather than reliance on one technique.

Anticipated Impacts of the Use

Grazing by domestic livestock has the short-term effect of removing some or much of the standing vegetation from a tract of grassland. Properly prescribed, the effect of this vegetation removal increases the vigor of the grassland, stimulates growth of desired species of grass and forbs, and reduces the abundance of targeted species such as cool-season invasive plants, noxious weeds and other invasive plants, woody species, and cattails.

Grazing in the spring may cause the loss of some bird nests due to trampling, and may cause some birds not to nest in grazed areas. Prescribed grazing is usually of short duration with the result of enhanced, more diverse, and vigorous grassland habitats. Grazing livestock may create a minor and temporary disturbance to wildlife, but generally does no harm.

Grazing on public wildlife lands can create an aesthetic issue of concern for some people, including visitors, who do not understand grassland management. There is a slight potential for conflict between the visiting public and the livestock or the permittee, particularly during fall hunting seasons. These situations can be limited by having livestock removed by the anticipated beginning of fall hunting seasons.

To eliminate any appearance of favoritism or impropriety, managers follow "Refuge Manual" procedures for cooperator or permittee selection.

There will be no negative effects on cultural resources or threatened and endangered species.

Determination

The use of prescribed grazing is compatible at Audubon, Chase Lake, Lake Alice, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Kellys Slough, Shell Lake, and Stewart Lake national wildlife refuges.

Stipulations Necessary to Ensure Compatibility

- Monitor vegetation and wildlife to assess the effects of the management tool.
- Require general and special conditions for each permit to ensure consistency with management objectives.
- Restrict the use of vehicles and motorized equipment to the minimum necessary to conduct operations to meet management objectives.

Justification

Upland and wetland habitat conditions will deteriorate without the use of a full range of management tools. Migratory bird habitat and ecological diversity will decrease as habitat suitability declined. Invasive plant species will increase and habitat diversity will decrease if grazing practices did not continue at the refuges. To maintain and enhance habitat for migratory birds and other wildlife, habitat manipulation such as grazing needs to occur. Grazing will provide a means to restore degraded grasslands for the benefit of grassland-dependent species.

Mandatory 10-year Reevaluation Date: 2018

Description of Use: Prescribed Haying of Grasslands

The Service will continue to use prescribed haying of grasslands at Audubon, Chase Lake, Lake Alice, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Kellys Slough, Shell Lake, and Stewart Lake national wildlife refuges.

Haying is the cutting and removal, by baling and transport to an off-site location, of grass or other upland vegetation for the production of livestock forage. Haying for this purpose is typically done by a cooperating farmer acting under authority of a cooperative farming agreement or special use permit issued by the project leader or refuge manager. Prescribed haying in North Dakota averaged about 13,500 acres per year from 1996 to 2000.

Haying is an effective management tool as part of an overall grassland management plan to improve and maintain Service-managed grasslands for the benefit of migratory birds and other wildlife. Grasslands require periodic renovation to maintain vigor, diversity, and the structure necessary for migratory bird nesting. Haying can be an alternative to prescribed burning or grazing, which are the two other methods used to manage grassland habitats. If local conditions preclude

the use of prescribed fire or livestock numbers are not available, removal of biomass through haying reduces unwanted overstory, including woody plants, and opens up the soil surface to sunlight. Such removal of vegetation allows for more vigorous regrowth of desirable species following the haying, although results are neither as dramatic nor positive as with fire or grazing.

Haying can be part of a strategy to seed native grass on newly acquired lands or on tame grass stands that need restoration. To reduce competition from invasive plants and minimize herbicide applications, the Service may use a cooperating farmer to apply the native grass seed mix and “interseed” with a cover crop. As a requirement of the special use permit, the Service will require the cooperator to cut, bale, and remove the cover crop before it matures and goes to seed. The resultant hay will be used for livestock feed. In addition, haying serves the biological purpose of releasing young native grass and forb seedlings for growth with minimal competition.

A third possible use of haying on Service-managed grasslands involves the initial steps of removing unwanted vegetation prior to seeding the tract to native grasses. Haying of a nonnative cool-season stand of grass is an effective step before spraying the field with herbicide to kill all existing vegetation. Removal of the heavy grass overstory by haying allows herbicide to more effectively reach and treat the remaining target plants. Better removal of unwanted grasses, in turn, will ensure better success of planted grasses and forbs whether they are “interseeded” into the sod or into the soil turned and leveled prior to seeding.

Haying is sometimes used prior to treatment of invasive plants: the tract is hayed and after a period, the flush of invasive plants is treated with an herbicide application. Removal of vegetation through haying allows the herbicide to more effectively reach and treat the target plants.

A more limited application of haying on Service-managed lands involves its use to establish firebreaks for prescribed burns. The Service will permit a cooperating farmer to hay firebreak strips in the fall. Those areas will then have little standing dead vegetation in early spring, or will green up earlier in the spring, and allow use as a firebreak.

Availability of Resources

Funding and staff resources are sufficient at each field station to administer prescribed haying. Staff time will be needed to evaluate the use, prepare site-specific special use permits, and ensure compliance with the permit authorization and stipulations necessary to ensure compatibility. To lessen any appearance of favoritism or impropriety, managers follow “Refuge Manual” procedures for establishing rental rates and cooperator selection.

Anticipated Impacts of the Use

Haying will result in short-term disturbances to wildlife and long-term benefits to grasslands and the wildlife species that use these grasslands. Short-term impacts include disturbance and displacement of wildlife typical of any noisy heavy-equipment operation. Cutting and removal of standing grass will result in the short-term loss (late summer to midsummer the following year) of habitat for those species requiring taller grass for feeding and perching. The Service will typically schedule prescribed haying after July 31 to avoid impacts to most nesting birds. Long-term benefits will accrue due to the increased vigor of regrown grasses or the establishment of highly desirable native grass and forb species, which will improve habitat conditions for the same species affected by the short-term removal of cover.

Long-term negative effects may occur to some resident wildlife species such as pheasant, which may lose overwinter habitat in hayed areas. Strict time constraints and limiting grass stands to no more than 50% being hayed at any one time will limit the anticipated effects on these species.

There will be no negative effects on cultural resources or threatened and endangered species.

Determination

The use of prescribed haying is compatible at Audubon, Chase Lake, Lake Alice, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Kellys Slough, Shell Lake, and Stewart Lake national wildlife refuges.

Stipulations Necessary to Ensure Compatibility

- Schedule prescribed haying to occur after July 31 in any given year, unless there are documented management reasons for prescribing an earlier hay date.
- Issue the permit subject to the revocation and appeals procedure contained in Title 50, Part 25 of the *Code of Federal Regulations*.
- Allow haying on no more than 50% of a tract in any one year, unless size restrictions or habitat conditions warrant haying more than half of the area.
- Couple prescribed haying with a light disking or dragging operation or an “interseeding” of desirable species of grass or legumes to further increase the vigor of the grass stand.
- Require removal of bales or stacks by September 10.

Justification

Upland habitat conditions will deteriorate without the use of a full range of management tools. Migratory bird habitat and ecological diversity will decrease as habitat suitability declines. Invasive plant species will increase and habitat diversity will decrease if haying

practices do not continue at the refuges. To maintain and enhance the habitat for migratory birds and other wildlife, habitat manipulation such as haying needs to occur. Haying will provide a means to restore degraded grasslands for the benefit of grassland-dependent species.

Mandatory 10-year Reevaluation Date: 2018

Description of Use: Cooperative Farming

The Service will continue to use cooperative farming at Audubon, Chase Lake, Lake Alice, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Kellys Slough, Shell Lake, and Stewart Lake national wildlife refuges.

Cooperative farming is the term used for cropping activities done by a third party on lands that the Service owns in fee title or controls through a conservation easement. This activity is usually done on a short-term basis (3–4 years or less) to provide an optimal seedbed for establishment of native grasses and forbs or other desirable planted cover for wildlife. Cooperative farming on certain tracts can provide a fall food source for migratory waterfowl or a winter food source for resident wildlife. A farmer acts under authority of a cooperative farming agreement or special use permit issued by the project leader or refuge manager. Terms of the agreement ensure that the farmer follows all current Service and refuge restrictions. North Dakota refuges and waterfowl production areas permitted an average of 6,400 acres of cooperative farming during 1996–2000.

Cooperative farming activities are generally limited to areas of former cropland or poor quality stands of tame or cool-season invasive grasses. Service policies do not allow tilling or cropping of highly erodible soils without an approved NRCS conservation plan.

Generally, farmed areas (before reseeding to more desirable plant species) will not cover more than 50% of the tract. Areas at the refuges that are planted for food plots will be limited to the size needed to provide sufficient food for the targeted wildlife species.

Availability of Resources

Staff time is available for development and administration of cooperative farming agreements. Most of the needed fieldwork to prepare and plan for this use will be done as part of routine grassland management duties. The decision to use a cooperating farmer will be part of the overall strategy for managing lands within a refuge. The additional time needed to coordinate issuance of the special use permit or cooperative farming agreement and oversight of the permit or agreement is relatively minor and within the refuges' resources. In addition, the use of a cooperating farmer will free up Service employees who would otherwise have to conduct the farming operation.

In most cases, farmers conduct cooperative farming operations on Service lands on a share basis rather than for a fee. The Service typically receives its share as (1) harvested grain used for other management purposes such as standing grain left for wildlife food, (2) additional work such as control of invasive plants, cultivation, or additional seedbed preparation, or (3) supplies such as herbicide or grass seed to be used on the same tract of land. The Service deposits any fees or cash income related to the farming into the Refuge Revenue Sharing Account. The Service receives fair-market value consideration from cooperating farmers, but the generation of income is a secondary consideration when developing the terms and conditions of a special use permit or cooperative farming agreement. To lessen any appearance of favoritism or impropriety, managers follow “Refuge Manual” procedures for establishing rental rates and cooperator selection.

Anticipated Impacts of the Use

Cooperative farming to prepare suitable seedbeds for planting better cover and habitat will result in short-term disturbances and long-term benefits to both resident and migratory wildlife using the refuges. Short-term effects include disturbance and displacement of wildlife typical of any noisy heavy-equipment operation, and the loss of poor quality cover while the tract is farmed. Wildlife may use farmed areas as additional food sources during the farming period.

There will be long-term benefits due to the establishment of diverse or more desirable habitat for nesting, escape cover, perching, or noncrop feeding activities. The resulting habitat will generally improve conditions for most of the species negatively affected by the short period of farming activity.

There will be no negative effects on cultural resources or threatened and endangered species.

Determination

The use of cooperative farming is compatible at Audubon, Chase Lake, Lake Alice, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Kellys Slough, Shell Lake, and Stewart Lake national wildlife refuges.

Stipulations Necessary to Ensure Compatibility

- Monitor vegetation and wildlife to assess the effects of the management tool.
- Require general and special conditions for each permit to ensure consistency with management objectives.
- Restrict the use of vehicles and motorized equipment to the minimum necessary to conduct operations to meet management objectives.
- Restrict farming permittees to use of approved chemicals that are less detrimental to wildlife and the environment.

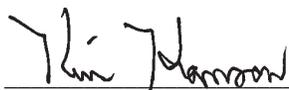
Justification

Habitat conditions will deteriorate without the use of a full range of management tools. Migratory bird habitat and ecological diversity would decrease as habitat suitability declined. Invasive plant species would increase and habitat diversity would decrease if farming practices did not continue at the refuges. To maintain and enhance habitat for migratory birds and other wildlife, habitat manipulation such as farming needs to occur.

Mandatory 10-year Reevaluation Date: 2018

Signatures

Reviewed



9/30/08



9-30-08

Kim Hanson
Project Leader
Arrowwood National Wildlife Refuge Complex
(Chase Lake National Wildlife Refuge)

Date

Paul Cornes
Refuge Supervisor
Region 6, National Wildlife Refuge System

Date

Approved



9/30/08



9/30/08

Lloyd Jones
Project Leader
Audubon National Wildlife Refuge Complex
(Audubon, Lake Ilo, Lake Nettie, McLean, and
Stewart Lake national wildlife refuges)

Date

Richard A. Coleman, PhD
Assistant Regional Director
Region 6, National Wildlife Refuge System

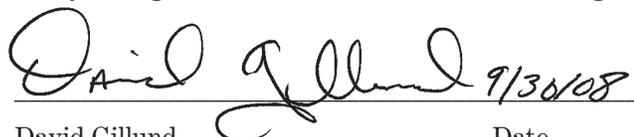
Date



9/30/08

Roger Holivoet
Project Leader
Devils Lake Wetland Management District Complex
(Kellys Slough and Lake Alice national wildlife refuges)

Date



9/30/08

David Gillund
Project Leader
Lostwood Wetland Management District Complex
(Lake Zahl and Shell Lake national wildlife refuges)

Date

Bibliography

- Adamus P.R. 1996. Bioindicators for assessing ecological integrity of prairie wetlands. EPA/600/R-96/082. Corvallis, OR: U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Western Ecology Division. [Pages unknown.]
- Anderson, R.C. 1990. The historic role of fire in the North American grassland. In: Collins, S.L.; Wallace, L.L.; editors. Fire in North American tallgrass prairies. Norman, OK: University of Oklahoma Press. 8–18.
- Austin, J.E. 1998. Highlight box: waterfowl in the Prairie Pothole Region. In: Mac, M.J.; Opler, P.A.; Puckett Haecker, C.E.; Doran, P.D.; editors. Status and trends of the nation's biological resources, vol. 2. [Internet]. Version 21JAN2000. Jamestown, ND: Northern Prairie Wildlife Research Center online. <<http://www.npwrc.usgs.gov/resource/2000/grlands/grlands.htm>> 456–7.
- Baer, N.W. 1989. Shelterbelts and windbreaks in the Great Plains. *Journal of Forestry* 87:32–6.
- Bakker, K.K. 2003. A synthesis of the effect of woody vegetation on grassland-nesting birds. In: Proceedings of the South Dakota Academy of Science; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 119–41.
- Bakker, K.K.; Naugle, D.E.; Higgins, K.F. 2002. Incorporating landscape attributes into models for migratory grassland bird conservation. *Conservation Biology* 16:1638–46.
- Balsler, D.S.; Dil, H.H.; Nelson, H.K. 1968. Effect of predator reduction on waterfowl nesting success. *Journal of Wildlife Management* 32:669–82.
- Bartonek, J.C. 1968. Summer foods and feeding habits of diving ducks in Manitoba [PhD dissertation]. Madison, WI: University of Wisconsin–Madison. [Pages unknown].
- Bartonek, J.C. 1972. Summer foods of American wigeon, mallards, and a green-winged teal near Great Slave Lake, N.W.T. *Canadian Field-Naturalist* 86:373–6.
- Batt, B.D.; Anderson, M.G.; Anderson, C.D.; Caswell, F.D. 1989. The use of prairie potholes by North American ducks. In: van der Valk, A.; editor. Northern prairie wetlands. Ames, IA: Iowa State University Press. 204–27.
- Beauchamp, W.D.; Koford, R.R.; Nudds, T.D. [et al.] 1996. Long-term declines in nest success of prairie ducks. *Journal of Wildlife Management* 60:247–57.
- Bedunah, D.J. 1992. The complex ecology of weeds, grazing, and wildlife. *Western Wildlands* 18:6–11.
- Berkey, G.; Crawford, R.; Galipeau, S.; Johnson, D.H. [et al.] 1993. A review of wildlife management practices in North Dakota [unpublished report]. On file at U.S. Fish and Wildlife Service, Lakewood, CO. 51 p.
- Blumenthal, D.M.; Jordan, N.R.; Svenson, E.L. 2003. Weed control as a rationale for restoration: the example of tallgrass prairie. *Conservation Ecology* 7(1):6.
- Borthwick, S.M. 1988. Impacts of agricultural pesticides on aquatic invertebrates inhabiting prairie wetlands [master's thesis]. Fort Collins, CO: Colorado State University. [Pages unknown].
- Bragg, T.B. 1982. Seasonal variations in fuel and fuel consumption by fires in a bluestem prairie. *Ecology* 63(10):7–11.
- Bragg, T.B. 1995. The physical environment of Great Plains grasslands. In: Keeler, K.; Joern, A.; editors. The changing prairie. New York: Oxford University Press. 49–81.
- Bragg, T.B.; Steuter, A.A. 1996. Prairie ecology—the mixed prairie. In: Samson, F.B.; Knopf, F.L.; editors. Prairie Conservation. Washington DC: Island Press. 53–65.
- Bryce, S.A.; Omernik, J.M.; Pater, D.A. [et al.] 1996. Ecoregions of North Dakota and South Dakota [color poster with map, descriptive text, summary tables, and photographs]. Reston, VA: U.S. Geological Survey. [Map scale 1:1,500,000].
- Burger, L.D.; Burger, L.W., Jr.; Faaborg, J. 1994. Effects of prairie fragmentation on predation on artificial nests. *Journal of Wildlife Management* 58:249–54.
- Carpinellil, M.F. 2001. Designing weed-resistant plant communities by maximizing niche occupation and resource capture [PhD dissertation]. Bozeman, MT: Montana State University. [Pages unknown].
- Caudill, James; Henderson, Eric. 2005. Banking on nature 2004: the economic benefits to local communities of national wildlife refuge visitation. [Location of publisher unknown]: U.S. Fish and Wildlife Service, division of economics. [Pages unknown].
- Charnov, E.L. 1976. Optimal foraging, the marginal value theorem. *Theoretical Population Biology* 9:129–36.

- Conner, R.; Seidl, A.; VanTassell, L.; Wilkins, N. 2001. U.S. grasslands and related resources: an economic and biological trends assessment. Texas Cooperative Extension Reports and Publications. [Location of publisher unknown]: [Publisher unknown]. 153 p.
- Cook, H.H.; Powers, C.F. 1958. Early biochemical changes in the soils and waters of artificially created marshes in New York. *New York Game and Fish Journal* 5:9–65.
- Dahl, T.E. 1990. Wetland losses in the United States 1780s to 1980s. Washington DC: U.S. Department of the Interior, Fish and Wildlife Service. 13 p.
- Dai, X.; Boutton, T.W.; Hailemichael, M. [et al.] 2006. Soil carbon and nitrogen storage in response to fire in a temperate mixed-grass savanna. *Journal of Environmental Quality* 35:1620–8.
- Daubenmire R. 1959. A canopy-coverage method of vegetational analysis. *Northwest Science* 33:43–64.
- Davis, S.; Brigham, R.M.; Shaffer, T.L.; James, P.C. 2006. Mixed-grass prairie passerines exhibit weak and variable responses to patch size. *The Auk* 123(3):807–21.
- Dion, N.; Hobson, K.A.; Lariviere, S. 2000. Interactive effects of vegetation and predators on the success of natural and simulated nests of grassland songbirds. *The Condor* 102:629–34.
- Dixon, C.; Hollevoet, R. 2005. Ground-nesting bird management on cropland dominated landscapes within the prairie pothole region of North and South Dakota: a step-down plan from the Prairie Pothole Joint Venture [unpublished report]. [Location where on file unknown]. U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].
- Domek, Tom. 1998. Last call for tallgrass in North Dakota. [Internet]. Version 02OCT1998. Jamestown, ND: Northern Prairie Wildlife Research Center online. <<http://www.npwrc.usgs.gov/resource/plants/tallgras/lastcall.htm>> *North Dakota Outdoors* 60(10):14–19.
- Dornfeld, R. 1988. Wetland restoration; a mid-continent waterfowl management project final activity report. Twin Cities, MN: U.S. Department of the Interior, Fish and Wildlife Service. 36 p.
- Duebbert, H.F.; Frank, A.M. 1984. Value of prairie wetlands to duck broods. *Wildlife Society Bulletin* 12:27–34.
- Duebbert, H.F.; Jacobson, E.T.; Higgins, K.F.; Podoll, E.B. 1981. Establishment of seeded grasslands for wildlife habitat in the prairie pothole region. Special Scientific Report—Wildlife No. 234. Washington DC: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].
- Duebbert, H.F.; Lokemoen, J.T. 1980. High duck nesting success in a predator-reduced environment. *Journal of Wildlife Management* 44:428–37.
- Espie, R.H.M.; Brigham, R.M.; James, Paul C. 1996. Habitat selection and clutch fate of piping plovers (*Charadrius melodus*) breeding at Lake Diefenbaker, Saskatchewan. *Canadian Journal of Zoology* 74:1069–75.
- Estey, Mike. 2007. [Title of unpublished report unknown]. [Location where on file unknown]. U.S. Department of the Interior, Fish and Wildlife Service, Habitat and Population Evaluation Team. [Pages unknown].
- Euliss, N.H., Jr.; LaBaugh, J.W.; Fredrickson, L.H. [et al.] 2004. The wetland continuum: a conceptual framework for interpreting biological studies. *Wetlands* 24:448–58.
- Euliss, N.H., Jr.; Wrubleski, D.A.; Mushet, D.M. 1999. Wetlands of the prairie pothole region: invertebrate species composition, ecology, and management. In: Batzer, D.; Rader, R.B.; Wissinger, S.A.; editors. *Invertebrates in freshwater wetlands of North America—ecology and management*. New York: John Wiley and Sons. 471–514.
- Flannery, T. 2001. The eternal frontier. [Location of publisher unknown]: Atlantic Monthly Press. [Pages unknown].
- Fredrickson, L.H. 1991. Strategies for water level manipulations in moist-soil systems. U.S. Fish and Wildlife Service, Waterfowl Management Handbook, Fish and Wildlife Leaflet 13.4.6. Washington DC: U.S. Department of the Interior, Fish and Wildlife Service.
- Friend M.; Franson, J.C. 1999. Field manual of wildlife diseases, general field procedures and diseases of birds. U.S. Department of the Interior, Geological Survey, Information and Technology Report 1999-001. [Pages unknown].
- Garrettson, P.R.; Rohwer, F.C. 2001. Effects of mammalian predator removal on production of upland-nesting ducks in North Dakota. *Journal of Wildlife Management* 65:398–405.
- Garrettson, P.R.; Rohwer, F.C.; Zimmer, J.M. [et al.] 1996. Effects of mammalian predator removal on waterfowl and non-game birds in North Dakota. In: Transactions of the North American Wildlife and Natural Resources Conference; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 61:94–101.
- Gazda, R.J.; Meidinger, R.R.; Ball, I.J.; Connelly, J.W. 2002. Relationships between Russian olive and duck nest success in southeastern Idaho. *Wildlife Society Bulletin* 30:337–44.
- Grant, T.A.; Madden, E.; Berkey, G.B. 2004. Tree and shrub invasion in northern mixed-grass prairie: implications for breeding grassland birds. *Wildlife Society Bulletin* 32:807–18.
- Greenwood, R.J.; Sargeant, A.B.; Johnson, D.H. [et al.] 1995. Factors associated with duck nest success in the Prairie Pothole Region of Canada. *Wildlife Monograph* 128. [Pages unknown].
- Greenwood, R.J.; Sargeant, A.B.; Piehl, J.L. [et al.] 1999. Foods and foraging of prairie striped skunks

- during the avian nesting season. *Wildlife Society Bulletin* 27:823–32.
- Greenwood, R.J.; Sovada, M.A. 1996. Prairie duck populations and predation management. In: *Transactions of the North American Wildlife and Natural Resources Conference*; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 61:31–42.
- Grondahl, C.; Evelsizer, A. 2002. Prairie wildflowers and grasses of North Dakota. Jamestown, ND: North Dakota Game and Fish Department—Bismarck, ND.
- Grue, C.E.; Tome, M.W.; Messmer, T.A. [et al.] 1989. Agricultural chemicals and prairie pothole wetlands: meeting the needs of the resource and the farmer—U.S. perspective. In: *Transactions of the North American Wildlife and Natural Resources Conference*; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 54:43–58.
- Guo, Q.; Shaffer, T. 2006. Community maturity, species saturation and the variant diversity–productivity relationships in grasslands. *Ecology Letters* 9:1–9.
- Haig, S.M.; Plissner, J.H. 1993. Population status of the threatened/endangered piping plover in 1991. In: Higgins, K.F.; Brashier, M.R.; editors. *Proceedings, the Missouri River and its tributaries: piping plover and least tern symposium*; [Date of symposium unknown]; Brookings, SD. Brookings, SD: South Dakota State University. 32–5.
- Hanowski, J.M.; Christian, D.P.; Niemi, G.J. 2000. Landscape requirements of prairie sharp-tailed grouse *Tympanuchus phasianellus campestris* in Minnesota, USA. *Wildlife Biology* 6:257–63.
- Helmets, D.L. 1993. *Shorebird management manual*. Manomet, MA: Western Hemisphere Shorebird Reserve Network. [Pages unknown].
- Helmets, D.L.; Gratto-Trevor, C.L. 1996. Effects of predation on migratory shorebird recruitment. In: *Transactions of the North American Wildlife and Natural Resources Conference*; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 61:50–61.
- Herkert, J.R. 1994. The effects of habitat fragmentation on Midwestern grassland bird communities. *Ecological Applications* 4:461–71.
- Herkert, J.R. 1995. An analysis of Midwestern breeding bird population trends: 1966–1993. *American Midland Naturalist* 134:41–50.
- Higgins, K.F. 1986. Interpretation and compendium of historical fire accounts in the northern Great Plains. Resource Publication 161. Washington DC: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].
- Higgins, K.F.; Barker, W.T. 1982. Changes in vegetation structure in seeded nesting cover in the prairie pothole region. U.S. Fish and Wildlife Service Special Science Report—Wildlife 242. Washington DC: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].
- Hoff, M.J. 1999. Predator trapping on township-sized blocks: does duck nesting success increase? [master's thesis]. Baton Rouge: Louisiana State University. [Pages unknown].
- Howell, E.A. 1988. The role of restoration in conservation biology. *Endangered Species* 5:1–4.
- Hutchinson, M. 1992. Vegetation management guideline: Canada thistle (*Cirsium arvense* [L.] Scop.). *Natural Areas Journal* 12:160–1.
- Igl, L.D.; Johnson, D.H. 1995. Migratory bird population changes in North Dakota. In: LaRoe, E.T.; Farris, G.S.; Puckett, C.E. [et al.]; editors. *Our living resources*. [Location of publisher unknown]: U.S. Department of the Interior. 298–300.
- Info Please. 2007. North Dakota almanac. [Internet]. <<http://www.infoplease.com/ipa/A0108256.html>> [access date unknown].
- Jensen, Ray E. [No date]. Climate of North Dakota. [Internet]. Version 02APR98. Fargo, ND: National Weather Service, North Dakota State University. Jamestown, ND: Northern Prairie Wildlife Research Center online. <<http://www.npwrc.usgs.gov/resource/habitat/climate/index.htm>>
- Johnson, D.H.; Igl, L.D. 2001. Area requirements of grassland birds: a regional perspective. *Auk* 118:24–34.
- Johnson, Douglas H. 2006a. Terrestrial bird communities on the Woodworth study area. [Internet]. Revised August 3, 2006. Jamestown, ND: Northern Prairie Wildlife Research Center online. <<http://www.npwrc.usgs.gov/resource/habitat/woodwort/johnson.htm>>
- Johnson, Douglas H. 2006b. Conservation Reserve Program (CRP) grassland bird use of conservation reserve program fields in the Great Plains. In: *Farm Bill Contributions to Wildlife Conservation*. [Internet]. Wildlife Habitat Management Institute online. <<ftp://ftp-fc.sc.egov.usda.gov/WHMI/WEB/CompRev/Johnson19-34.pdf>> 19–33.
- Johnson, Douglas H.; Haseltin, Susan S.D.; Cowardin, Lewis M. 1994. Wildlife habitat management on the northern prairie landscape. [Internet]. Version 30APR2001. Jamestown, ND: Northern Prairie Wildlife Research Center online. <<http://www.npwrc.usgs.gov/resource/habitat/whabmgt/index.htm>> *Landscape and Urban Planning* 28:5–21.
- Johnson, Douglas H.; Igl, Lawrence D.; Dechant Shaffer, Jill A. [series coordinators]. 2004. Effects of management practices on grassland birds. [Internet]. Version 12AUG2004. Jamestown, ND: Northern Prairie Wildlife Research Center online. <<http://www.npwrc.usgs.gov/resource/literatr/grasbird/index.htm>>
- Johnson, R.G.; Temple, S.A. 1990. Nest predation and brood parasitism of tall grass prairie birds. *Journal of Wildlife Management* 54(1):106–11.

- Kadlec, J.A.; Smith, L.M. 1992. Habitat management for breeding areas. In: Batt, B.D.J.; Afton, A.D.; Anderson, M.G. [et al.]; editors. Ecology and management of breeding waterfowl. Minneapolis: University of Minnesota. [Pages unknown].
- Kantrud, H.A. 1993. Duck nest success on Conservation Reserve Program land in the prairie pothole region. *Journal of Soil and Water Conservation* 48:238–42.
- Kantrud, Harold A. 1983. An environmental overview of North Dakota: past and present. [Internet]. Version 16JUL97. Jamestown, ND: Northern Prairie Wildlife Research Center online. <www.npwrc.usgs.gov/resource/habitat/envovrvw/index.htm>
- Kantrud, H.A.; Higgins, K.F. 1992. Nest and nest site characteristics of some ground-nesting non-passerine birds of northern grasslands. *Prairie Naturalist* 24:67–84.
- Kantrud, Harold A.; Krapu, Gary L.; Swanson, George A.; Allen, James A. 1989. Prairie basin wetlands of the Dakotas: a community profile. [Internet]. Version 16JUL97. Jamestown, ND: Northern Prairie Wildlife Research Center online. <<http://www.npwrc.usgs.gov/resource/wetlands/basinwet/index.htm>>
- Kelsey, K.W.; Naugle, D.E.; Higgins, K.F.; Bakker, K.K. 2006. Planting trees in prairie landscapes: do the ecological costs outweigh the benefits? *Natural Areas Journal* 26(3):254–60.
- Klett, A.T.; Duebbert, H.F.; Heismeyer, G.L. 1984. Use of seeded native grasses as nesting cover by ducks. *Wildlife Society Bulletin* 12:134–8.
- Knopf, F.L. 1994. Avian assemblages on altered grasslands. *Studies in Avian Biology*. 15:247–57.
- Knopf, F.L. 1995. Declining grassland birds. In: LaRoe, E.T.; Farris, G.S.; Puckett, C.E. [et al.]; editors. Our living resources. [Location of publisher unknown]: U.S. Department of the Interior. 296–98.
- Knutsen, G.A.; Euliss, N.H. 2001. Wetland restoration in the Prairie Pothole Region of North America: a literature review. U.S. Geological Survey, Biological Science Report. [Location of publisher unknown]: U.S. Geological Survey. 55 p.
- Koper, N.; Schmiegelow, F. 2006. A multi-scaled analysis of avian response to habitat amount and fragmentation in the Canadian dry mixed-grass prairie. *Landscape Ecology* 21:1045–59.
- Krapu, G.L.; Swanson, G.A. 1975. Some nutritional aspects of reproduction in prairie nesting pintails. *Journal of Wildlife Management* 39:156–62.
- Krull, J.N. 1970. Aquatic plant–macroinvertebrate associations and waterfowl. *Journal of Wildlife Management* 34:707–18.
- Kuehl, A.K.; Clark, W.R. 2002. Predator activity related to landscape features in northern Iowa. *Journal of Wildlife Management* 66:1224–34.
- Larson, M.A.; Ryan, M.R.; Murphy, R.K. 2002. Population viability of piping plovers: effects of predator exclusion. *Journal of Wildlife Management* 66:361–71.
- Laubhan, M.K.; Gleason, R.A.; Euliss, N.H., Jr. [et al.] 2006. A preliminary biological assessment of Long Lake National Wildlife Refuge, North Dakota. U.S. Department of Interior, Fish and Wildlife Service, Biological Technical Publication, FWS/BTP-R6006-2006. Washington DC. [Pages unknown].
- Laubhan, M.K.; Roelle, J.E. 2001. Managing wetlands for waterbirds. In: Rader, R.B.; Batzer, D.P.; Wissinger, S.; editors. Biomonitoring and management of North American freshwater wetlands. New York: John Wiley and Sons. 387–411.
- Lokemoen, J.T. 1984. Examining economic efficiency of management practices that enhance waterfowl production. In: Transactions of the North American Wildlife and Natural Resources Conference; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 49:584–607.
- Lorenzana, J.C.; Sealy, S.G. 1999. A meta-analysis of the impact of parasitism by the brown-headed cowbird on its hosts. *Studies in Avian Biology* 18:241–53.
- Lynch, J.; Evans, C.D.; Conover, V.C. 1963. Inventory of waterfowl environments of the prairie Canada. In: Transactions of the North American Wildlife and Natural Resources Conference; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 28:93–109.
- Mabee, T.J.; Estelle, V.B. 2000. Assessing the effectiveness of predator exclosures for plovers. *Wilson Bulletin* 112:14–20.
- Madden, E.M.; Murphy, R.K.; Hansen, A.J.; Murray, L. 2000. Models for guiding management of prairie birds habitat in northwestern North Dakota. *The American Midland Naturalist* 144(2):377–92.
- Martin, T.E. 1988. Processes organizing open-nesting bird assemblages: competition or nest predation? *Evolutionary Ecology* 2:37–50.
- Martin, T.E. 1995. Avian life history evolution in relation to nest sites, nest predation and food. *Ecological Monographs* 65:101–27.
- Mense, B. 1996. The effects of predator removal and nest-site selection on productivity of overwater nesting birds in North Dakota [master's thesis]. Pittsburg, KS: Pittsburg State University. [Pages unknown].
- Meyer, M.I.; Swanson, G.A. 1982. Mosquitoes (Diptera: Culicidae) consumed by breeding Anatidae in south central North Dakota. *Prairie Naturalist* 14:27–31.
- Milchunas, D.G.; Sala, O.E.; Lauenroth, W.K. 1988. A generalized model of the effects of grazing by large herbivores on grassland community structure. *American Midland Naturalist* 132(1):87–106.
- Murkin, H.R.; Batt, B.D.J. 1987. The interactions of vertebrates and invertebrates in peatlands and marshes. *Memoirs of the Entomological Society of Canada* 140:15–30.

- Murphy, R.K.; editor. 2005. Conservation strategy and guidelines for Dakota skippers on Service lands in the Dakotas [unpublished report]. Bismarck, ND: U.S. Department of the Interior, Fish and Wildlife Service, refuges and wildlife and ecological services, Dakota skipper committee. 23 p.
- Murphy, R.K.; Grant, T.A. 2005. Land management history and floristics in mixed-grass prairie, North Dakota, USA. *Natural Areas Journal* 25:351–8.
- Murphy, R.K.; Michaud, I.M.G.; Prescott, D.R.C. [et al.] 2003. Predation on adult piping plovers at predator enclosure cages. *Waterbirds* 26:150–5.
- National Wildlife Federation. 2001. The American prairie: going, going, gone? A Status Report on the American Prairie. [Location of publisher unknown]: National Wildlife Federation. [Pages unknown].
- Naugle, David E.; Higgins, Kenneth F.; Bakker, Kristel K. 2000. A synthesis of the effects of upland management practices on waterfowl and other birds in the northern Great Plains of the United States and Canada. University of Wisconsin–Stevens Point, College of Natural Resources, Wildlife Technical Report No. 1. Stevens Point, WI. 39 p.
- Naugle, D.E.; Higgins, K.F.; Nusser, S.M. 1999. Effects of woody vegetation on prairie wetland birds. *Canadian Field-Naturalist* 113:487–92.
- Naugle, D.E.; Quamen, F. 2007. Assessing the impacts of tree plantings on grassland birds in North and South Dakota. Completion Report for North Dakota State Wildlife Grant #T19. [Location where on file unknown]. 25 p.
- Nelson, J.G.; Leege, T.A. 1982. Nutritional requirements and food habitats. In: Thomas, J.W.; Toweill, D.E.; editors. *Elk of North America*. Harrisburg, PA: Stackpole Books. [Pages unknown].
- Newcombe, C.P.; MacDonald, D.D. 1991. Effects of suspended sediments on aquatic ecosystems. *North American Journal of Fisheries Management* 11:72–82.
- Niemuth, N.D. 2000. Land use and vegetation associated with greater prairie chicken leks in an agricultural landscape. *Journal of Wildlife Management* 64:278–86.
- Niemuth, N.D.; Estey, M.E.; Loesch, C.R. 2005. Developing spatially explicit habitat models for grassland bird conservation planning in the Prairie Pothole Region of North Dakota. In: Ralph, C.J.; Rich, T.D.; editors. *Bird conservation implementation and integration in the Americas: proceedings of the third international Partners in Flight conference 2002*; [Date of conference unknown]; [Location of conference unknown]. PSW-GTR-191. Albany, CA: USDA Forest Service. 469–77.
- Niemuth, N.D.; Estey, M.E.; Reynolds, R.E. [et al.] 2006. Use of wetlands by spring-migrant shorebirds in agricultural landscapes of North Dakota's Drift Prairie. *Wetlands* 26:30–9.
- North Dakota Department of Agriculture. 2006. 2005 Noxious weed list survey: reported acres. [Location where on file unknown].
- North Dakota Game and Fish Department. 2005. Mixed-grass prairie (Missouri Coteau). In: North Dakota comprehensive wildlife conservation strategy. [Internet]. <<http://gf.nd.gov/conservation/docs/section%205.3%20mixed-grass%20prairie-missouri%20coteau.pdf>> 54–7.
- North Dakota Parks and Recreation Department. [No date]. North Dakota prairie—our natural heritage. [Internet]. Version 05MAY99. Jamestown, ND: Northern Prairie Wildlife Research Center online. <<http://www.npwrc.usgs.gov/resource/habitat/heritage/index.htm>>
- North Dakota State Water Commission. 2005. A reference guide: water in North Dakota. Bismarck, ND. 20 p.
- O'Leary, C.H.; Nyberg, D.W. 2000. Treelines between fields reduce the density of grassland birds. *Natural Areas Journal* 20:243–9.
- Patten, M.A.; Shochat, E.; Reinking, D.L. [et al.] 2006. Habitat edge, land management, and rates of brood parasitism in tallgrass prairie. *Ecological Applications* 16:687–95.
- Pedlar, J.H.; Fahrig, L.; Merriam, G.H. 1997. Raccoon habitat use at 2 spatial scales. *Journal of Wildlife Management* 61:102–12.
- Peterjohn, B.G.; Sauer, J.R. 1999. Population status of North American grassland birds. *Studies in Avian Biology* 19:27–44.
- Plissner, J.H.; Haig, S.M. 2000. Status of a broadly distributed endangered species: results and implications of the second International Piping Plover Census. *Canadian Journal of Zoology* 78:128–39.
- Pokorny, M.L. 2002. Plant functional group diversity as a mechanism for invasion resistance [master's thesis]. Bozeman, MT: Montana State University. [Pages unknown].
- Pokorny, M.L.; Sheley, R.L.; Zabinski, C.A. [et al.] 2005. Plant functional group diversity as a mechanism for invasion resistance. *Restoration Ecology* 13(3):448–59.
- Pool, Duane B.; Austin, Jane E.; editors. 2006. Migratory bird management for the Northern Great Plains Joint Venture: implementation plan. General Technical Report TC-01. Bismarck, ND: Northern Great Plains Joint Venture. 171 p.
- Prindiville-Gaines, E.; Ryan, M.R. 1988. Piping plover habitat use and reproductive success in North Dakota. *Journal of Wildlife Management* 52:266–73.
- Recher, H.F. 1966. Some aspects of the ecology of migrating shorebirds. *Ecology* 47:393–407.
- Remele, Larry. 1988. North Dakota history: overview and summary. In: North Dakota Blue Book. Bismarck, ND: North Dakota Secretary of State's Office. 2–5.
- Ribic, C.A.; Sample, D.W. 2001. Associations of grassland birds with landscape factors in southern Wisconsin. *American Midland Naturalist* 146:105–21.

- Rich, T.D.; Beardmore, C.J.; Berlanga, H. [et al.] 2004. Partners in Flight North American landbird conservation plan. Ithaca, NY: Cornell Lab of Ornithology. [Pages unknown].
- Robel, R.J.; Briggs, J.N.; Dayton, A.D.; Hulbert, L.C. 1970. Relationships between visual obstruction measurements and weight of grassland vegetation. *Journal of Range Management* 23:295–7.
- Robinson, Elwyn B. 1966. History of North Dakota. Lincoln, NE: University of Nebraska Press. 58, 67–8, 113–5, 129, 134.
- Romig, G.P.; Crawford, R.D. 1995. Clay-colored sparrows in North Dakota parasitized brown-headed cowbirds. *Prairie Naturalist* 27:193–205.
- Rosenberg, D.M.; Danks, H.V. 1987. Aquatic insects of peatlands and marshes in Canada: introduction. *Memoirs of the Entomological Society of Canada* 140:1–4.
- Royer, R.A.; Austin, J.E.; Newton, W.E. 1998. Checklist and “pollard walk” butterfly survey methods on public lands. *American Midland Naturalist* 140:358–71.
- Rumble, M.A.; Flake, L.D. 1983. Management considerations to enhance use of stock ponds by waterfowl broods. *Journal of Range Management* 36:691–4.
- Ryan, M.R.; Root, B.G.; Mayer, P.M. 1993. Status of piping plovers in the Great Plains of North America: a demographic simulation model. *Conservation Biology* 7:581–5.
- Samson, F.; Knopf, F. 1994. Prairie conservation in North America. *BioScience* 44:418–21.
- Samson, Fred B., Knopf, Fritz L.; Ostlie, Wayne R. 1998. Grasslands. In: Mac, M.J.; Opler, P.A.; Puckett Haecker, C.E.; Doran, P.D.; editors. Status and trends of the nation’s biological resources, vol. 2. [Internet]. Version 21JAN2000. Jamestown, ND: Northern Prairie Wildlife Research Center online. <<http://www.npwrc.usgs.gov/resource/2000/grlands/grlands.htm>> 437–72.
- Sargeant, A.B. 1972. Red fox spatial characteristics in relation to waterfowl predation. *Journal of Wildlife Management* 36:225–36.
- Sargeant, A.B.; Allen, S.H.; Hastings, J.O. 1987. Spatial relations between sympatric coyotes and red foxes in North Dakota. *Journal of Wildlife Management* 51:285–93.
- Sargeant, A.B.; Arnold, P.M. 1984. Predator management for ducks on waterfowl production areas in the northern plains. In: Proceedings of the Vertebrate Conference; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 11:161–7.
- Sargeant, A.B.; Greenwood, R.J.; Sovada, M.A.; Shaffer, T.L. 1993. Distribution and abundance of predators that affect duck production in the Prairie Pothole Region. U.S. Fish and Wildlife Service, Resource Publication 194. [Location of publisher unknown]: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].
- Sargeant, A.B.; Raveling, D.G. 1992. Mortality during the breeding season. In: Batt, B.D.J.; Afton, A.D.; Anderson, M.G. [et al.]; editors. Ecology and management of breeding waterfowl. Minneapolis: University of Minnesota Press. 396–422.
- Sargeant, A.B.; Sovada, M.A.; Shaffer, T.L. 1995. Seasonal predator removal relative to hatch rate of duck nests in waterfowl production areas. *Wildlife Society Bulletin* 23(3):507–13.
- Schmitz, R.A.; Clark, W.R. 1999. Survival of ring-necked pheasant hens during spring in relation to landscape features. *Journal of Wildlife Management* 63:147–54.
- Schroeder, R.L.; Holler, J.I.; Taylor, J.P. 2004. Managing national wildlife refuges for historic or non-historic conditions: determining the role of the refuge in the ecosystem. *Natural Resources Journal* 44(4):1183–1210.
- Severson, K.E.; Sieg, C.H. 2006. The nature of eastern North Dakota: pre-1880 historical ecology. Fargo, ND: North Dakota State University, North Dakota Institute for Regional Studies. 308 p.
- Shaffer, J.A.; Goldade, C.M.; Dinkins, M.F. [et al.] 2003. Brown-headed cowbirds in grasslands: their habitat, hosts, and response to management. *Prairie Naturalist* 35(3):145–186.
- Sheley R.L.; Half, M.L. 2006. Enhancing native forb establishment and persistence using a rich seed mixture. *Restoration Ecology* 12(4):627–35.
- Shutler, D.; Mullie, A.; Clark, R.G. 2000. Bird communities of prairie uplands and wetlands in relation to farming practices in Saskatchewan. *Conservation Biology* 14:1441–51.
- Sims, P.I. 1988. Grasslands. In: Barbour, M.G.; Billings, W.D.; editors. North American terrestrial vegetation. Cambridge: Cambridge University Press. 266–86.
- Skagen, S.K.; Oman, H.D. 1996. Dietary flexibility of shorebirds in the Western Hemisphere. *Canadian Field-Naturalist* 10:419–44.
- Snyder, W.D. 1984. Ring-necked pheasant nesting ecology and wheat farming on the high plains. *Journal of Wildlife Management* 48:878–88.
- Sovada, M.A.; Anthony, R.M.; Batt, B.D. J. 2001. Predation on waterfowl in arctic tundra and prairie breeding areas: a review. *Wildlife Society Bulletin* 29(1):6–15.
- Sovada, M.A.; Burns, M.J.; Austin, J.E. 2005. Predation of waterfowl in prairie breeding areas. Jamestown, ND: Northern Prairie Wildlife Research Center. 70 p.
- Sovada, M.A.; Sargeant, A.B.; Grier, J.W. 1995. Differential effects of coyotes and red foxes on duck nest success. *Journal of Wildlife Management* 59:1–9.
- Stephens, D.W.; Krebs, J.R. 1986. Foraging theory. Princeton, NJ: Princeton University Press. [Pages unknown].
- Steuter, A.A.; McPherson, G.R. 1995. Fire as a physical stress. In: Bedunah, D.J.; Sosebee, R.E.;

- editors. *Wildland plants: physiological ecology and developmental morphology*. 550–79.
- Stewart, R.E.; Kantrud, H.A. 1971. Classification of natural ponds and lakes in the glaciated prairie region. Bureau of Sport Fisheries and Wildlife, Resource Publication 92. Washington DC. [Pages unknown].
- Stewart, Robert E. 1975. Breeding birds of North Dakota. [Internet]. Version 06JUL2000. Fargo, ND: Tri-College Center for Environmental Studies. Jamestown, ND: Northern Prairie Wildlife Research Center online. <<http://www.npwrc.usgs.gov/resource/birds/bbofnd/biog.htm>> 295 p.
- Sugden, L.G.; Beyersbergen, G.W. 1984. Farming intensity on waterfowl breeding grounds in Saskatchewan parklands. *Wildlife Society Bulletin* 12:22–6.
- Svedarsky, D.; Van Amburg, G. 1996. Integrated management of the greater prairie chicken and livestock on the Sheyenne National grassland. Bismarck, ND: North Dakota Game and Fish Department. [Pages unknown].
- Swanson, G.A. 1978. A water column sampler for invertebrates in shallow wetlands. *Journal of Wildlife Management* 42:670–2.
- Swanson, G.A.; Adomaitis, V.A.; Lee, F.B. [et al.] 1984. Limnological conditions influencing duckling use of saline lakes in south-central, North Dakota. *Journal of Wildlife Management* 48:340–9.
- Swanson, G.A.; Krapu, G.L.; Serie, J.R. 1979. Foods of laying female dabbling ducks on the breeding grounds. In: Bookhout, T.A.; editor. *Proceedings of a 1977 symposium waterfowl and wetlands—an integrated review*; [Date of symposium unknown]; [Location of symposium unknown]. Madison, WI: North-central Section of the Wildlife Society. 47–57.
- Tilman, D. 1996. Community invisibility, recruitment limitations, and grassland biodiversity. *Ecology* 78(1):81–92.
- Trammell, M.A.; Butler, J.L. 1995. Effects of exotic plants on native ungulate use of habitat. *Journal of Wildlife Management* 59:808–16.
- Transeau, E. 1935. The prairie peninsula. *Ecology* 16(3):423–7.
- [USFWS] U.S. Fish and Wildlife Service. 1990. Interior population of the least tern recovery plan. [Location of publisher unknown]: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].
- . 1994a. Draft revised recovery plan for piping plovers breeding on the Great Lakes and northern Great Plains of the U.S. [Location of publisher unknown]: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].
- . 1994b. Whooping crane recovery plan. [Location of publisher unknown]: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].
- . 1996. Western prairie fringed orchid (*Plantanthera praeclara*) recovery plan. [Location of publisher unknown]: U.S. Department of the Interior, Fish and Wildlife Service. 101 p.
- . 1999a. Fulfilling the promise. Arlington, VA: U.S. Department of the Interior, Fish and Wildlife Service. 94 p.
- . 1999b. National strategy for management of invasive species, WH-7. In: Fulfilling the promise. Arlington, VA: U.S. Department of the Interior, Fish and Wildlife Service. 94 p.
- . 2001. 2000–2001 contingency plan: federal–state cooperative protection of whooping cranes [unpublished report]. On file at U.S. Fish and Wildlife Service in Albuquerque, NM. 42 p.
- . 2002. Status assessment and conservation guidelines, Dakota skipper. [Location of publisher unknown]: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown].
- . 2004. Chronic wasting disease plan for U.S. Fish and Wildlife Service lands in the Dakotas [unpublished report]. [Location where on file unknown]. 17 p.
- [USGS] U.S. Geological Survey. 2006. Ecoregions of North Dakota and South Dakota. [Internet]. Jamestown, ND: Northern Prairie Wildlife Research Center online. <<http://www.npwrc.usgs.gov/resource/habitat/ndsdeco/ecotext.htm>> [Date accessed unknown].
- . 2007. Wetlands of North Dakota. [Internet]. Water Science Center. <<http://nd.water.usgs.gov/wetlands/index.html>> [accessed March 2007].
- [NABCI] U.S. North American Bird Conservation Initiative Committee. 2007. Bird conservation region 11. [Internet]. <<http://www.nabci-us.org/bcr11.html>> [Date accessed unknown].
- Vallentine, J.F. 1990. *Grazing management*. New York: Academic Press. [Pages unknown].
- Vogl, R.J. 1974. Effect of fire on grasslands. In: Kozlowski, T.T.; Ahlgren, C.E.; editors. *Fire and ecosystems*. New York: Academic Press. [Pages unknown].
- Voigts, D.K. 1976. Aquatic invertebrates abundance in relation to changing marsh vegetation. *American Midland Naturalist* 95:313–22.
- Watson, A.K. 1985. Introduction: the leafy spurge problem. In: Watson, A.K.; editor. *Leafy spurge*. Weed Science Society of America Monograph 3:1–6.
- Weaver, J.E. 1954. *North American prairie*. Lincoln, NE: Johnsen Publishing Company. [Pages unknown].
- Weaver, J.E.; Albertson, F.W. 1936. Effects of the great drought on the prairies of Iowa, Nebraska and Kansas. *Ecology* 17(4):567–639.
- Weaver, J.E.; Albertson, F.W. 1956. *Grasslands of the Great Plains: their nature and use*. Lincoln, NE: Johnsen Publishing Company. [Pages unknown].
- Weller, M.W.; Spatcher, C.S. 1965. Role of habitat in the distribution and abundance of marsh birds. Department of Zoology and Entomology Special Report Number 43. Ames, IA: Iowa State University,

- Agricultural and Home Economics Experiment Station. [Pages unknown].
- Williams, M.A.; Crawford, R.D. 1989. Use of earthen islands by nesting ducks in North Dakota. *Journal of Wildlife Management* 53:411–7.
- Wilson, S.D.; Belcher, J.W. 1989. Plant and bird communities of native prairie and introduced Eurasian vegetation in Manitoba, Canada. *Conservation Biology* 3(1):39–44.
- Winter, M.; Johnson, D.H.; Faaborg, J. 1999. Patterns of area sensitivity in grassland nesting birds. *Conservation Biology* 13:1424–36.
- Winter, M.; Johnson, D.H.; Faaborg, J. 2000. Evidence for edge effects on multiple levels: artificial nests, natural nests, and distribution of nest predators in Missouri tallgrass prairie fragments. *Condor* 102:256–66.
- Witmer, G.W.; Bucknall, J.L.; Fritts, T.H.; Moreno, D.G. 1996. Predator management to protect endangered avian species. In: *Transactions of the North American Wildlife and Natural Resources Conference*; [Date of conference unknown]; [Location of conference unknown]. [Location of publisher unknown]: [Publisher unknown]. 61:102–8.
- Wollheim, W.M.; Lovvorn, J.R. 1996. Effects of macrophyte growth forms on invertebrates communities in saline lakes of the Wyoming High Plains. *Hydrobiologia* 323:83–96.
- Wyoming Partners in Flight. 2002. Growing grassland birds: best management practices for grasslands to benefit birds in Wyoming. Lander, WY: Wyoming Game and Fish Department. [Pages unknown].
- Zimmer, J.M. 1996. Effects of predator reduction on the survival and movements of northern shoveler broods [master's thesis]. Baton Rouge, LA: Louisiana State University. [Pages unknown].

