

# Draft Comprehensive Conservation Plan and Environmental Assessment

*North Dakota National Wildlife Refuges*

**August 2008**

**Prepared by**

*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*

Region 6, Mountain-Prairie Region  
Division of Refuge Planning  
134 Union Boulevard, Suite 300  
Lakewood, CO 80228  
303/236 8145



# Contents

<i>Abbreviations</i> .....	vii
<i>Summary</i> .....	ix
<b>1 Introduction</b> .....	1
1.1 Purpose and Need for the Plan .....	3
1.2 U.S. Fish and Wildlife Service and the Refuge System .....	3
1.3 National and Regional Mandates .....	4
1.4 Refuge Contributions to National and Regional Plans .....	5
1.5 Ecosystem Description and Threats .....	9
1.6 Planning Process .....	11
<b>2 The Refuges</b> .....	15
2.1 Establishment, Acquisition, and Management History .....	15
2.2 Special Values .....	20
2.3 Purposes .....	20
2.4 Vision .....	33
2.5 Goals .....	33
2.6 Planning Issues .....	33
<b>3 Alternatives</b> .....	37
3.1 Alternatives Development .....	37
3.2 Elements Common to All Alternatives .....	38
3.3 Description of Alternatives .....	38
3.4 Comparison of Alternatives .....	42
<b>4 Affected Environment</b> .....	49
4.1 Physical Environment .....	49
4.2 Biological Resources .....	58
4.3 Cultural Resources .....	69
4.4 Chase Lake Wilderness .....	70
4.5 Visitor Services .....	70
4.6 Partnerships .....	72
4.7 Socioeconomic Environment .....	72
4.8 Operations .....	74
<b>5 Environmental Consequences</b> .....	75
5.1 Effects Common to All Alternatives .....	75
5.2 Description of Consequences .....	76
5.3 Cumulative Impacts .....	80
<b>6 Implementation of the Proposed Action</b> .....	81
6.1 Identification of the Proposed Action .....	81
6.2 Summary of the Proposed Action (Draft CCP) .....	81
6.3 Goals, Objectives, Strategies, and Rationale .....	82
Habitat and Wildlife Goal .....	82
Monitoring and Research Goal .....	100

Cultural Resources Goal . . . . .	102
Visitor Services Goal . . . . .	102
Partnerships Goal . . . . .	106
Operations Goal . . . . .	107
6.4 Funding and Staff . . . . .	107
6.5 Step-down Management Plans . . . . .	108
6.6 Monitoring and Evaluation . . . . .	112
6.7 Plan Amendment and Revision. . . . .	112
<b>Glossary . . . . .</b>	<b>115</b>
<b>Appendixes</b>	
Appendix A—Key Legislation and Policies . . . . .	125
Appendix B—Preparers and Contributors . . . . .	133
Appendix C—Public Involvement . . . . .	137
Appendix D—Draft Compatibility Determinations for Wildlife-dependent Recreational Uses, Grazing, Haying, and Farming . . . . .	139
Appendix E—Fire Management Program for National Wildlife Refuges within the Eastern North Dakota Fire District . . . . .	149
Appendix F—Fire Management Program for National Wildlife Refuges within the Western North Dakota Fire District . . . . .	153
Appendix G—Bird Species of the Refuges . . . . .	157
Appendix H—Primary and Secondary Bird Species of the North Dakota Prairie . . . . .	165
Appendix I—North Dakota’s Threatened and Endangered Species . . . . .	167
Appendix J—Priority-setting Example for Native Prairie Portions of Fee-title Lands. . . . .	169
<b>Bibliography . . . . .</b>	<b>173</b>

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**Figures**

1	Vicinity map for the 12 refuges, North Dakota . . . . .	2
2	Map of the bird conservation regions of North America . . . . .	6
3	Map of the Prairie Pothole Region of the United States and Canada . . . . .	7
4	Map of ecosystems in region 6 of the U.S. Fish and Wildlife Service . . . . .	10
5	Steps in the planning process . . . . .	11
6	Map of Audubon National Wildlife Refuge, North Dakota . . . . .	21
7	Map of Chase Lake National Wildlife Refuge, North Dakota . . . . .	22
8	Map of Kellys Slough National Wildlife Refuge, North Dakota . . . . .	23
9	Map of Lake Alice National Wildlife Refuge, North Dakota . . . . .	24
10	Map of Lake Ilo National Wildlife Refuge, North Dakota . . . . .	25
11	Map of Lake Nettie National Wildlife Refuge, North Dakota . . . . .	26
12	Map of Lake Zahl National Wildlife Refuge, North Dakota . . . . .	27
13	Map of McLean National Wildlife Refuge, North Dakota . . . . .	28
14	Map of Shell Lake National Wildlife Refuge, North Dakota . . . . .	29
15	Map of Stewart Lake National Wildlife Refuge, North Dakota . . . . .	30
16	Map of Stump Lake National Wildlife Refuge, North Dakota . . . . .	31
17	Map of White Lake National Wildlife Refuge, North Dakota . . . . .	32
18	Map of the physiographic regions in North Dakota . . . . .	51
19	Map of the level 4 ecoregions in North Dakota . . . . .	52
20	Map of the predicted duck-pair concentrations in North Dakota . . . . .	65
21	Map of the seven-county core area for piping plover in North Dakota . . . . .	67
22	Map of the whooping crane sightings in North Dakota . . . . .	68
23	The adaptive management process . . . . .	113

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**Tables**

1	Planning Process Summary for the 12 Refuges, North Dakota . . . . .	12
2	Land Information for the 12 Refuges, North Dakota . . . . .	20
3	Comparison of Alternatives for the 12 Refuges, North Dakota . . . . .	43
4	Ecoregions of the 12 Refuges, North Dakota . . . . .	53
5	Conditional Water Permits for Lake Alice National Wildlife Refuge, North Dakota . . . . .	57
6	Prairie Decline in North Dakota . . . . .	58
7	State-listed Noxious Weeds Found at National Wildlife Refuges in North Dakota . . . . .	61
8	Step-down Management Plans for Audubon National Wildlife Refuge, North Dakota . . . . .	108
9	Step-down Management Plans for Chase Lake National Wildlife Refuge, North Dakota . . . . .	109
10	Step-down Management Plans for Kellys Slough National Wildlife Refuge, North Dakota . . . . .	109
11	Step-down Management Plans for Lake Alice National Wildlife Refuge, North Dakota . . . . .	109
12	Step-down Management Plans for Lake Ilo National Wildlife Refuge, North Dakota . . . . .	110
13	Step-down Management Plans for Lake Nettie National Wildlife Refuge, North Dakota . . . . .	110
14	Step-down Management Plans for Lake Zahl National Wildlife Refuge, North Dakota . . . . .	111
15	Step-down Management Plans for McLean National Wildlife Refuge, North Dakota . . . . .	111
16	Step-down Management Plans for Shell Lake National Wildlife Refuge, North Dakota . . . . .	111
17	Step-down Management Plans for Stewart Lake National Wildlife Refuge, North Dakota . . . . .	111
18	Step-down Management Plans for White Lake National Wildlife Refuge, North Dakota . . . . .	112



# Abbreviations

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

<b>SWG</b>	State Wildlife Grant
<b>USC</b>	United States Code
<b>USDA</b>	U.S. Department of Agriculture
<b>USFWS</b>	U.S. Fish and Wildlife Service
<b>USGS</b>	U.S. Geological Survey
<b>VOR</b>	visual obstruction reading
<b>WG</b>	wage grade (employment)
<b>WMD</b>	wetland management district
<b>WUI</b>	wildland–urban interface

# Summary



USFWS

*Newly hatched mallard ducklings.*

This is a summary of the draft comprehensive conservation plan and environmental assessment for 12 of the U.S. Fish and Wildlife Service's national wildlife refuges in North Dakota: Audubon, Chase Lake, Kellys Slough, Lake Alice, Lake Ilo, Lake Nettie, Lake Zahl, McLean, Shell Lake, Stewart Lake, Stump Lake, and 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. Chapter 6 contains the draft plan for the 12 refuges; the final plan is scheduled for completion in 2008 and 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.

- 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.

## Planning Process

The planning process for a comprehensive conservation plan consists of a series of steps including environmental analysis. Public and partner involvement are 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.

## ISSUES

Public scoping for the 12 national wildlife refuges that the Service started in 2007, along with refuge information, identified five major areas of concern regarding management of the refuges.

## Wetland and Upland Habitats

Aggressive management of wetland and upland habitats must be conducted 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 conservation easement, can be evaluated.

## Invasive Plants

The refuges have previously farmed uplands that have since been restored. Most of these uplands have the native vegetation character but are compromised by invading species such as leafy spurge, Canada thistle, absinth wormwood, Kentucky bluegrass, and smooth brome. These invasive plants substantially diminish the 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.

## Wildlife Management

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

## Priority Species

American white pelican occur in large numbers on Chase Lake within the Chase Lake National Wildlife Refuge. Endangered whooping cranes can be observed in the marshes of several refuges. The primary issues related to priority species are as follows: (1) monitoring populations and habitat use; and (2) providing essential habitat and developing conditions that promote increased recruitment or population protection.

## Predator Management

Several species including red fox, striped skunk, and raccoon are found at higher than historical levels due to modifications of habitat. These species can adversely affect migratory bird populations. Woody vegetation provides habitat for predators and attracts forest-edge bird species that may displace grassland species.

## Wildlife Disease

National wildlife refuges in North Dakota have a history of botulism outbreaks. There is an ongoing issue of striking a balance between managing botulism, providing optimal habitats, and maintaining other refuge programs.

## Visitor Services

There is a growing demand for public recreation in North Dakota. The public would like to see more opportunities to participate in the six wildlife-dependent recreational uses—hunting, fishing, wildlife observation, photography, environmental education, and interpretation. Hunting is permitted only at Audubon, Chase Lake, Lake Alice, Lake Nettie, and Lake Zahl

national wildlife refuges. Fishing is permitted only at Audubon and Lake Ilo national wildlife refuges. Wildlife observation, photography, environmental education, and interpretation are available at 10 of the refuges, with the exception of Stump Lake and White Lake national wildlife refuges, which are closed to all public use.

## Operations

Funding and staff are not sufficient to fulfill the purposes and meet the goals of the refuges. The Service's staff needs 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.

## Monitoring and Research

Basic data about recruitment, mortality, and habitat use for a representative group of species must be collected and analyzed on a regular basis to make appropriate decisions that affect the habitats these species depend on. The use of the refuges as a research field station could make valuable strides in development of new directions in management and expansion of the knowledge of field biologists.

## 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 national wildlife refuges.

## THE VISION FOR THE REFUGES

*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 following goals were developed 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.

## Alternatives

The planning team developed the following three alternatives as management options to address the key issues.

### ALTERNATIVE A—CURRENT MANAGEMENT (NO ACTION)

Under alternative A, management activities conducted by the Service throughout all 12 refuges would not change:

- The Service sets priorities for refuge habitats and only high-priority habitats are managed. Native species restoration continues at its current level. Invasive species management is limited to legally listed species and those of ecological concern that occur on high-priority tracts.
- Refuge staffs document and protect new cultural resources as they are opportunistically found. Staffs protect known resources from vandalism, theft, and destruction. The Service maintains and preserves historical sites.
- The current level of visitor services includes environmental education, interpretation, and hunting and fishing access for those refuges with permitted use.
- Refuge staffs preserve existing partnerships that address resource information needs, protect and enhance habitat, and promote wildlife-dependent recreational use.
- Refuge staffs use volunteers to help with environmental and education programs. Operations consist of maintaining vehicles and equipment.

### ALTERNATIVE B—MODERATELY ENHANCED MANAGEMENT (PROPOSED ACTION)

Under alternative B, wildlife habitat management would enhance wetlands and uplands, where warranted, on refuge lands:

- Management objectives for habitat types would be based on 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; high- and medium-priority habitats would be managed. Additional degraded habitat tracts would be identified and restored to native species. Invasive species management would be limited to legally listed species and those of ecological concern that occur on high- and medium-priority tracts. Refuge staffs and partners would expand biological surveys, such as colonial bird counts and biweekly waterfowl counts, and baseline monitoring on high- and medium-priority tracts.
- The Service would document and protect cultural resources. Educational programs and partner research and inventories would be conducted on a limited basis. Refuge staffs would protect known resources from vandalism, theft, and destruction. The Service would maintain and preserve historical sites.
- Refuge staffs would improve and expand programs for youth and conservation groups. These programs and events such as waterfowl identification workshops would be done on a

3-year rotation among refuges. Staffs would develop “friends groups.” The Service would 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.

- The Service would expand existing partnerships to address migratory bird habitat improvement. Refuge staffs would work with local, state, and federal agencies to promote and protect migratory bird habitat within the refuges.

## **ALTERNATIVE C—ENHANCED MANAGEMENT**

Under alternative C, management by the refuge staffs would be more intensive and widespread, targeting native prairie and wetland complexes:

- The Service would intensively manage refuge habitats, with an emphasis on migratory birds. Refuge staffs would manage all refuge habitats (high-, medium-, and low-priority tracts). 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 such as grassland birds. The Service would conduct baseline surveys of all refuge habitats. The Service would seek graduate students to do research and monitoring of refuge projects.
- The Service would document and protect cultural resources. Educational programs and partner research and inventories would be conducted on a limited basis. Refuge staffs would protect known resources from vandalism, theft, and destruction. The Service would maintain and preserve historical sites.
- 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 bird species would increase wildlife-viewing opportunities for the public. Refuge staffs would improve and expand programs for youth and conservation groups. These programs and events such as waterfowl identification workshops would be done on a 3-year rotation among refuges. The Service would 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.
- The Service would seek new partners to develop and 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.
- There would be increased staffs, equipment, and funding to accomplish the actions in this alternative.

# 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) has developed a draft 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

The draft CCP was developed 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 within

this draft CCP and environmental assessment (EA) meet the requirements of the National Environmental Policy Act of 1969 (NEPA). Compliance with the NEPA is being achieved through involvement of the public.

A planning team of representatives from various Service programs including the divisions of realty, visitor services, and resources; and the North Dakota Game and Fish Department (NDGF) prepared the draft CCP and EA. In addition, the planning team used public input. Public involvement and the planning process are described in section 1.6, “The Planning Process.”

After reviewing a wide range of public comments and management needs, the planning team developed alternatives for management of the refuges. The team recommended one alternative to be the Service’s proposed action, which addresses all substantive issues while determining how best to achieve the purposes of the refuges. The proposed action is the Service’s recommended course of action for management of the refuges. “Chapter 3, Alternatives” summarizes the proposed action, with its predicted effects described in “Chapter 5, Environmental Consequences.” The details of the proposed action compose the draft CCP (chapter 6).

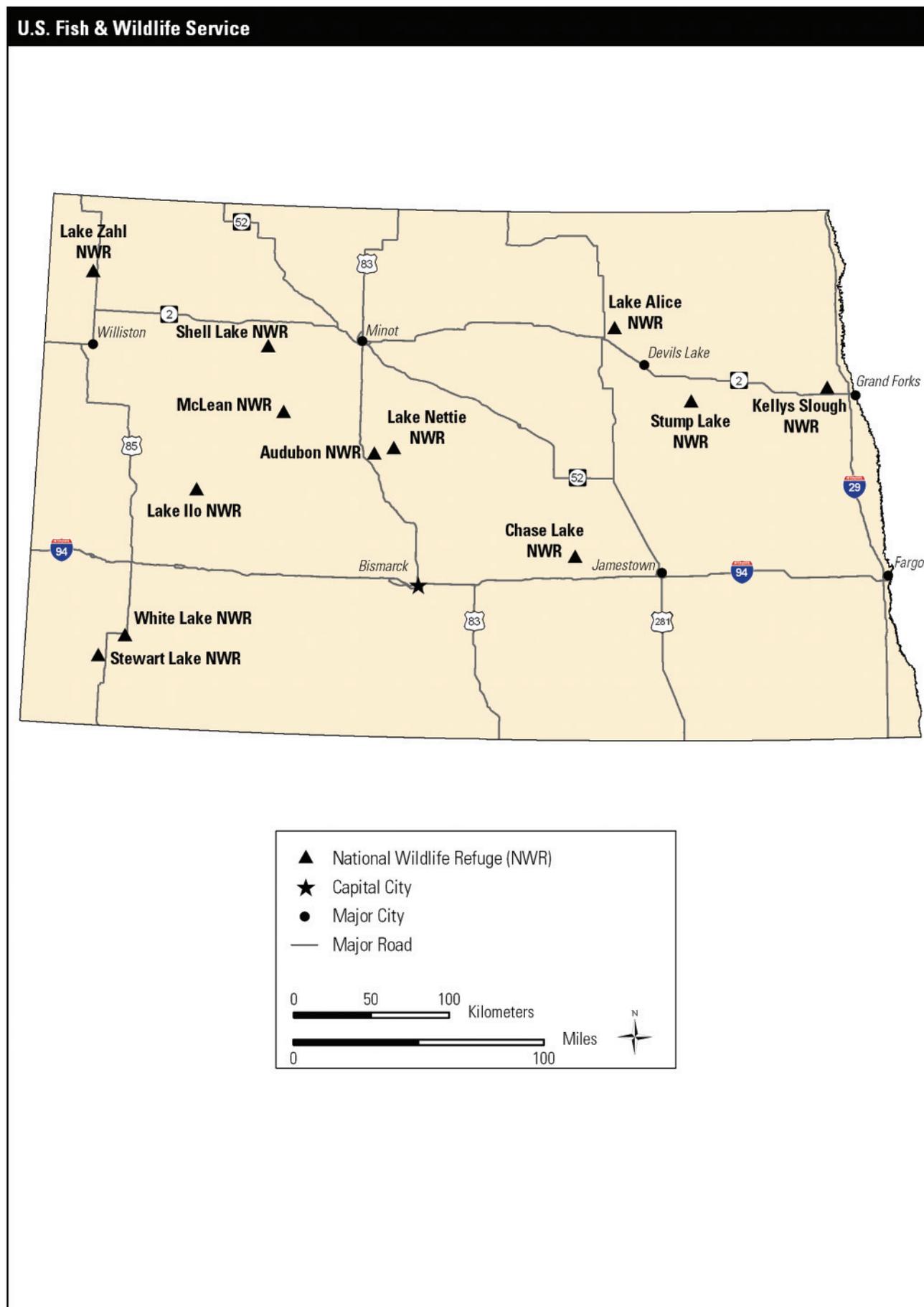


Figure 1. Vicinity map for the 12 refuges, North Dakota.

When finalized, the CCP will serve as a working guide for management programs and actions for the next 15 years. The final CCP will specify the necessary actions to achieve the vision and purposes of the 12 North Dakota 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.

## 1.1 Purpose and Need for the Plan

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

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 (NWRs) encompassing 343,145 acres (0.8% of the state).
- Manages 11 wetland management districts (WMDs).
  - 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. 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.

### FULFILLING 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.”

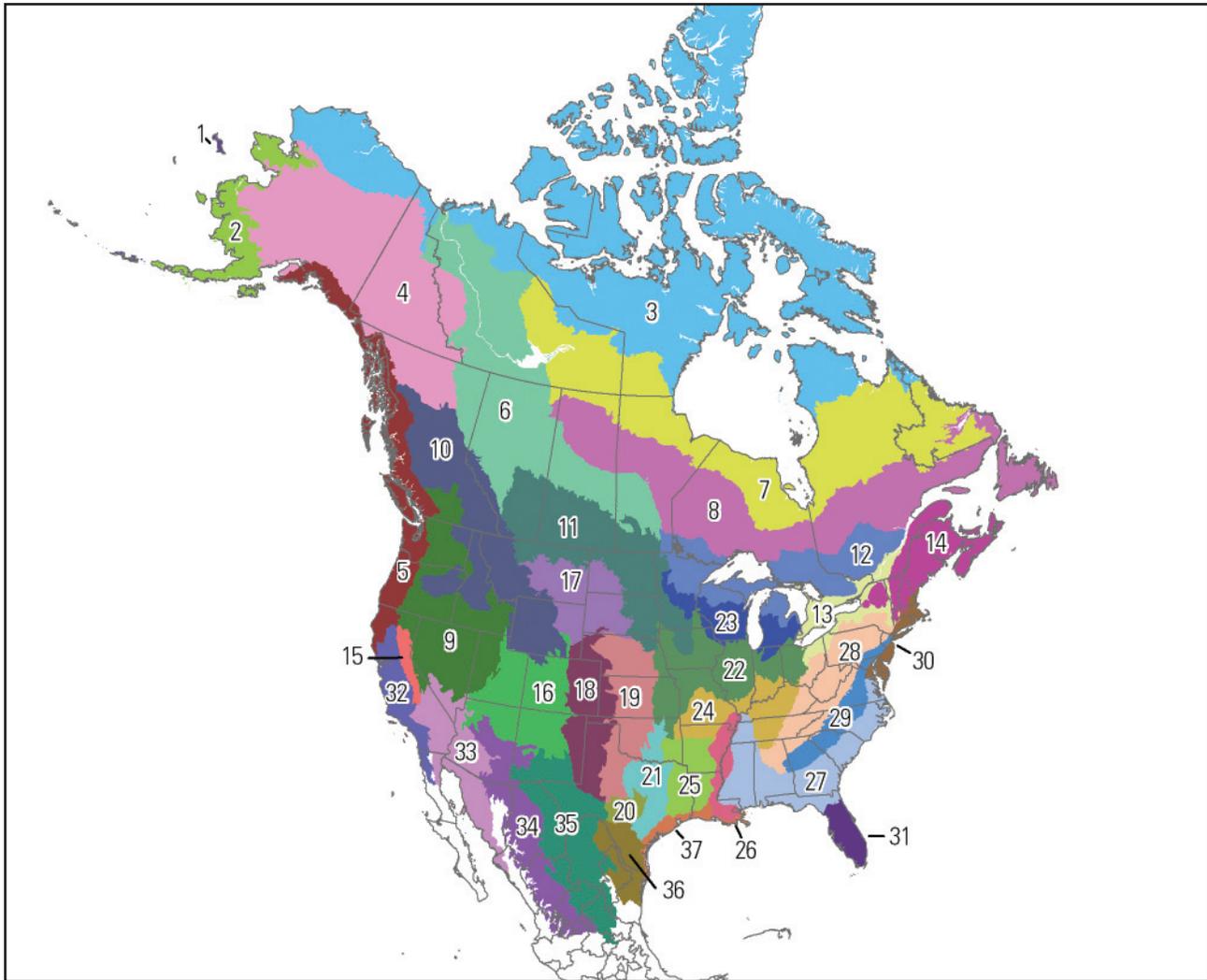
PIF splits North America into seven avifaunal biomes (birds of an ecological regional area) and 37 bird conservation regions (BCRs) for planning purposes (see figure 2, map of BCRs). The 12 national wildlife refuges are within the prairie avifaunal biome in BCRs 11 and 17.



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

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).

BCR 17 is dominated by mixed-grass prairie that lies west and south of the glaciated Prairie Pothole Region (see figure 3), east of the Rocky Mountains, and north of the true short-grass prairie. Mostly due to the



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

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.

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.



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

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 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 draft 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, ecosystem map).

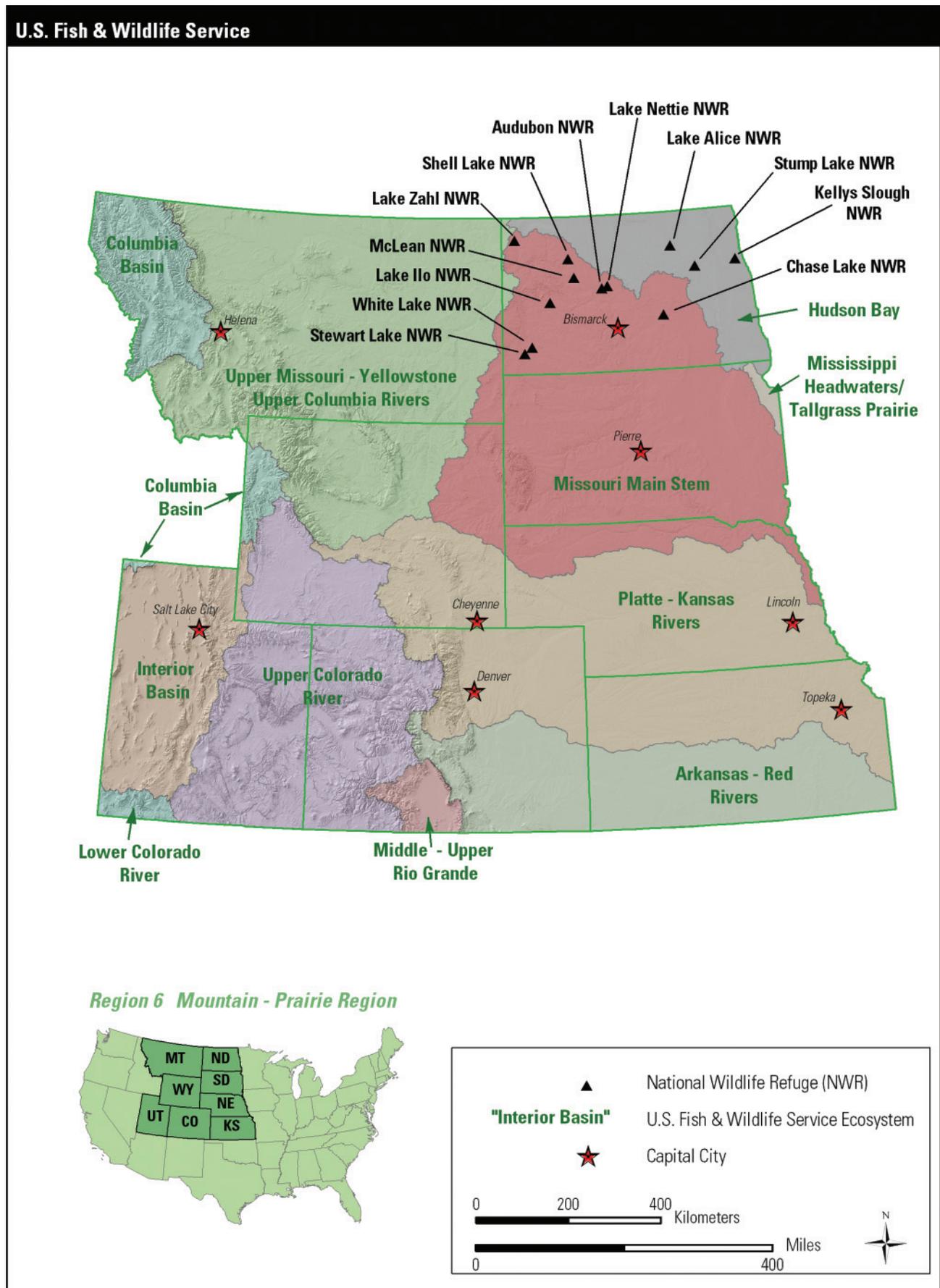


Figure 4. Map of ecosystems in region 6 of the U.S. Fish and Wildlife Service.

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. 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 draft CCP and the EA for the refuges is intended to comply with the Improvement Act, the NEPA, and the implementing regulations of the acts. The Service issued its Refuge System planning policy in 2000. This policy established requirements and guidance for refuge and 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).

Figure 5 displays the planning process to date for this draft CCP and EA. The Service began the preplanning process in August 2006. The planning team is Service

personnel from the affected North Dakota refuges, the regional divisions of refuge planning 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 current refuge program status, compiled and analyzed relevant data, and determined the purposes of the refuges. Table 1 summarizes accomplishment of the main planning steps for this CCP effort.

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

Over the course of preplanning and scoping, the planning team collected available information about the resources of the refuges and surrounding areas. “Chapter 4, Affected Environment” summarizes this information.

The draft CCP (chapter 6) outlines long-term guidance for management decisions, sets forth proposed objectives and strategies to accomplish refuge purposes and meet goals, and identifies the Service’s best estimate of future needs.

The draft CCP details program levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning purposes.

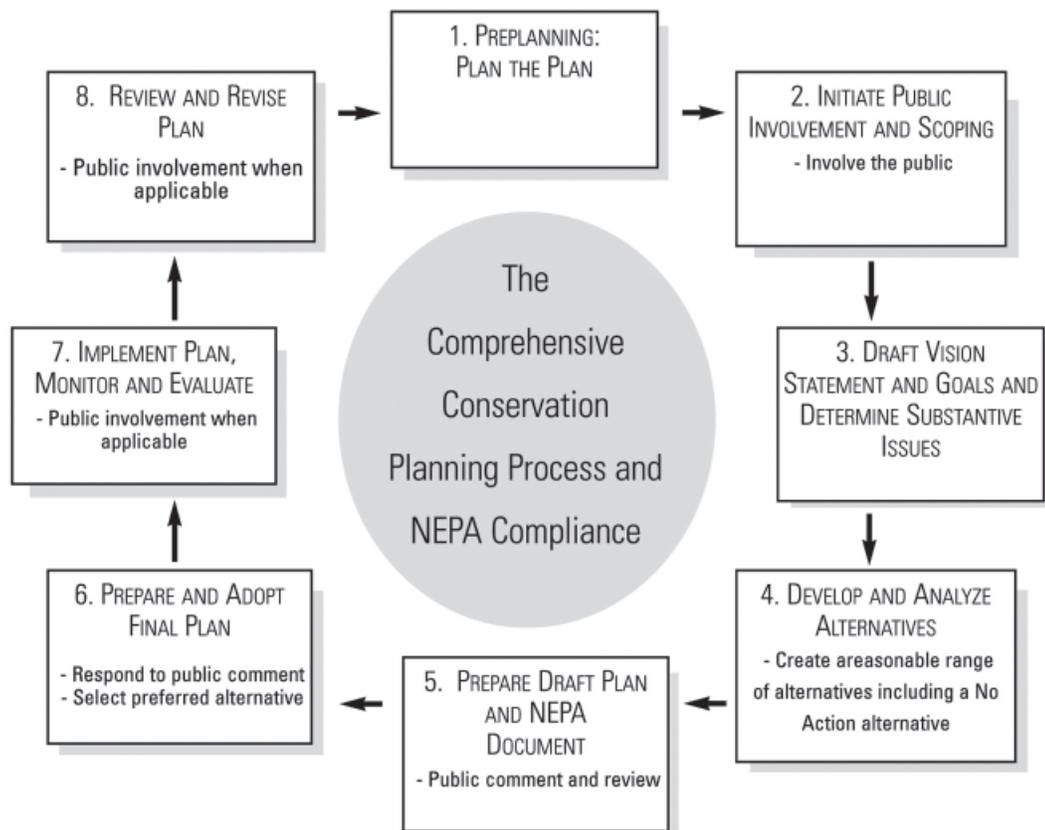


Figure 5. Steps in the planning process.

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

<i>Date</i>	<i>Event</i>	<i>Outcome</i>
May 2006	Initial meeting with North Dakota project leaders.	CCP overview.
August 2006	Meeting with refuge staffs and field review.	Planning team was finalized; biological and visitor services issues were reviewed.
December 2006	Kick off meeting, initial development of vision and goals.	Refuge purposes were identified; initial issues and qualities list was developed; mailing list was started; biological and mapping needs were identified; and public scoping was planned.
February 2007	Public notice of intent to prepare a CCP.	Notice was published in the <i>Federal Register</i> .
March 2007	Initial public contact through mailing of the first planning update.	Public opportunity was offered (to learn about the CCP and provide comments); planning update described the CCP process and provided comment forms and postage-paid envelopes mailed.
March–April 2007	Public meetings.	Public opportunity was offered (to learn about the CCP and provide comments).
March–April 2007	Alternatives development.	Alternatives for refuge management were developed and drafted by the planning team.
February–May 2007	Development of biological objectives.	Objectives and strategies were developed and drafted by the planning team for the biological aspects of refuge management.
June–July 2007	Development of visitor services objectives.	Objectives and strategies were developed and drafted by the planning team for the visitor services at the refuges.
May 2008	Internal review of the draft plan.	Draft plan was reviewed by the Service's regional staff.
August 2008	Draft plan released for public review.	Revised draft plan was published for review by the public.

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

## COORDINATION WITH THE PUBLIC

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 first planning update issue was sent 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. The planning update included a comment form and postage-paid envelope to give the

public an opportunity to easily provide written comments. The local media also announced the public meetings.

The Service held six public scoping meetings during March–April 2007 (see table 1 for details). After a presentation about the refuges, along with an overview of the CCP and NEPA processes, attendees were encouraged to ask questions and offer comments. Service employees were available after the presentation to answer individual questions about the CCP process and the refuge management overview. Each attendee was given a comment form to submit additional thoughts or questions in writing.

The Service received 25 written comments throughout the scoping process. Input obtained from meetings and correspondence, including emails, were considered in development of this draft CCP and EA.

## STATE COORDINATION

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

## RESULTS OF SCOPING

Table 1 (previous) summarizes all scoping activities. Comments collected from scoping meetings and correspondence, including comment forms, were used in the development of a final list of issues addressed in this draft CCP and EA.

The Service determined which alternatives could best address these issues. The planning process ensures that issues with the greatest effect on the refuges are resolved or given priority over the life of the final CCP. “Chapter 2, The Refuges” summarizes the identified issues, along with a discussion of effects on resources.

In addition, the Service considered suggested changes to current refuge management that were presented by the public and other groups.



## 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 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) follow 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



© Michael Mauro

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

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 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 11,500-acre refuge is a major waterfowl concentration point 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. 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.



© Craig Bihrie

*Northern pintail is a common duck at the refuges.*

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.

## 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.



© Bob Gress

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

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.

## REFUGE SUMMARY

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

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

<i>National Wildlife Refuge</i>	<i>Reserved From Public Domain</i>	<i>Fee-title Acres From Other Agencies</i>	<i>Gift Acres</i>	<i>Purchase 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

Source: "2006 Annual Report of Lands Under Control of the Service."

## 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:



John and Karen Hollingsworth/USFWS

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

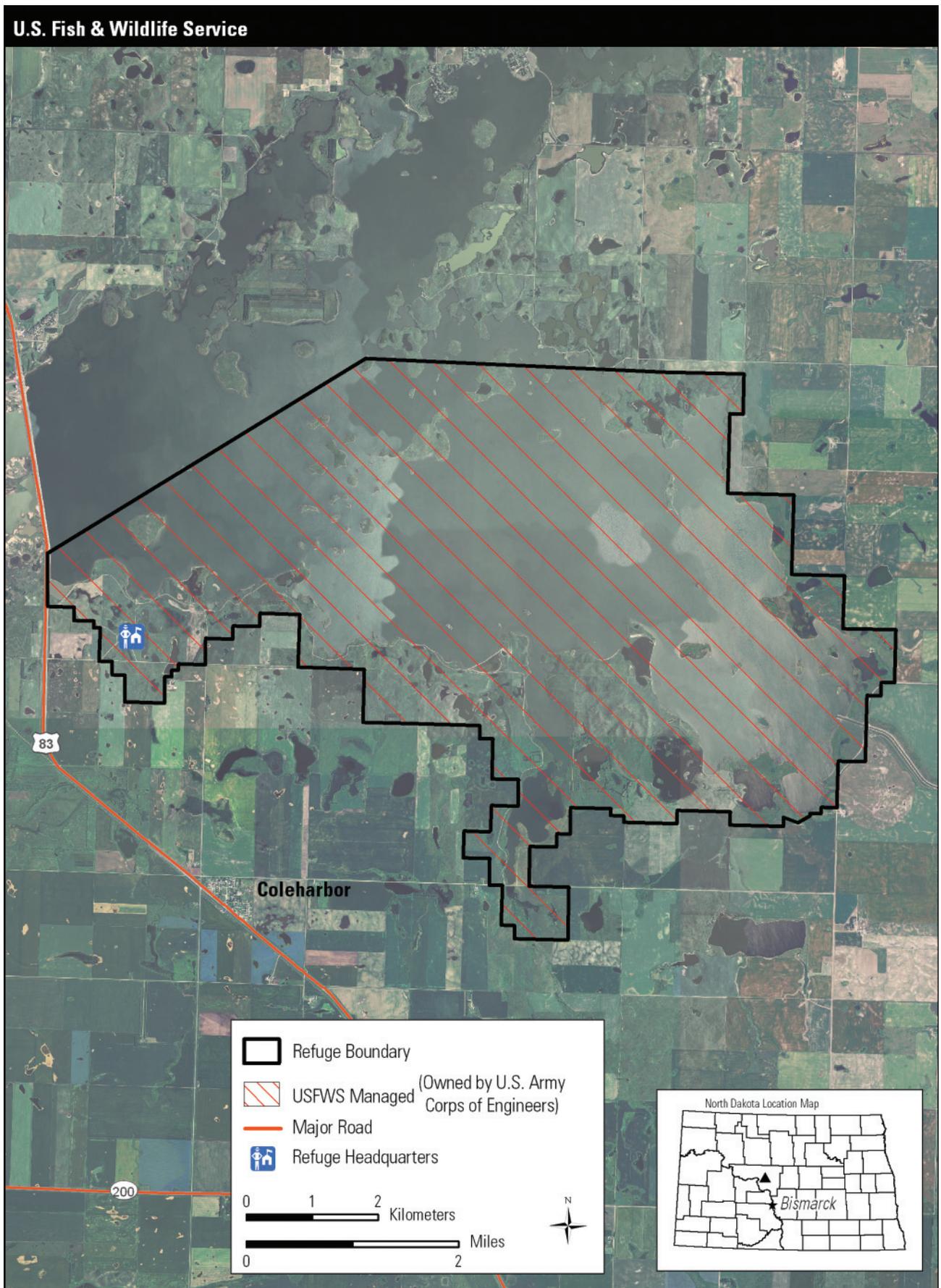
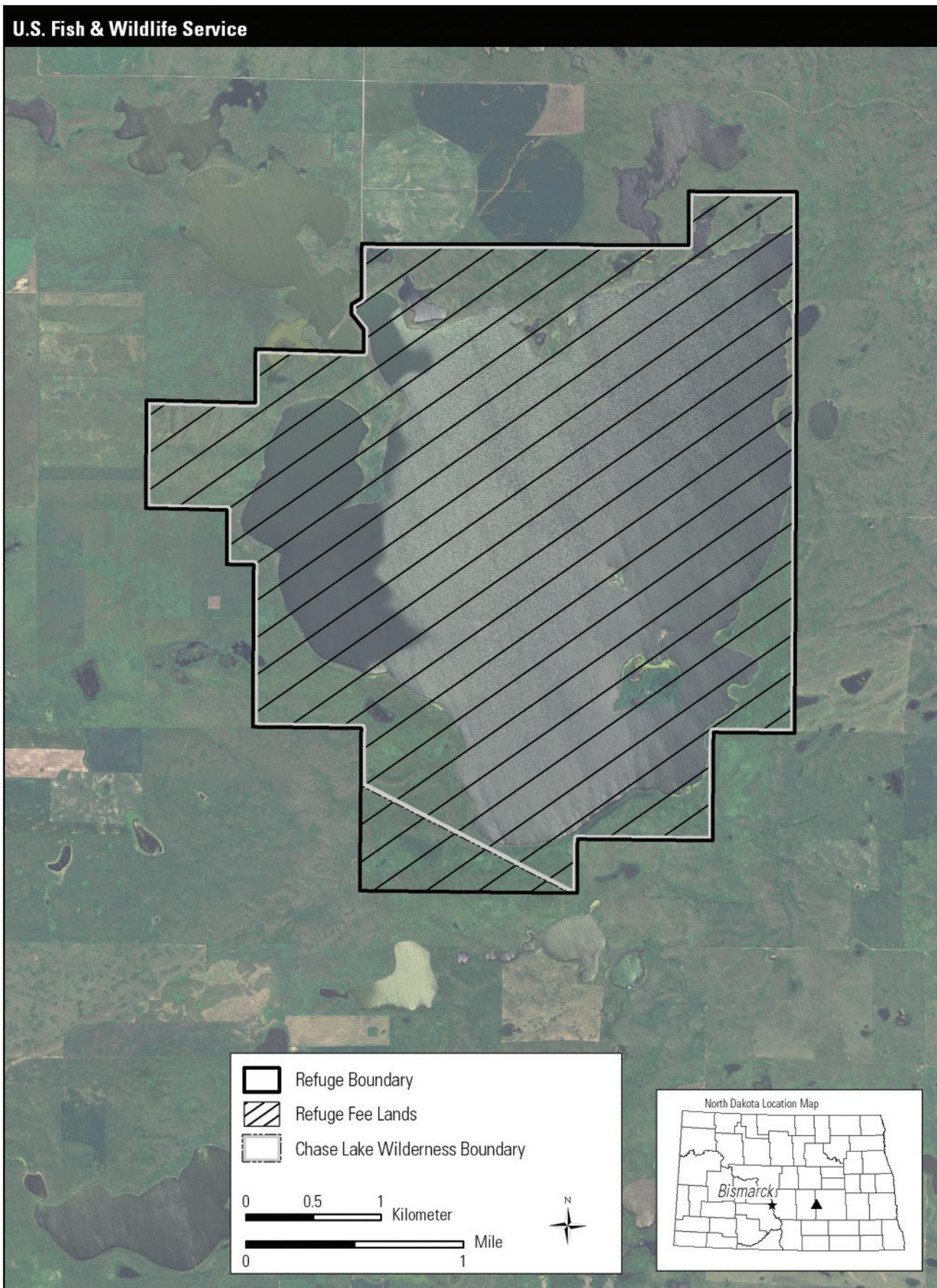


Figure 6. Map of Audubon National Wildlife Refuge, North Dakota.



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

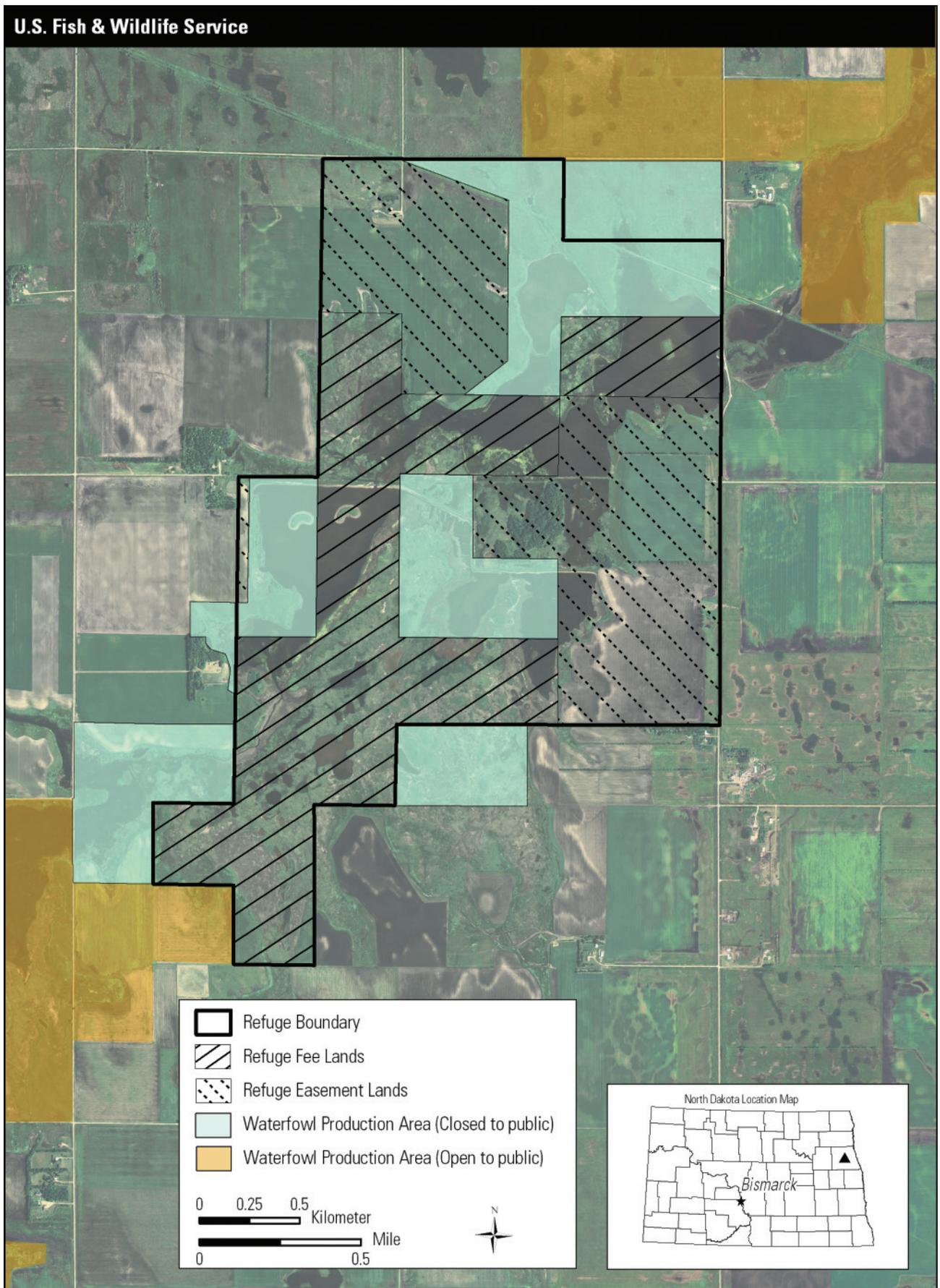


Figure 8. Map of Kellys Slough National Wildlife Refuge, North Dakota.

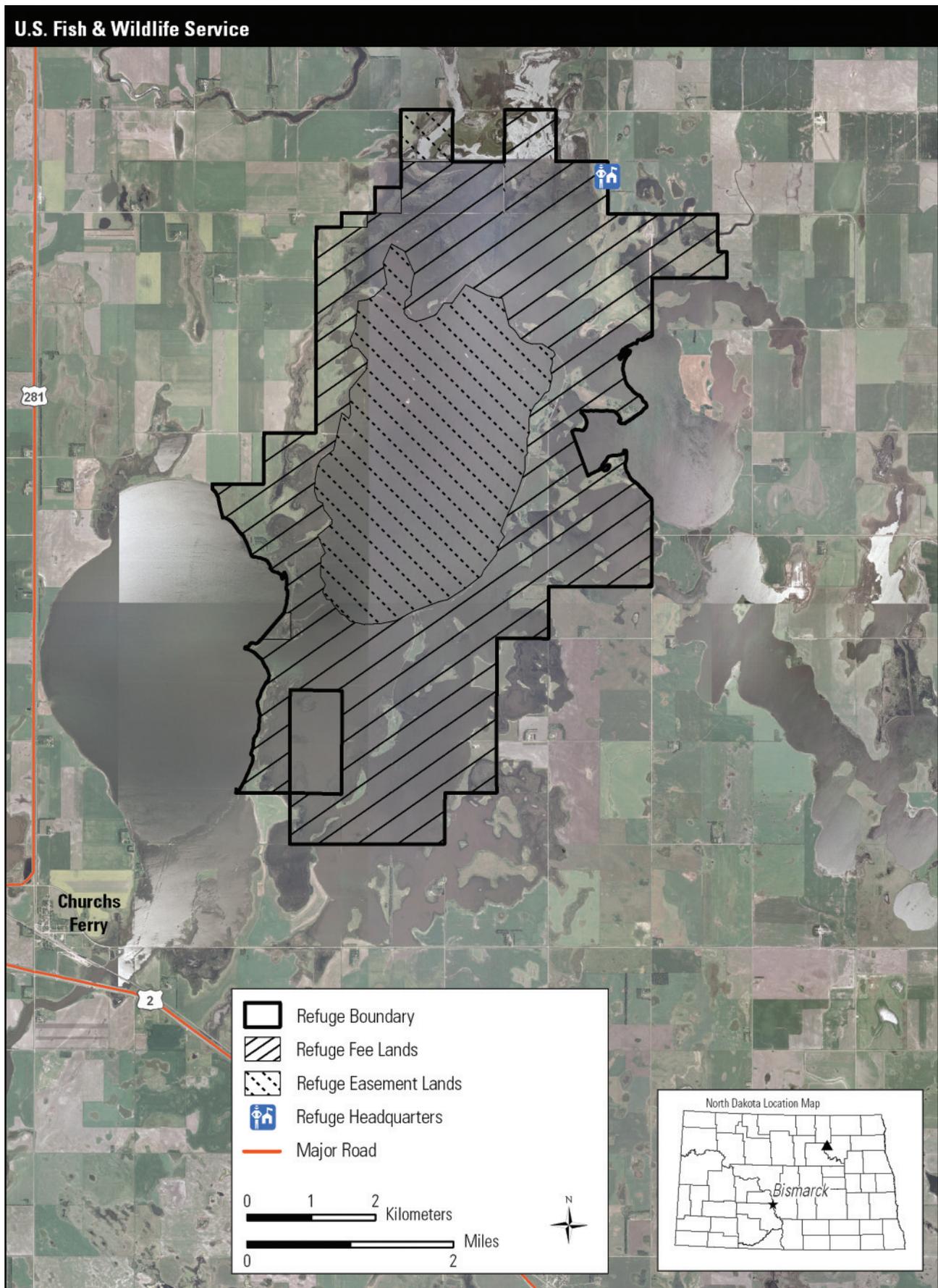


Figure 9. Map of Lake Alice National Wildlife Refuge, North Dakota.

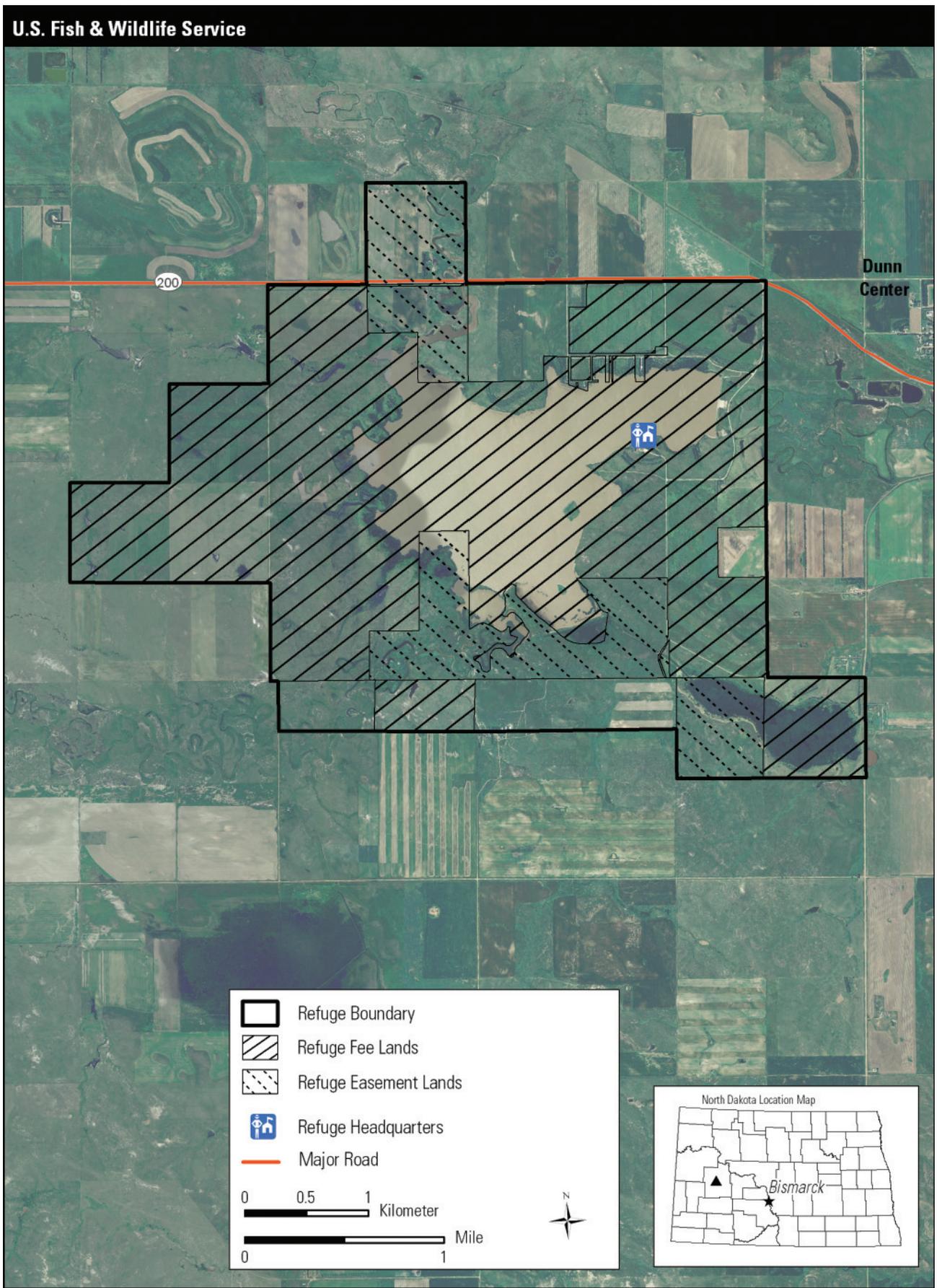


Figure 10. Map of Lake Ilo National Wildlife Refuge, North Dakota.

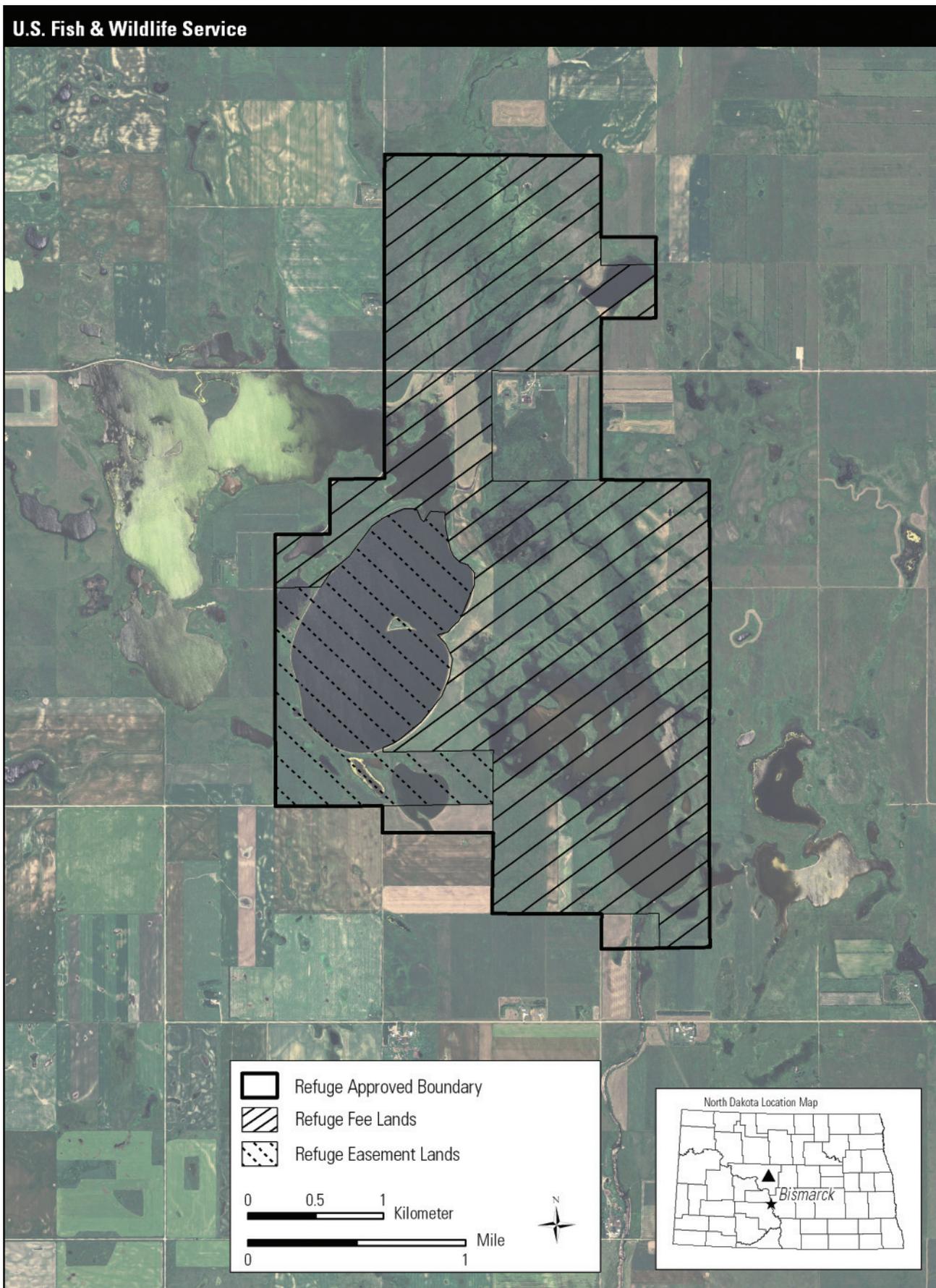


Figure 11. Map of Lake Nettie National Wildlife Refuge, North Dakota.

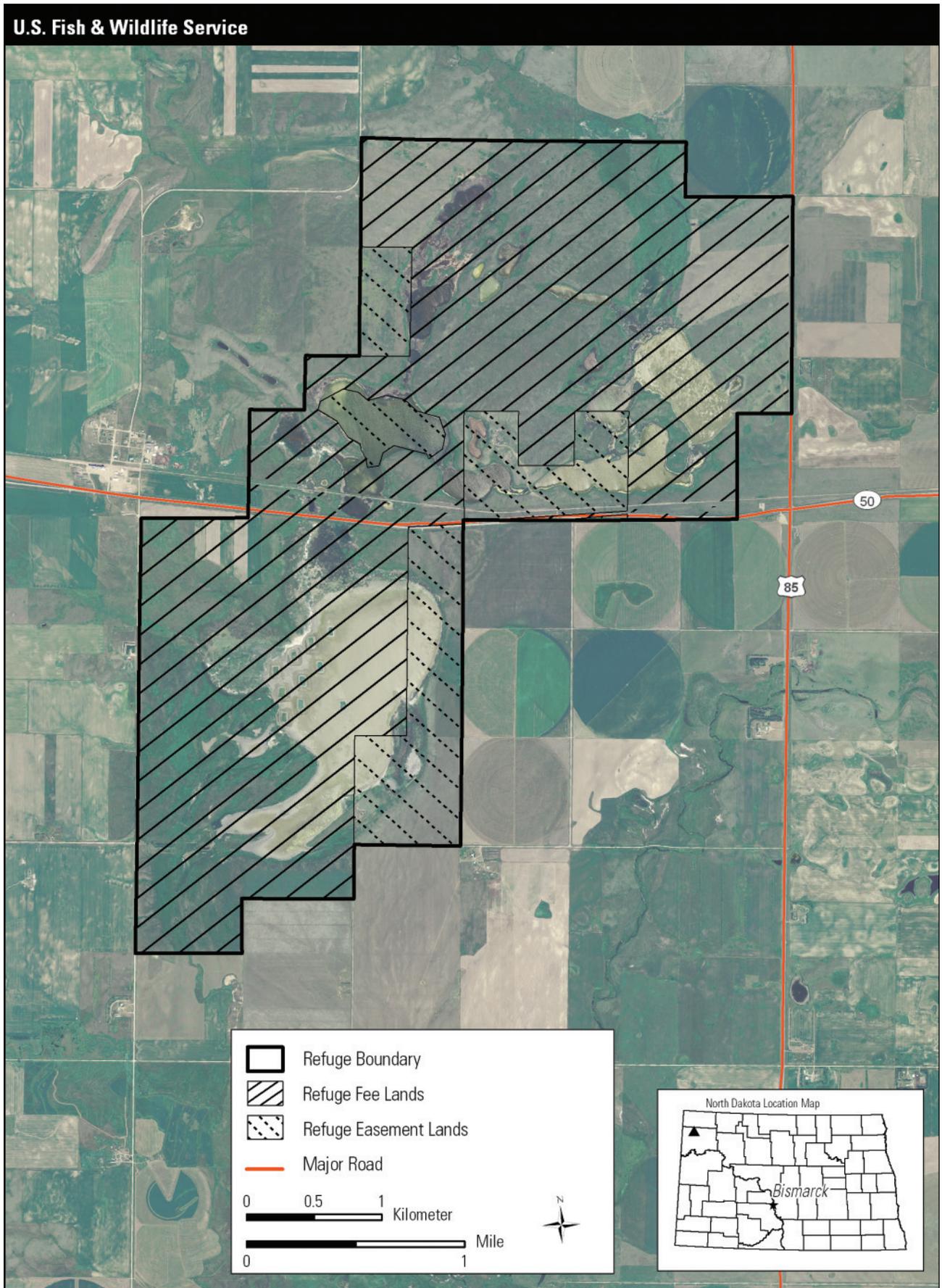
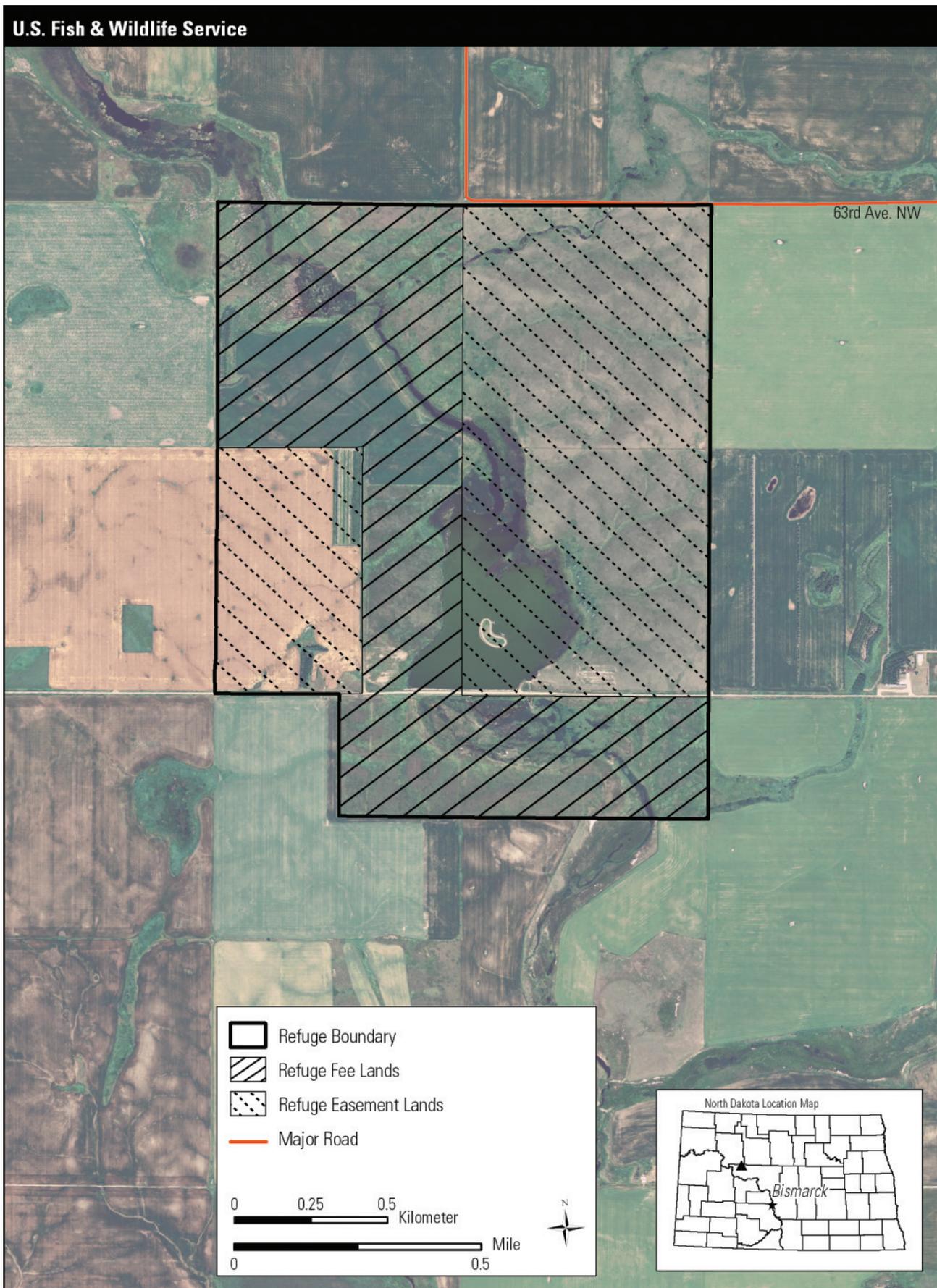


Figure 12. Map of Lake Zahl National Wildlife Refuge, North Dakota.



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

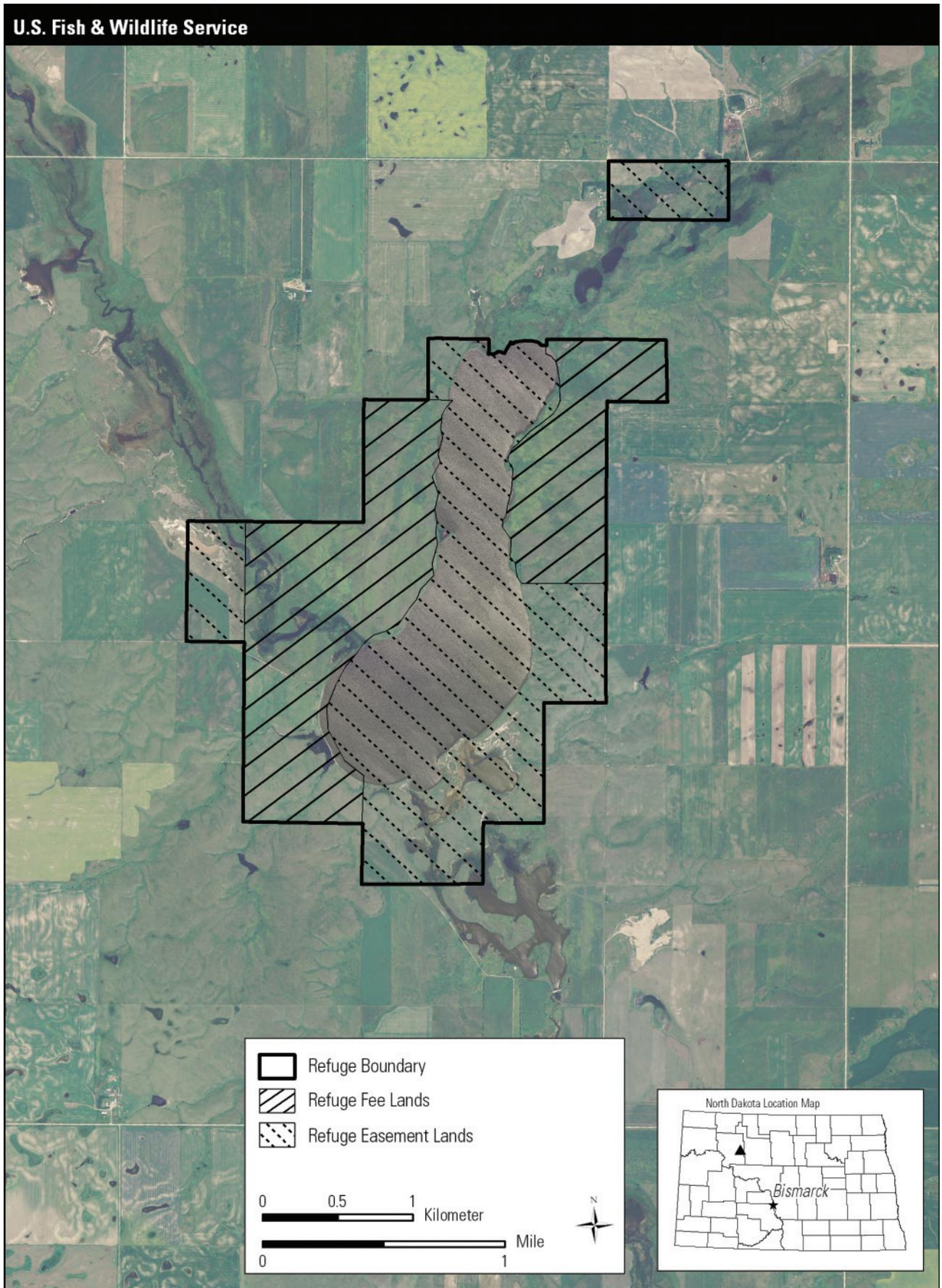


Figure 14. Map of Shell Lake National Wildlife Refuge, North Dakota.

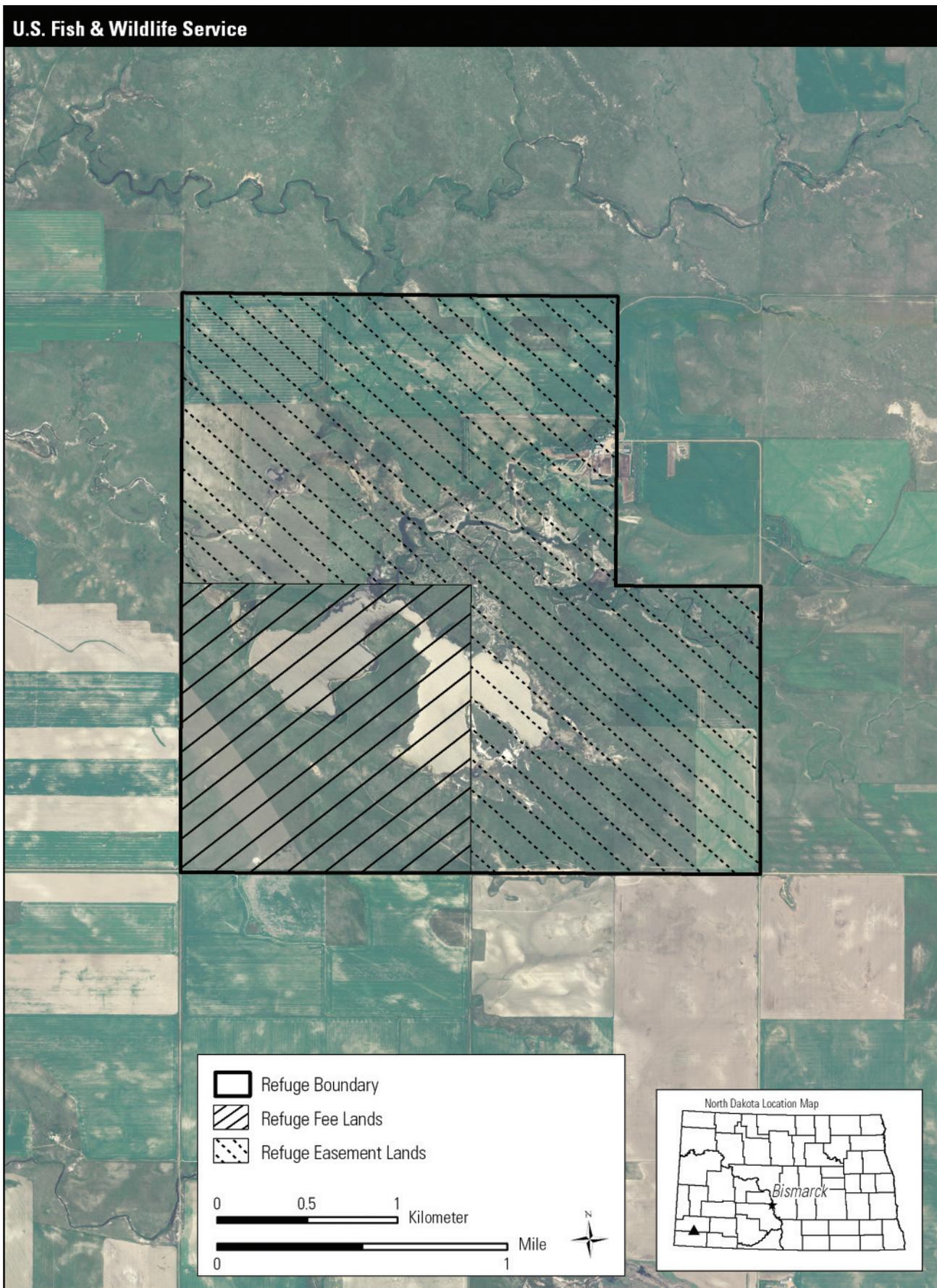


Figure 15. Map of Stewart Lake National Wildlife Refuge, North Dakota.



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

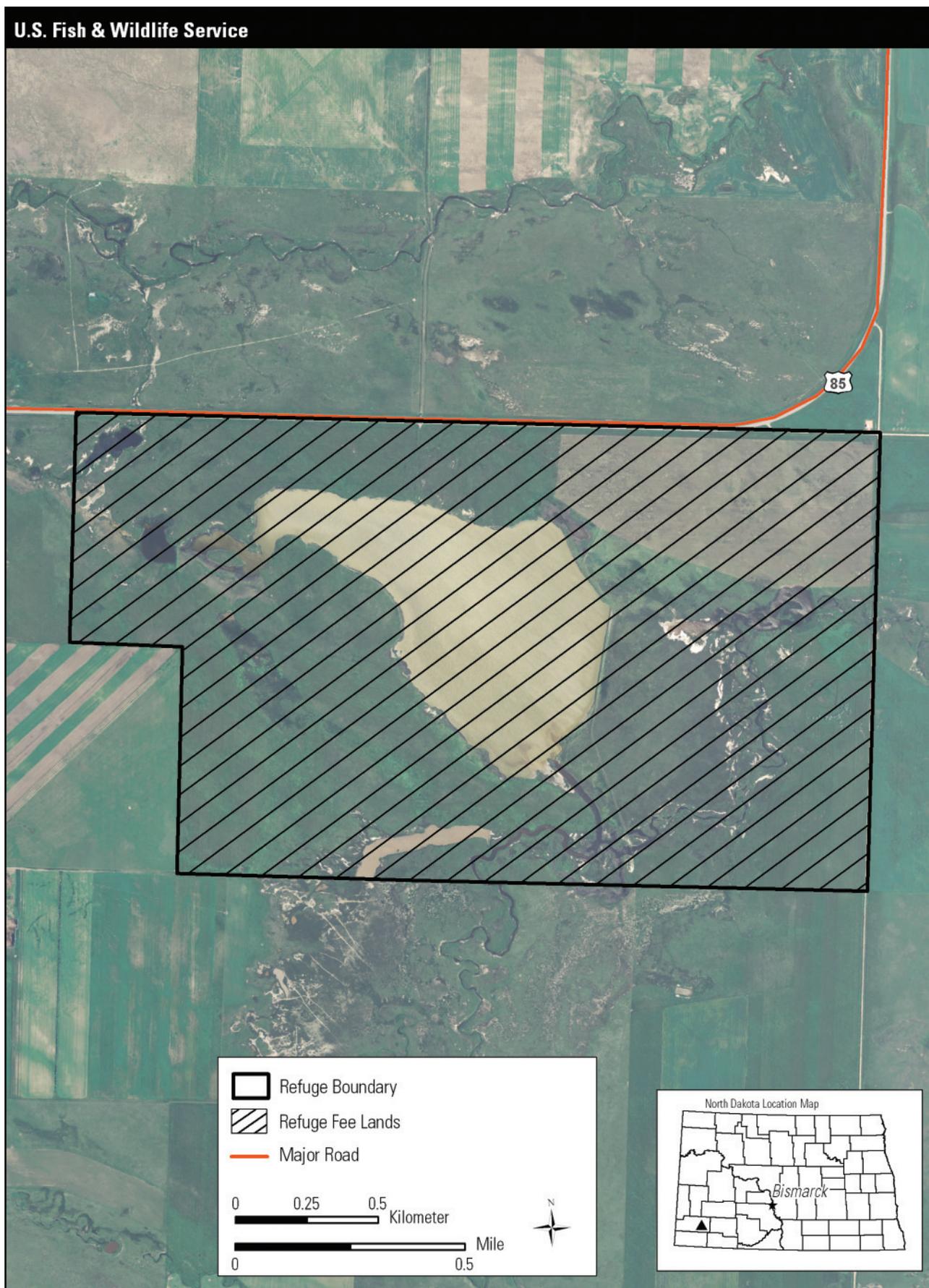


Figure 17. Map of White Lake National Wildlife Refuge, North Dakota.

- 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 would 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.*

## 2.5 Goals

The Service developed five 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 the 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 HABITAT

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, would need to be taken to protect the federal Farm Bill and its conservation provisions, such as the Conservation Reserve Program and “Swampbuster” and “Sod Saver” 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 would 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. Basic data about recruitment, mortality, and habitat use for a representative group of species must be collected and analyzed on a regular

basis to make appropriate decisions that affect the habitats these species depend on. The use of the refuges as a research field station 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 would like to see more opportunities 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 Alternatives



*A male canvasback finds security in a refuge wetland.*

Alternatives are different approaches for management of the 12 national wildlife refuges designed to resolve issues; achieve the refuges' purposes, vision, and goals; and help fulfill the mission of the Refuge System while complying with current laws and regulations and policies. The NEPA requires an equal and full analysis of all alternatives considered for implementation.

This chapter describes three management alternatives for the refuges: alternative A (current management, "no action"); alternative B (moderately enhanced management, proposed action); and alternative C (enhanced management).

This draft CCP and EA was completed at the programmatic level (overall guidance covering multiple units), rather than as a management plan for each refuge. This was the most logical approach given the following circumstances:

- Twelve national wildlife refuges are covered in the plan.
- There is a mixture of fee-title and easement authorities.

- There is a similar purpose, vision, and goal for each refuge.
- All units are located throughout the state of North Dakota.

## 3.1 Alternatives Development

Alternatives were formulated to address the significant issues, concerns, and problems identified by the Service, the public, and the governmental partners during public scoping and throughout the development of the draft plan.

This chapter contains the following sections:

- elements common to all alternatives
- description of alternatives
- summary of alternatives and environmental consequences (table 3)

The three management alternatives represent different approaches to protect and restore fish, wildlife, plants, habitats, and other resources. Alternative A, no-action alternative, describes ongoing refuge management.

The no-action alternative is a basis for comparison with alternatives B and C. Alternative B is the Service's proposed action and basis for the draft CCP in chapter 6.

The planning team assessed biological conditions and external relationships affecting the refuges. This information contributed to the development of alternatives, each of which presents a unique approach for addressing long-term goals. Each alternative was evaluated based on expected progress in meeting the vision and goals of the refuges and how it would address core habitat and wildlife issues and threats. Where data are available, trends in habitat and wildlife are evaluated, and the environmental consequences of each alternative are projected.

## 3.2 Elements Common to All Alternatives

A number of elements are common to all three alternatives. The need to maintain suitable habitat for a wide range of migratory bird species, especially those species of management concern, is common throughout.

Management of upland habitats includes the potential use of an array of practices (fire, grazing, chemicals, and biological control) in all alternatives. Across all alternatives, management of disturbed uplands (lands that have been, or are currently being, cropped, farmed, broken, or seeded to a native or tame grass mixture) focuses on improved habitat quality for migratory birds.

The alternatives include cultural resource evaluations in response to activities that are "undertakings" under section 106 of the National Historic Preservation Act (NHPA). The Service would comply with the NHPA and other pertinent cultural resource laws. In addition, the Service would protect where possible resources eligible to the National Register of Historic Places.



*Management and monitoring focus on preservation of the diversity of the prairies.*

Visitor services, such as workshops and enhanced outreach, would be provided to area schools and the public to as full an extent as possible. Maintaining support, on refuges that are open, for hunting, fishing, wildlife observation and photography, and environmental education and interpretation are common to all the alternatives.

The monitoring and research efforts in all alternatives focus on improving the Service's knowledge of how best to control invasive plants and increasing the intensity and extent of upland and wetland vegetation monitoring.

## 3.3 Description of Alternatives

Management actions to advance the mission of the Refuge System and the purpose and vision of the 12 refuges are described below. The alternatives reflect options to address significant threats, problems, and issues raised by public agencies, private citizens, and interested organizations.

Each alternative differs in its ability to achieve long-term habitat and wildlife goals. However, each is similar in its approach to managing the refuges.

Each alternative

- would pursue the goals outlined in chapter 2;
- would protect and enhance a diverse assemblage of habitats;
- would be consistent with the purposes of the refuges and the mission and goals of the Refuge System.

### ALTERNATIVE A—CURRENT MANAGEMENT (NO ACTION)

Under alternative A, management activities being conducted by the Service throughout the 12 refuges would not change. It provides the baseline against which to compare other alternatives. It is also a requirement of the NEPA that a no-action alternative be addressed in the planning process.

The Service would not develop any new management, restoration, or visitor services programs for the refuges. Staffs would not expand or change current habitat and wildlife management practices conducted for the benefit of waterfowl, migratory birds, and other wildlife. Staffs would conduct monitoring, inventory, and research activities at their current level (limited, issue-driven research and limited monitoring and inventory of birds and vegetation). Funding and staff levels would not change and programs would follow the same direction, emphasis, and intensity as they do at present.

#### Habitat and Wildlife

The current management of wildlife habitat and associated species is based on high-, medium-, and

low-priority areas at the refuges. Currently, only high-priority tracts receive consistent management. Acquisition efforts by the division of realty focus on high-priority tracts, and those are only from willing private landowners.

There is a concerted control effort for invasive plants recognized by the state and county. Habitat management at high-priority tracts addresses invasive plants of ecological concern. Refuge staffs use prescribed fire, farming (see appendix D), grazing (see appendix D), and invasive plant control to maintain and improve native prairie and tame grass units.

Refuge staffs would continue to monitor energy development and evaluate road and pad development on a case-by-case basis. Staffs would monitor for contaminant spills and direct cleanup by the power company.

Under this alternative, the staffs would continue to monitor and document the presence and use of refuge lands by federally listed species such as piping plovers and whooping cranes, as well as American white pelicans. The staffs would continue to impose area closures to public use in order to protect federally listed species using refuge lands, especially during nesting season.



USFWS

*Blazing star is a native prairie wildflower.*

### Monitoring and Research

Staffs would complete Service-mandated surveys on habitat and wildlife within specified timeframes and would continue to conduct baseline monitoring on high-priority tracts.

The current wildlife-monitoring efforts would continue: (1) annual surveys of various bird groups (for example, breeding waterfowl and migrant shorebirds); (2) periodic monitoring of waterfowl- and colonial-waterbird-nesting effort and success; and (3) 4-square-mile waterfowl pair counts.

Monitoring and inventory of vegetation—through belt transect monitoring of management effects and “Refuge Lands Geographic Information System” (RLGIS) habitat mapping—would continue. Vegetation line transects would continue periodically on a limited number of refuge units to track trends in progress being made using management activities to improve native prairie habitat.

Cooperative research efforts with other agencies and organizations would continue. Staffs would continue to use available information and sound science to make informed management decisions.

### Cultural Resources

The effect on cultural resources would be evaluated in response to activities that are “undertakings” under section 106 of the NHPA. The Service would comply with the NHPA and other pertinent cultural resource laws. In addition, the Service would protect where possible resources eligible to the National Register of Historic Places.

### Visitor Services

For refuges open to hunting (Audubon, Chase Lake, Lake Alice, Lake Nettie, and Zahl) and fishing (Audubon and Lake Ilo), those programs would continue with season dates paralleling the regular statewide seasons. Special use permits would continue to be used to regulate trapping to meet predator management objectives.

Access is limited to the refuges’ public use roads and foot traffic on all Service lands. Some refuges are open to limited wildlife-dependent recreational uses, such as only hunting and fishing. Stump Lake and White Lake national wildlife refuges are closed to all public use.

Visitor services events and workshops with such groups as school districts, youth groups, and conservation groups are conducted on a multiyear rotation among refuges.

Refuge informational brochures and publications would continue to be updated periodically. Public use facilities including displays, signage, and brochures would be maintained at each refuge’s headquarters and throughout each refuge.

Media outreach through newspaper articles and radio announcements would continue to be occasionally made.

### Partnerships

The refuge staffs would work to preserve existing partnerships need to address resource information

needs, protect and enhance habitat, and promote wildlife-dependent recreational use, education, and outreach. Current partners include local private landowners—for management, acquisition of grassland and wetland, weed initiatives, and outreach.

The refuges also would continue their partnerships for biological and public outreach with government agencies such as U.S. Geological Survey (USGS) and NDGF and with nongovernmental organizations such as Ducks Unlimited.

### Operations

The funding and staff resources would remain at current levels to meet the necessary legal and obligated mandates and to provide management at the high-priority tracts. Operations for the refuges would continue to include maintenance of vehicles and other equipment in good working condition to achieve management goals. An adequate law enforcement presence would be provided for visitor safety and facility and wildlife protection.

## ALTERNATIVE B—MODERATELY ENHANCED (PROPOSED ACTION)

Under alternative B, wildlife habitat management would provide for enhanced wetland and upland management, where warranted, on refuge lands. Management objectives for various habitat types would be based on habitat preferences of groups of target species such as waterfowl, migratory shorebirds, grassland bird species, and priority species. Refuge staffs would focus on high- and medium-priority tracts. The refuge staffs would carry out compatible production enhancement techniques for targeted migratory bird populations.

The refuge staffs would maintain existing environmental education and visitor services programs, with additional waterfowl emphases. The Service proposes, at a future date, a new environmental learning center for Audubon National Wildlife Refuge and interpretive panels for Lake Alice National Wildlife Refuge.

### Habitat and Wildlife

Management of wetland and upland habitats would be driven by the habitat needs of a group of target species (for example, waterfowl, migratory shorebirds, grassland bird species, and priority species). The focus of the refuge staffs would be to maintain and enhance native prairie through enhanced management at high- and medium-priority tracts to address invasive plants of ecological concern, in order to provide quality habitat.

Old croplands would be managed for the same target species. Management would be an ongoing process to convert unsuitable nesting habitat (such as cropland; degraded dense, nesting cover [DNC]; monotypic cool-season tame grass stands) to a diverse native plant mixture. Species included in the plant mix would be

based on historical vegetative composition, soil structure, and requirements of the target species. Established native grass stands and the remainder of the disturbed uplands would be periodically managed to rejuvenate grass, reduce litter accumulations, and control invasive plants through (1) haying (see appendix D), (2) grazing (see appendix D), (3) prescribed burning, and (4) chemical or biological treatments.

Invasive and planted woody vegetation would be managed in a way that provides the greatest overall benefit to a select group of targeted species. This alternative would allow for the removal of trees and shrubs if refuge staffs decided that it is the most appropriate management for the benefit of target species.

Under this alternative, the Service's Habitat and Populations Evaluation Team (HAPET) in Bismarck, North Dakota, would help refuge staffs to identify high- and medium-high-priority habitats for target species. The Service's division of realty would focus acquisition efforts on high-priority tracts to buy in fee title, such as "roundouts" (odd shapes in boundaries that are "straightened" by the purchase of land), from willing selling landowners.

For targeted migratory bird populations, the refuge staffs would incorporate compatible production enhancement techniques such as island trapping for predators and artificial nesting structures.

As in alternative A, the staffs would continue to monitor and document the presence and use of refuge lands by federally listed species such as piping plovers and whooping cranes, as well as American white pelicans. The staffs would continue to impose area closures to public use in order to protect federally listed species using refuge lands, especially during nesting season.

### Monitoring and Research

Current monitoring and research would continue as described for alternative A. Refuge staffs would also complete some baseline monitoring at high- and medium-priority tracts. The staffs would participate in landscape-level analysis to (1) guide and promote management-level research to improve habitat management practices, and (2) monitor for improved success of seeded areas to native grasses (both in composition and structure), as well as monitoring control of nonnative grasses (such as Kentucky bluegrass and smooth brome) and other invasive plants.

### Cultural Resources

As in alternative A, the effect on cultural resources would be evaluated in response to activities that are "undertakings" under section 106 of the NHPA. The Service would comply with the NHPA and other pertinent cultural resource laws. In addition,

the Service would protect where possible resources eligible to the National Register of Historic Places.

### Visitor Services

This alternative would expand the current level and quality of opportunities and facilities for environmental education and interpretation to meet the needs of a wide array of target audiences of all abilities. Hunting, fishing, wildlife observation, and photography uses would be similar to alternative A.

Visitor services events and workshops with such groups as school districts, youth groups, and conservation groups would be conducted on a 3-year rotation among refuges (every 3 years, a different refuge would conduct these activities). Workshops would emphasize waterfowl and migratory bird identification with school groups and teachers.

Media outreach with local newspapers and radio stations would be conducted annually. Refuge brochures and publications would be reviewed annually and updates completed as needed.

All visitor services facilities would be reviewed and, if necessary, upgraded to meet Service standards. The Service proposes, at a future date, a new environmental learning center for Audubon National Wildlife Refuge and kiosks and interpretive panels for Lake Alice National Wildlife Refuge. In addition, Lake Alice National Wildlife Refuge would explore opening the lake to ice fishing and, if the floodwater recedes in the next 15 years, restoration of visitor service facilities. Kellys Slough National Wildlife Refuge would expand its environmental education programs.



© Craig Bihrie

*Duck hunters get an early start on a peaceful morning.*

### Partnerships

Under this alternative, existing partnerships would be expanded to address resource information needs for a broad group of wildlife species such as waterfowl, shorebirds, and songbirds. This alternative would encourage continued work with local, state, and federal agencies to explore new avenues to meet the goals. Neighboring, private landowners would be targeted

for partnerships, which the Service would expand to enhance waterfowl habitats within the refuges. This alternative would also promote developing and fostering partnerships with local communities, such as “friends groups,” to inform the public of refuge programs and special events.

### Operations

This alternative would require an increase in refuge operations to address program needs for the “modified management” strategy. Increased funding for staff, equipment, and supplies would be needed to support management of priority resources. Law enforcement would be provided for visitor safety and facility and wildlife protection.

## ALTERNATIVE C—ENHANCED MANAGEMENT

Under alternative C, refuge staffs would apply more intensive and widespread management of the native prairie and wetland complexes. Refuge staffs would seek out restoration projects that expand and return native grasslands to quality native prairie. This alternative has the potential to provide management options that address habitat requirements and needs of specific groups of water-dependent birds (for example, waterfowl and shorebirds).

The staffs would develop new environmental education and visitor services programs. The Service proposes, at a future date, a new environmental learning center for Audubon National Wildlife Refuge and interpretive panels are planned for Lake Alice National Wildlife Refuge.

### Habitat and Wildlife

All refuge tracts would receive consistent management. The staffs would intensively manage the most intact ecosystems of native prairie and wetland, which are more likely to support a wide range of migratory bird species, especially those of management concern such as northern pintail and marbled godwit. Returning grasslands to quality native prairie would be a priority. Management would emphasize restoration of representative examples of native mixed- and tall-grass prairies, including healthy grasslands to benefit ground-nesting species of migratory birds.

Management of disturbed upland habitats would be driven by the needs of waterfowl and shorebirds. Under this alternative, old cropland sites and badly degraded native prairies would be lowest priority, but would be managed to attract high densities of waterfowl species that use DNC; efforts to increase nest and brood survival would focus on these tracts.

The Service would continue fee-title and easement expansion acquisition, along with enforcement through proactive GIS mapping. Acquisition efforts would be directed at high-priority easements, mainly with fee-title purchase of “roundouts.”

Legally identified, nonnative, invasive plants would be managed on priority tracts, allowing for management actions that benefit a specific wildlife group. This alternative would allow for the removal of existing nonnative trees and shrubs for the benefit of another wildlife group such as grassland-dependent songbirds, upland-nesting shorebirds, and waterfowl.

As in alternative A, the staffs would continue to monitor and document the presence and use of refuge lands by federally listed species such as piping plovers and whooping cranes, as well as American white pelicans. The staffs would continue to impose area closures to public use in order to protect federally listed species using refuge lands, especially during nesting season.

### Monitoring and Research

The refuges' monitoring and research activities would parallel those in alternative B, with the addition of answering specific management questions. Research money would be available for graduate student work and self-directed research projects.

The following research would be done:

- Annually conduct vegetation transects on native prairie habitats.
- Conduct a research project on reseeding uplands to native mixes.
- Monitor water quality; specifically assess upstream threats (concentrated animal-feeding operations and the air base).
- Conduct waterfowl population and density surveys.
- Conduct cooperative (with NDGF) upland bird and deer surveys.
- Conduct a reptile and amphibian inventory.

### Cultural Resources

As in alternatives A and B, the effect on cultural resources would be evaluated in response to activities that are "undertakings" under section 106 of the NHPA. The Service would comply with the NHPA and other pertinent cultural resource laws. In addition, the Service would protect where possible resources eligible to the National Register of Historic Places. The refuge staffs would develop educational programs and interpretive opportunities for the public.

### Visitor Services

The current level and quality of environmental education and interpretation opportunities and facilities would be expanded to meet the needs of a wide array of target audiences of all abilities. The

refuge staffs would develop programs to enhance wildlife-dependent recreational use, outdoor classroom activities, and interpretive exhibits and displays.

Visitor services events such as teacher workshops and waterfowl identification would be expanded over current levels and would be conducted annually by refuge staffs. Brochures and publications would be reviewed and renewed annually. New publications and educational materials would be developed to aid in the interpretation of the sights and sounds within the refuges.

Outreach would include the media and partner groups such as wildlife clubs and nonprofit conservation groups. Efforts to give presentations to the area public and schools would be a priority.

All visitor services facilities would be reviewed and, if necessary, upgraded to meet Service standards. The Service proposes, at a future date, a new environmental learning center for Audubon National Wildlife Refuge and kiosks and interpretive panels for Lake Alice National Wildlife Refuge. Lake Alice National Wildlife Refuge would explore opening the lake to ice fishing. If floodwaters recede in the next 15 years, the Service would restore visitor service facilities at Lake Alice National Wildlife Refuge. The Service would expand hunting-related outreach to the public about opportunities at Lake Alice National Wildlife Refuge. Kellys Slough National Wildlife Refuge would expand its environmental education programs.

### Partnerships

Partnership development and management would parallel that in alternative B. Additionally, existing partnerships with the local public and NDGF would be expanded. New partnerships would be developed to increase collaboration with community members ("friends groups") who have an appreciation for and interest in the welfare of the refuges.

### Operations

As in alternative B, this alternative would require an increase in refuge operations to address program needs for the "modified management" strategy. Increased funding for staff, equipment, and supplies would be needed to support management of priority resources. Law enforcement would be provided for visitor safety and facility and wildlife protection.

## 3.4 Comparison of Alternatives

Table 3 summarizes the actions and predicted consequences of each alternative.

**Table 3. Comparison of Alternatives for the 12 Refuges, North Dakota.**

<p><i>ALTERNATIVE A</i>  <i>Current Management (No Action)</i>                      Current funding, staff, and programs.</p>	<p><i>ALTERNATIVE B</i>  <i>Moderately Enhanced Management (Proposed Action)</i>                      Management of high- and medium-priority habitats. Improved visitor services.</p>	<p><i>ALTERNATIVE C</i>  <i>Enhanced Management</i>                      Intensive habitat management with migratory bird emphasis. Management of all uplands. Improved and expanded visitor services and outreach.</p>
<b>Habitat and Wildlife—Actions</b>		
<p>Prioritize refuge tracts for management, with only high-priority tracts receiving consistent management.</p> <p>Continue native species restoration at the current level.</p> <p>Use prescribed fire, grazing, farming, and invasive plant control to maintain and improve native prairie and tame grass units.</p> <p>Manage legally identified invasive plants at high-priority refuge tracts.</p> <p>Focus acquisition on high-priority tracts; use mostly conservation easements.</p>	<p>Prioritize refuge tracts for management, with only high- and medium-priority habitats receiving consistent management.</p> <p>Identify and restore degraded vegetative tracts to native grass species.</p> <p>Increase water management capability.</p> <p>Apply compatible production enhancement techniques for targeted migratory bird populations.</p> <p>Manage legally identified invasive plants at high- and medium-priority tracts.</p>	<p>Manage all refuge tracts consistently.</p> <p>Apply intensive management on native prairies and wetlands in the most intact ecosystems, which are more likely to support a wide range of migratory bird species.</p> <p>Enhance water management capability and manage all wetlands for waterfowl and shorebirds.</p> <p>Incorporate compatible production enhancement techniques for targeted migratory bird, such as island trapping for predators and hen houses.</p> <p>Manage legally identified invasive plants at all fee-title tracts.</p>
<b>Habitat and Wildlife—Environmental Consequences</b>		
<p>The current productivity of wetland and upland vegetation communities would be maintained in high-priority refuge tracts.</p> <p>The current support of waterfowl, shorebird, and upland species use would be maintained.</p> <p>There would be a gradual long-term deterioration of habitats in medium- and low-priority tracts.</p>	<p>The productivity of vegetative wetland and upland communities would be improved in all refuge tracts for bird species migration, breeding, and recruitment.</p> <p>Native prairie grass and forb conditions for targeted species would improve.</p> <p>The ability to mimic natural wetland cycling would be enhanced through increased water management.</p> <p>Waterfowl recruitment would be increased through improved habitat conditions and control of predators.</p> <p>Additional habitat in high-priority tracts would be protected through acquisition.</p>	<p>The productivity of vegetative wetland and upland communities would be improved in all refuge tracts for bird species migration, breeding, and recruitment.</p> <p>Management of intact landscapes would provide a structural mosaic of native vegetative communities with less fragmentation, which would lead to less invasive plant species.</p> <p>The occurrence of all invasive plants on all refuge lands would be mapped.</p>

**Table 3. Comparison of Alternatives for the 12 Refuges, North Dakota.**

<i>ALTERNATIVE A</i> <i>Current Management (No Action)</i> Current funding, staff, and programs.	<i>ALTERNATIVE B</i> <i>Moderately Enhanced Management (Proposed Action)</i> Management of high- and medium-priority habitats. Improved visitor services.	<i>ALTERNATIVE C</i> <i>Enhanced Management</i> Intensive habitat management with migratory bird emphasis. Management of all uplands. Improved and expanded visitor services and outreach.
Monitoring and Research—Actions		
<p>Conduct mandated surveys and some baseline monitoring on high-priority tracts.</p> <p>Periodically complete vegetation line transects at a limited number of tracts to track progress of management activities to improve native prairie.</p> <p>Complete 4-square-mile waterfowl pair counts.</p> <p>Monitor all conservation easements; enforce only high-priority violations.</p>	<p>Collect baseline vegetation and migratory bird data.</p> <p>Conduct mandated surveys and some baseline monitoring on high- and medium-priority tracts.</p> <p>Periodically complete vegetation line transects at a limited number of tracts to track progress of management activities to improve native prairie.</p> <p>Complete 4-square-mile waterfowl pair counts.</p> <p>Conduct colonial bird counts and biweekly waterfowl counts.</p> <p>Monitor the effects of management and restoration on migratory birds.</p>	<p>Increase collection of baseline vegetation and migratory bird data of all refuge habitats.</p> <p>Conduct mandated surveys and baseline monitoring.</p> <p>Increase monitoring of grasslands, wetlands, and wildlife. Expand vegetation transects on native prairie to include more refuge units and do annually.</p> <p>Conduct waterfowl population and density, upland bird, other migratory bird, and deer surveys. Conduct a reptile and amphibian inventory</p> <p>Monitor water quality to assess upstream threats.</p> <p>Conduct specific research to answer management questions, including research on reseeding uplands to native mixes and on migratory bird response to large-scale wind farms.</p>
Monitoring and Research—Environmental Consequences		
<p>Although limited, any information gathered would be beneficial to the staffs in analysis of management needs.</p>	<p>The additional monitoring and research would lead to improved habitat conditions and health of migratory and resident species that use refuge lands.</p>	<p><i>Same as alternative B.</i></p>
Cultural Resources—Actions		
<p>Conduct cultural resource evaluations in response to activities that are “undertakings” under section 106 of the NHPA.</p> <p>Comply with cultural resource laws including protection, when possible, of resources eligible for the National Register of Historic Places.</p>	<p><i>Same as alternative A.</i></p>	<p><i>Same as alternatives A and B, plus the following.</i></p> <p>Develop educational programs and interpretive opportunities for the public.</p>

**Table 3. Comparison of Alternatives for the 12 Refuges, North Dakota.**

<p><i>ALTERNATIVE A</i>  <i>Current Management (No Action)</i>                      Current funding, staff, and programs.</p>	<p><i>ALTERNATIVE B</i>  <i>Moderately Enhanced Management (Proposed Action)</i>                      Management of high- and medium-priority habitats. Improved visitor services.</p>	<p><i>ALTERNATIVE C</i>  <i>Enhanced Management</i>                      Intensive habitat management with migratory bird emphasis. Management of all uplands. Improved and expanded visitor services and outreach.</p>
<b>Cultural Resources—Environmental Consequences</b>		
<p>Cultural resources that would be potentially affected by an undertaking would be identified and, if significant, preserved when possible.</p>	<p><i>Same as alternative A.</i></p>	<p><i>Same as alternatives A and B, plus the following.</i>                       More of the public would learn about cultural resources in the refuges.</p>
<b>Visitor Services—Actions</b>		
<p>Conduct visitor services events such as teacher workshops on a multiyear rotation among refuges.                       Occasionally update brochures and publications.                       Occasionally do media outreach.</p>	<p>Explore ice-fishing opportunities at Lake Alice NWR.                       Conduct visitor services events such as teacher workshops and waterfowl identification on a 3-year rotation among refuges.                       Improve and expand programs for youth and conservation groups on a 3-year rotation.                       Start and expand environmental education programs for Kellys Slough and Lake Alice NWRs.                       Annually review brochures and publications; complete updates as needed.                       Develop “friends groups” associated with the refuges.                       Do limited outreach to wildlife groups, conservation and community groups, and teachers and students.                       Annually conduct media outreach.                       Construct a new administration and learning center for Audubon NWR.                       If the opportunity arises, restore visitor service facilities at Lake Alice NWR. Construct new kiosks and interpretive panels at Lake Alice NWR.</p>	<p><i>Same as alternative B, plus the following.</i>                       Develop outdoor classroom activities.                       Annually review and renew brochures and publications. Develop new publications and educational materials.                       Conduct outreach to include partner and conservation groups, wildlife clubs, teachers and students, and community groups.                       Enhance visitor services and add interpretive displays.</p>

**Table 3. Comparison of Alternatives for the 12 Refuges, North Dakota.**

<p><i>ALTERNATIVE A</i>  <i>Current Management (No Action)</i>                      Current funding, staff, and programs.</p>	<p><i>ALTERNATIVE B</i>  <i>Moderately Enhanced Management (Proposed Action)</i>                      Management of high- and medium-priority habitats. Improved visitor services.</p>	<p><i>ALTERNATIVE C</i>  <i>Enhanced Management</i>                      Intensive habitat management with migratory bird emphasis. Management of all uplands. Improved and expanded visitor services and outreach.</p>
<b>Visitor Services—Environmental Consequences</b>		
<p>Opportunities would continue at or near existing levels.</p>	<p>Through additional workshops, brochures, and exhibits, the public and school groups would better understand species and habitat relationships and the mission of the Refuge System.</p> <p>The establishment of visitor centers and contact stations would increase public visitation and knowledge of the refuges.</p> <p>There may be irreversible damage to relatively small areas of vegetation due to facility construction. Construction equipment may cause short-term disturbance to wildlife.</p>	<p><i>Same as alternative B.</i></p>
<b>Partnerships—Actions</b>		
<p>Continue at the current level of partnerships with the public, adjacent landowners, and school groups to promote the mission of the Refuge System.</p> <p>Continue coordination with the NDGF to help in the management of hunting and fishing programs at current open refuges (Audubon and Lake Ilo).</p>	<p><i>Same as alternative A, plus the following.</i></p> <p>Begin the study of a “friends group,” expand partnerships with universities, and improve relations with neighbors.</p>	<p><i>Same as alternatives A and B, plus the following.</i></p> <p>Expand and improve existing partnerships with the local public and NDGF. Develop new partnerships to benefit mutual programs.</p>
<b>Partnerships—Environmental Consequences</b>		
<p>Without new partnerships, the refuges would be unable to meet future demands from the public for visitation and public education. Monitoring and research would remain at the current level without the ability to expand into needs analyses.</p>	<p>Expanded partnerships would enable the refuges to meet the needs of visitors.</p> <p>Partners would help staff in monitoring and research, which would expand the knowledge of habitat management and restoration.</p>	<p><i>Same as alternative B.</i></p>

**Table 3. Comparison of Alternatives for the 12 Refuges, North Dakota.**

<i>ALTERNATIVE A</i> <i>Current Management (No Action)</i> Current funding, staff, and programs.	<i>ALTERNATIVE B</i> <i>Moderately Enhanced Management (Proposed Action)</i> Management of high- and medium-priority habitats. Improved visitor services.	<i>ALTERNATIVE C</i> <i>Enhanced Management</i> Intensive habitat management with migratory bird emphasis. Management of all uplands. Improved and expanded visitor services and outreach.
<b>Operations—Actions</b>		
Maintain current staff, equipment, and other resources.	Increase resources to accomplish moderate enhancement of refuge programs.  Provide law enforcement for visitor safety and facility and wildlife protection.	Increase resources to accomplish all mandates and other projects to enhance the mission of the Refuge System.  Provide law enforcement for visitor safety and facility and wildlife protection.
<b>Operations—Environmental Consequences</b>		
Current levels of operation would be maintained.  Property and equipment would be safe and workable, but refuges would lack state-of-the-art equipment for habitat improvement.	The refuge staffs would have the resources necessary to improve habitats and management for migratory species.  New improvements and accessibility would increase the value and usability of the refuges to visitors.	<i>Same as alternative B.</i>



## 4 Affected Environment



*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, the affected environment includes the fire and grazing history, cultural resources, visitor services, socioeconomic environment, and operations of the refuges.

### 4.1 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 (CO<sub>2</sub>) 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 CO<sub>2</sub>.

One Service activity in particular—prescribed burning—releases CO<sub>2</sub> 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°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 4 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

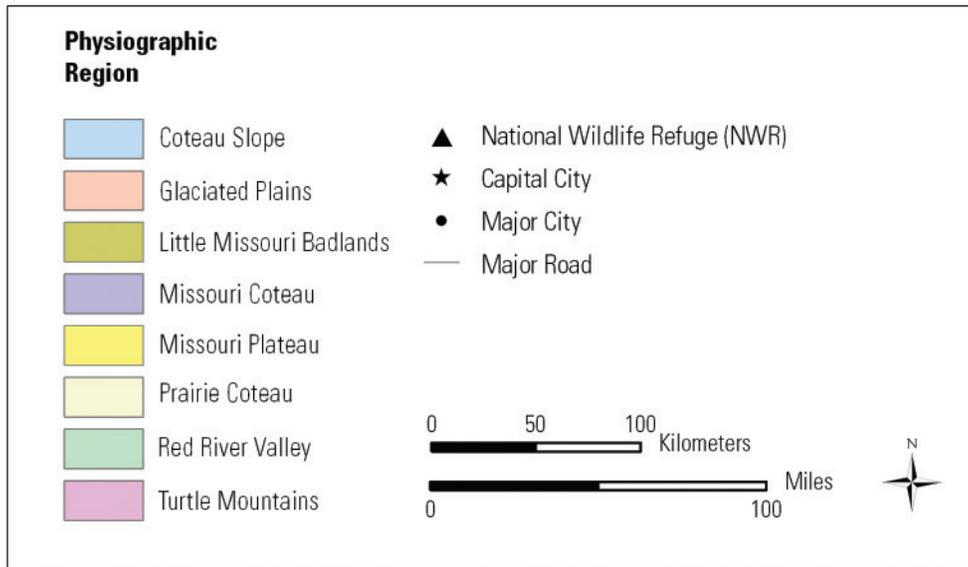
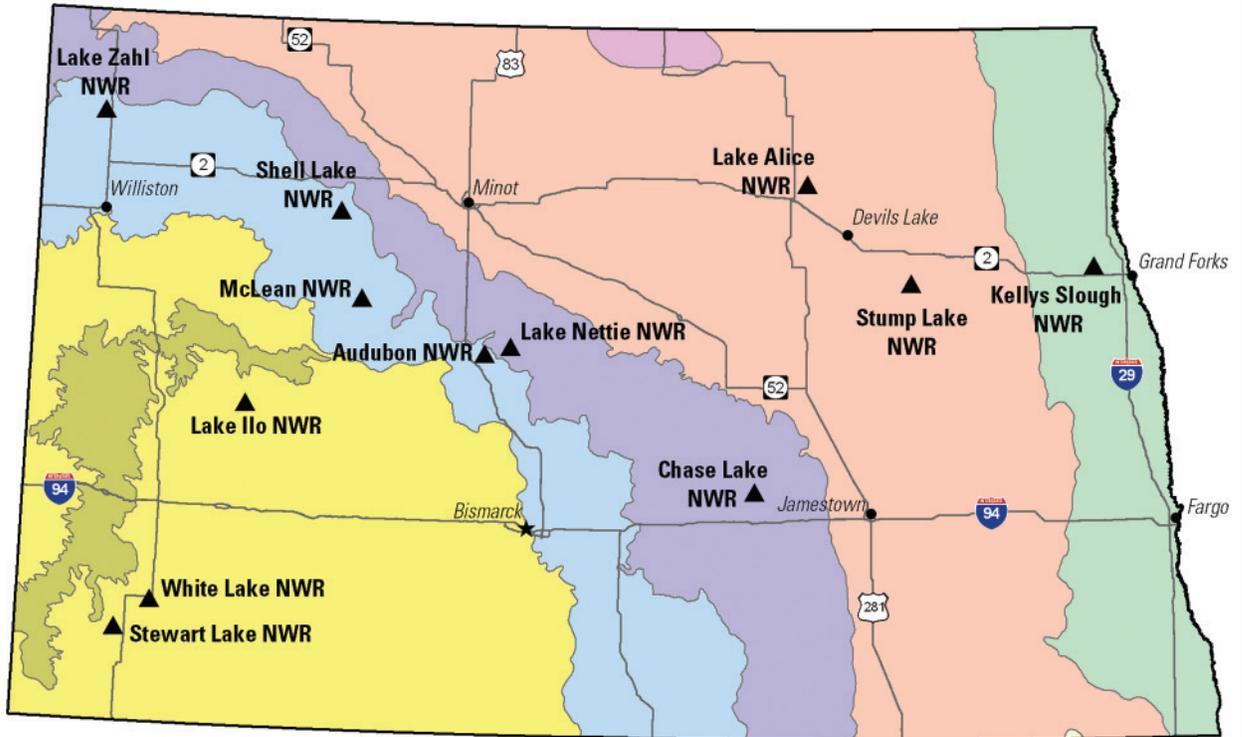


Figure 18. Map of the physiographic regions in North Dakota.

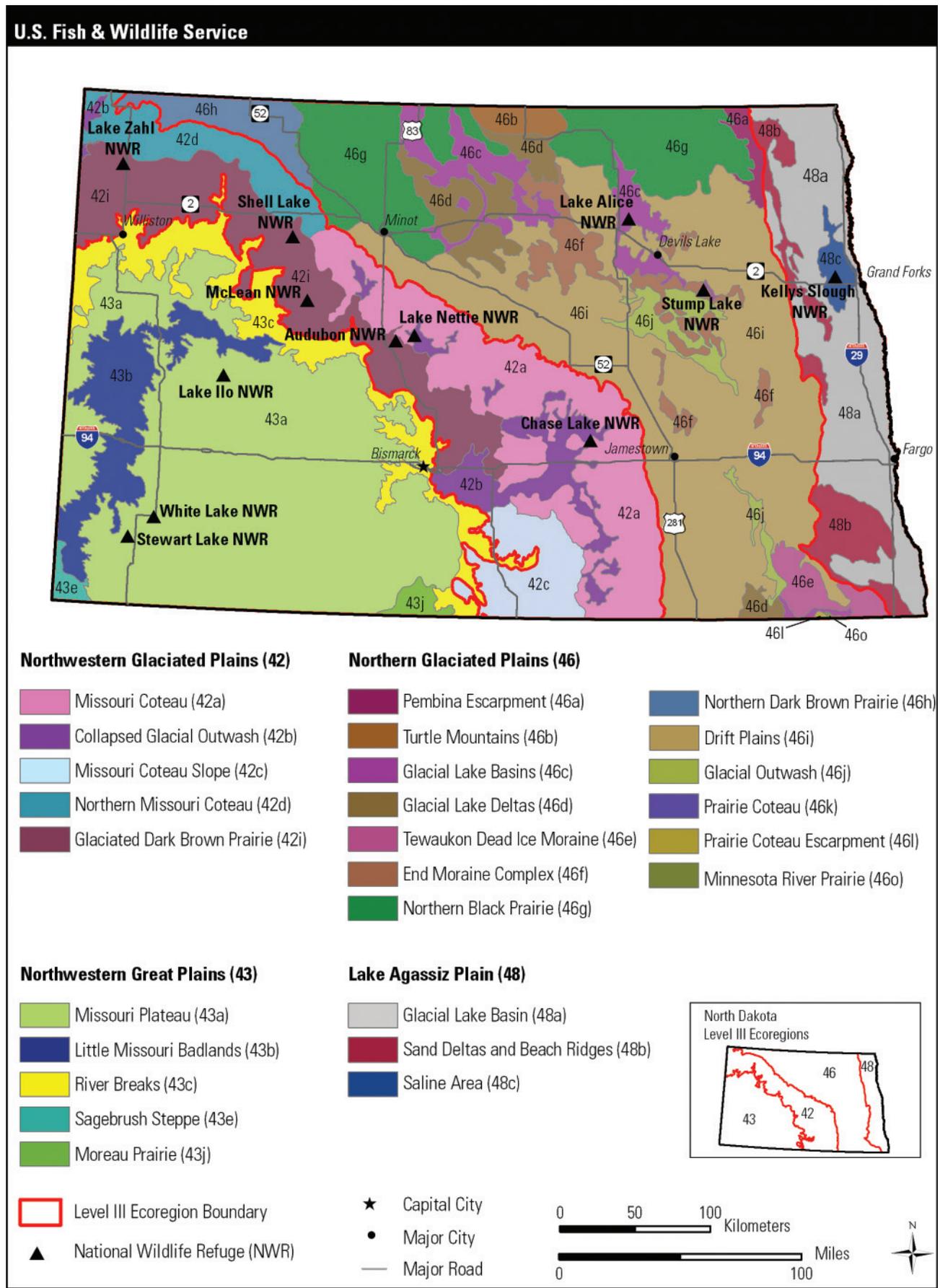


Figure 19. Map of the level 4 ecoregions in North Dakota.

**Table 4. Ecoregions of the 12 Refuges, North Dakota.**

<i>National Wildlife Refuge</i>	<i>Level 3 Ecoregion</i>
Audubon	Northwestern Glaciated Plains 42
Chase Lake	Northwestern Glaciated Plains 42
Kellys Slough	Lake Agassiz Basin 48
Lake Alice	Northern Glaciated Plains Ecoregion 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 Ecoregion 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 Northwestern Great Plains ecoregion 43 (below).

*Collapsed Glacial Outwash 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. Glaciated Dark Brown Prairie 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 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 43a (Level 4)*

On the Missouri Plateau, west of the Missouri River, the landscape opens up as 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.

*The Glacial Lake Basins 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 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 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).



Wetland sunset.

### 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 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 5 lists the conditional water permits that Lake Alice National Wildlife Refuge has for fish and wildlife purposes.

### **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.

**Table 5. 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 Use (acre-feet)<sup>1</sup></i>
4565	Outlet Marsh	March 9, 1992	24 cfs <sup>2</sup>	229.0	126.0
5060	Pintail Marsh	September 30, 1996	10,000 gpm <sup>3</sup>	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

<sup>1</sup>To offset evaporative losses.

<sup>2</sup>cfs=cubic feet per second.

<sup>3</sup>gpm=gallons per minute.

### 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.

## 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, given the title of “Attainment.” 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 E and F). 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).

## 4.2 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 6). 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

**Table 6. 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)*

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

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).



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

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 meanderings 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 would sweep 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).



G.A. Cooper/USDA-NRCS PLANTS Database

*Dalmatian toadflax is a state-listed noxious weed.*

### Invasive Plants

North Dakota has designated the invasive plants in table 7 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.

**Table 7. 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 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.

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 in North Dakota, and develop and maintain a database of noxious and invasive weed infestations.
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 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



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

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 would have 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



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

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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 E and F).

## 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.



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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 G.

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 H). 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 H.

### 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 H.

### 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

the 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

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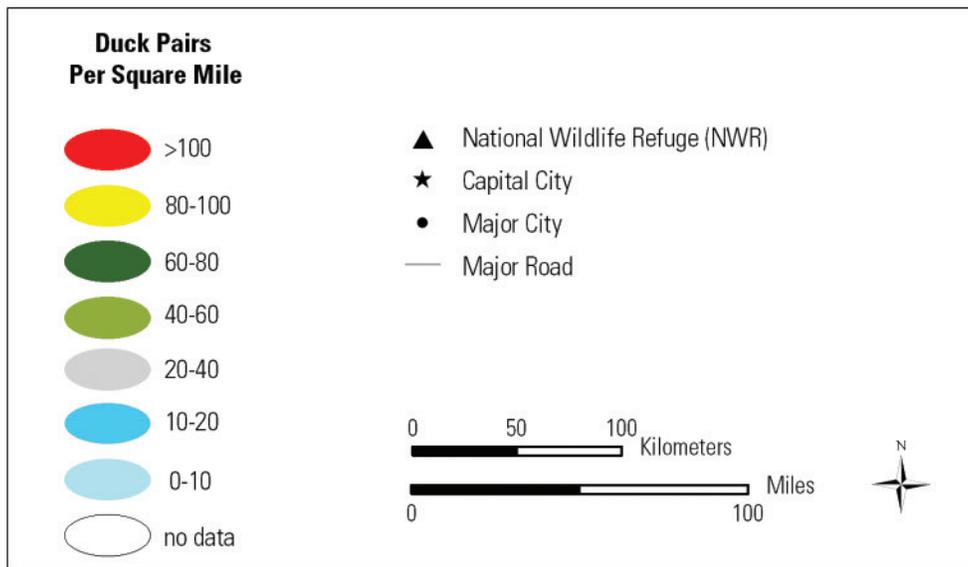
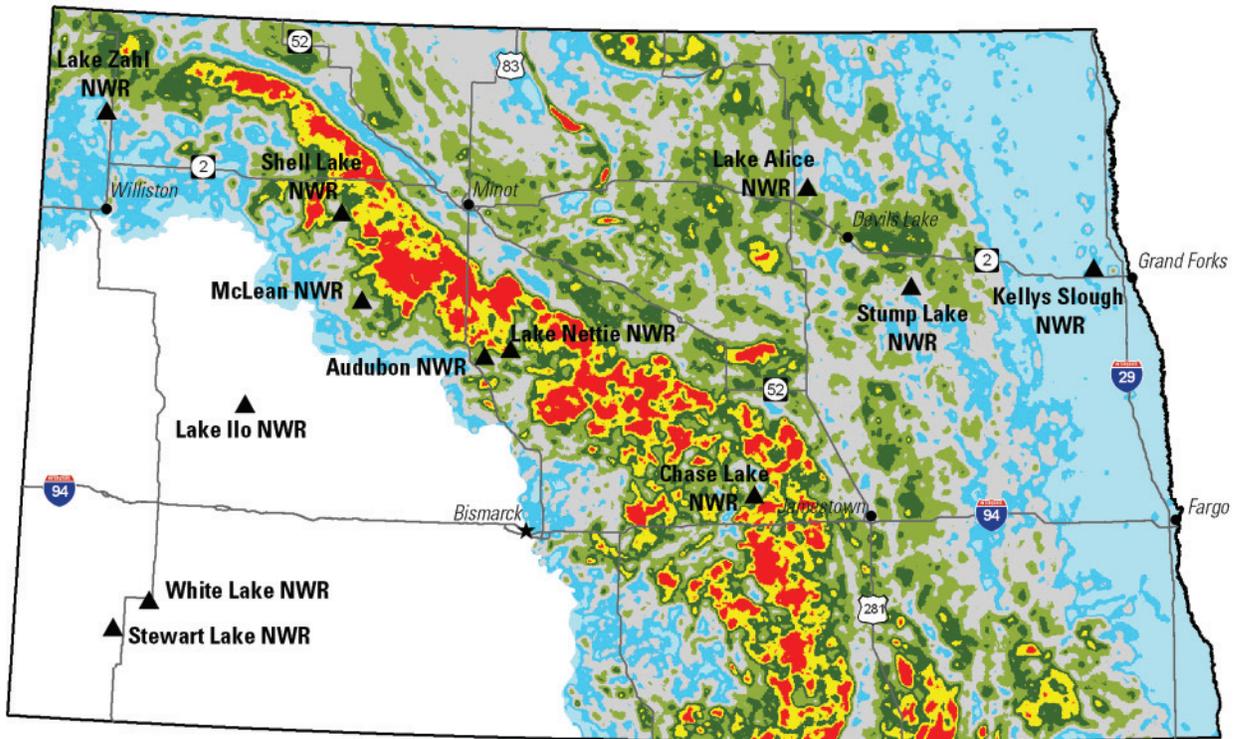


Figure 20. Map of the predicted duck-pair concentrations in North Dakota.

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.

Appendix I 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.

### Whooping Crane (Endangered)

The whooping crane is one of the most endangered birds in North America. The only naturally occurring



Ryan Hagerty/USFWS

*Whooping crane.*

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.*

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### 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

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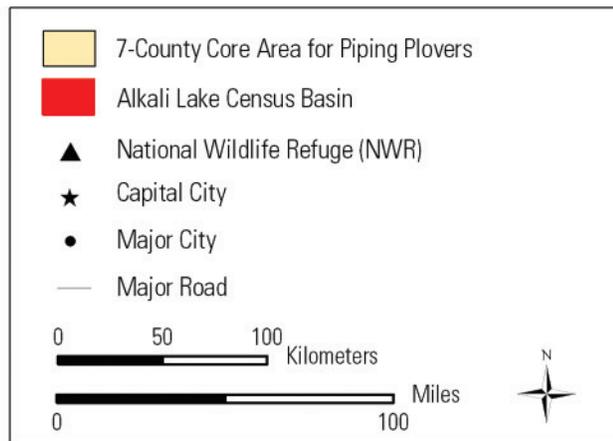
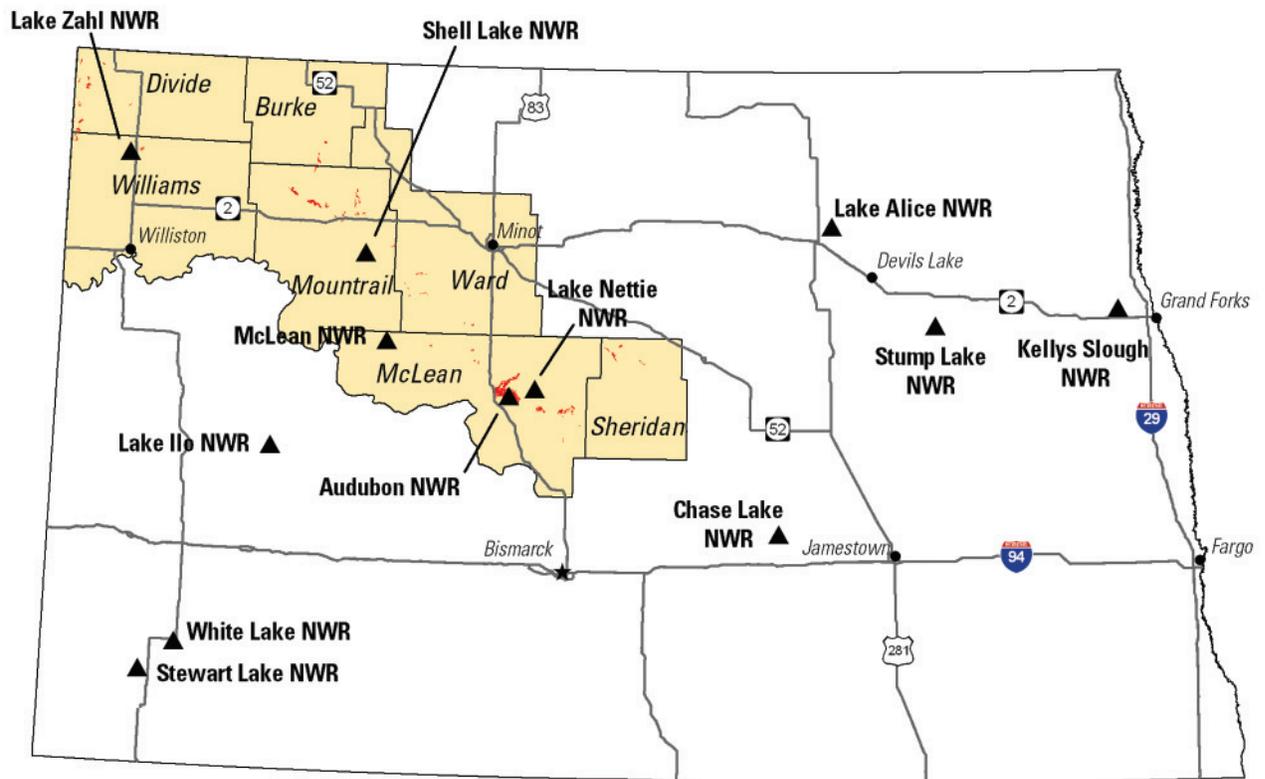


Figure 21. Map of the seven-county core area for piping plover in North Dakota.

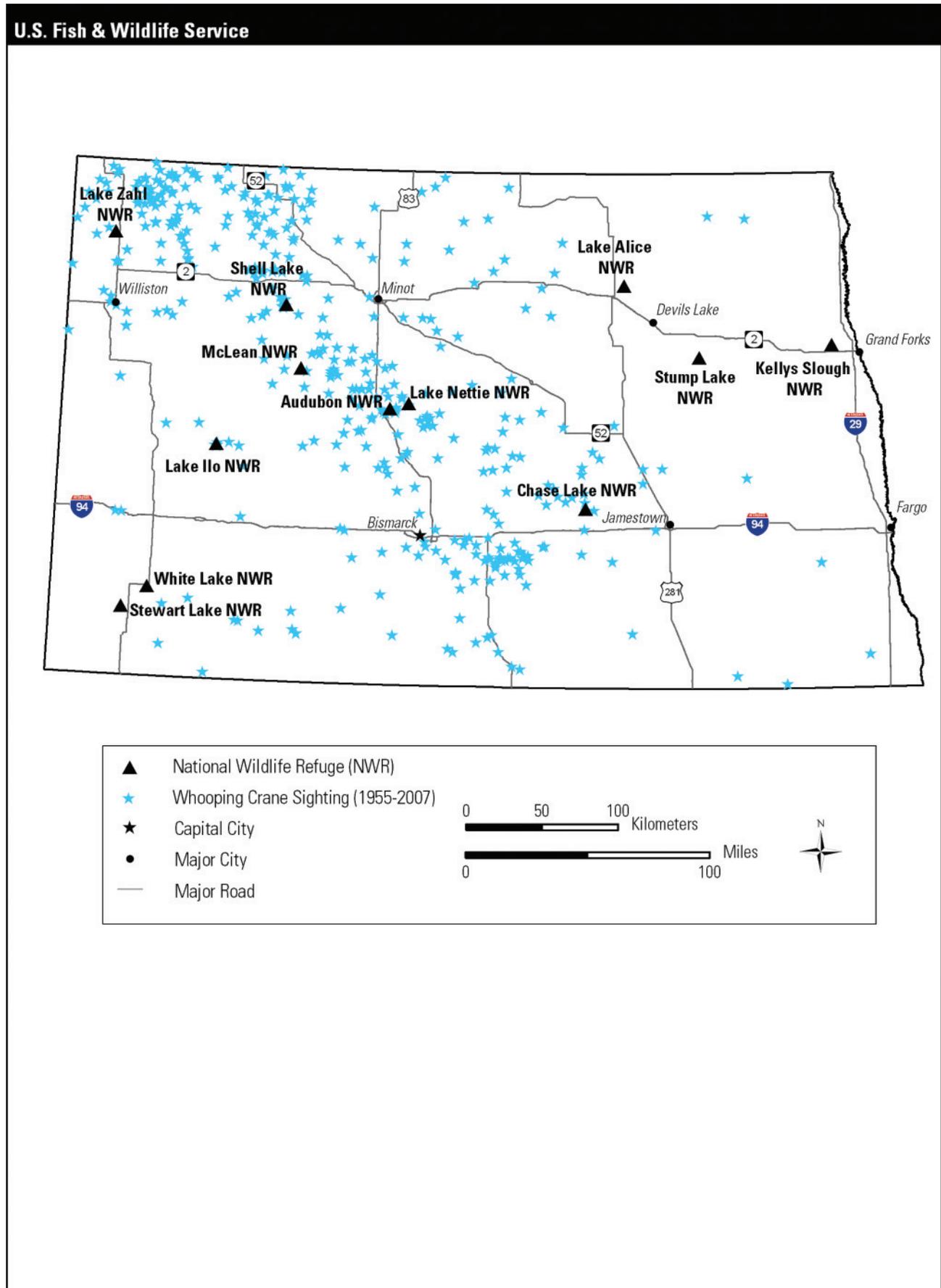


Figure 22. Map of the whooping crane sightings in North Dakota.

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.

### 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.

## 4.3 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.

## 4.4 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.

## 4.5 Visitor Services

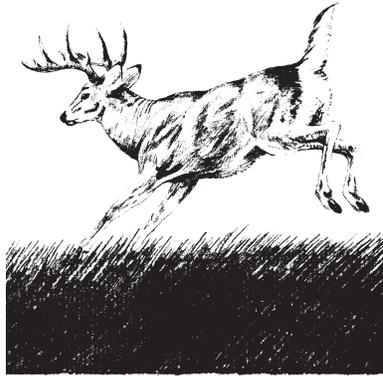
The Improvement Act emphasizes the importance of compatible, wildlife-dependent recreation. The act identifies these six wildlife-dependent recreational uses: hunting, fishing, wildlife observation, photography, environmental education, and interpretation.

## 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 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.



*White-tailed deer are common at many refuges.*



USFWS

*Ice houses on Audubon Lake during winter ice fishing at Audubon National Wildlife 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.

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.

## 4.6 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.

## 4.7 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 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. 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 (pheasants, 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.

No camping is permitted at refuges in North Dakota.

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.



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

## 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. Combing 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.

## 4.8 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.

# 5 Environmental Consequences



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*Pied-billed grebe in a courtship display.*

This chapter describes the environmental consequences for the management alternatives considered for the 12 national wildlife refuges (see chapter 3). The Service assessed the environmental consequences of carrying out each alternative on the physical, biological, cultural, social, and economical resources of the refuges.

## 5.1 Effects Common to All Alternatives

All alternatives would have the same effects on the following, as described in this section:

- global warming
- soils
- water quality, wetlands, and floodplains
- air quality
- cultural resources
- environmental justice
- public health and safety
- socioeconomics

### GLOBAL WARMING

The actions proposed in this document would conserve or restore land and habitat, thus retaining existing carbon sequestration at the refuges. These actions would contribute positively to efforts to mitigate human-induced global climate change.

The use of prescribed fire, which releases CO<sub>2</sub>, would result in no net loss of carbon because new vegetation would quickly replace the burned-up biomass. Overall, there should be little or no net change for carbon sequestered at the refuges from any of the management alternatives. As it relates to global climate change, the documentation of long-term changes in vegetation, species, and hydrology is an important part of monitoring and research. Adjustments in management may be necessary over time to adapt to a changing climate.

### SOILS

All alternatives would positively affect soil formation processes in refuge lands. Some disturbances to surface soils and topography would occur at those locations selected for (1) administrative, maintenance, and visitor facilities, (2) invasive plant removal and eradication, and (3) restoration of native habitat.

## WATER QUALITY, WETLANDS, AND FLOODPLAINS

All alternatives would positively affect water quality. Positive effects are anticipated from protecting groundwater recharge, preventing runoff, retaining sediment, and minimizing nonpoint source pollution.



USFWS

*Refuge System wetland.*

The management alternatives are not anticipated to have any adverse effects on the refuges' wetlands and floodplains, pursuant to Executive Order (EO) 11990 and EO 11988.

## AIR QUALITY

No adverse effects on air quality are expected. Short-term effects on air quality from the use of prescribed fire at the refuges should not vary significantly between any of the alternatives.

## CULTURAL RESOURCES

As a whole, cultural resources would be enhanced through protection of existing resources and extension of such protection to newly discovered cultural resources.

Cultural resource surveys at the refuges have been limited in the Service's fee-title lands. Therefore, additional surveys would be required before any new construction or excavation to fully satisfy provisions of the NHPA and applicable acts and policies related to historical and archaeological resources. Potentially negative effects from construction of trails or facilities would require review by the regional archaeologist and consultation with the North Dakota State Historic Preservation Office.

## ENVIRONMENTAL JUSTICE

None of the management alternatives described in this document would disproportionately place any adverse environmental, economic, social, or health effects on minority or low-income populations. There is no fee to enter the refuges; they are open to everyone.

Implementation of any action alternative that includes visitor services and environmental education is anticipated to benefit minority and low-income citizens living near the refuges by stimulating the economy and creating jobs.

## PUBLIC HEALTH AND SAFETY

Based on the nature of each alternative, the location of the refuges, and current land use, all alternatives are anticipated to have no significant negative effects on the quality of the human environment, including public health and safety.

## SOCIOECONOMICS

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

## 5.2 Description of Consequences

Management actions are prescribed by alternative as the means for responding to problems and issues raised by Service managers, the public, and governmental partners. Because management would differ for each alternative, the environmental and social effects resulting from implementation would likely differ as well.

The following section provides an analysis of the effects estimated to result from alternatives A, B, and C. A summary of this narrative is contained in table 3 in chapter 3.

### ALTERNATIVE A—CURRENT MANAGEMENT (NO ACTION)

The estimated potential effects of alternative A are described by the major topics discussed throughout this document.

#### Habitat and Wildlife

The current level of habitat management would be maintained at approximately the same intensity with the same resources (funding and staff). All management at refuge tracts would be prioritized with only the high-priority tracts receiving consistent management.

Habitat protection through acquisition efforts would focus on "roundouts" of high priority. Active management such as prescribed burning, grazing, farming, and invasive plant control would be used to maintain and improve native prairie tracts and tame grass units. The refuges would have improved quality of native vegetation in high-priority tracts and a status quo vegetative condition in medium- and low-priority tracts.

Refuge staffs would continue the current level of monitoring and documenting the presence and use of refuge lands by federally listed species, such as piping plover and whooping crane. The staffs would continue to impose area closures to public use in order to protect federally listed species using the refuges.

### Monitoring and Research

By maintaining the current level of monitoring, inventory, and research, Service staffs would continue to be able to use available information and sound science to make informed management decisions.

### Visitor Services

The hunting programs are open at Audubon, Chase Lake, Lake Alice, Lake Nettie, and Lake Zahl national wildlife refuges. The fishing programs are only open at Audubon and Lake Ilo national wildlife refuges. Hunting and fishing at these refuges would continue to be valued as two of the six wildlife-dependent recreational uses and would provide hunters with ample opportunity to hunt without compromising Refuge System mission and goals.

The current level of environmental education and interpretation programs would continue to be valued as wildlife-dependent recreational uses and would provide visitors with many opportunities to learn about a particular refuge and the Refuge System. Visitor services events such as teacher workshops would be conducted on a multiyear rotation among refuges. The refuge staffs would occasionally make updates to brochures and publications. There would be occasional attempts to do outreach to the media.

### Partnerships

Existing partnerships would continue to allow refuge staffs to accomplish much more than they could in the absence of partnerships. The refuge staffs would continue to improve and build partnerships with the local public, primarily landowners adjacent to the refuges. Partnerships with the NDGF would help the staffs manage hunting at the refuges. In addition, partnerships would improve the refuges' capabilities for research, monitoring, and inventory efforts and outreach and visitor service activities.

### Operations

This alternative would maintain refuge staffs at existing levels. The refuges would continue with the current level of operations and maintenance, including the maintenance of equipment and vehicles in good working condition to achieve management goals. Staffs would continue to operate with available funding and resources.

## ALTERNATIVE B—MODERATELY ENHANCED MANAGEMENT (PROPOSED ACTION)

The estimated potential effects of alternative B are described by the major topics discussed throughout this document.

### Habitat and Wildlife

The Service would manage all refuge units. For lands protected by conservation easements within the refuges, the refuge staffs would monitor and enforce all conservation easements. Monitoring would evaluate the effects of management and restoration on target migratory birds.



*Egrets in a wetland at Kellys Slough National Wildlife Refuge.*

There would be potential to increase the quality and expansion of native grasses and forbs, which would result in a corresponding decrease in acreage of nonnative grasses and forbs. This alternative would also limit the coverage of invasive, native, low shrubs (such as western snowberry and silverberry). Once some degree of success was achieved, it is likely that, through continued management, the degree of future invasion would be minimized.

Accomplishment of the above actions, with a corresponding positive vegetative response, would result in an improved breeding habitat conditions for the wildlife target species—waterfowl, shorebirds, and grassland Neotropical birds—with the resulting increase in nest success and nest densities for these wildlife groups. Potential does exist for less favorable breeding habitat condition for certain species such as nonnative bird species. Predator management through trapping would result in a decreased abundance of nest predators such as skunks, red fox, and raccoon, but may also result in artificially high populations of small mammals such as shrews and voles due to the removal of mid-sized predators. Removal of trees would result in less favorable habitat conditions for game species such as wintering deer and some resident bird species. Landscape fragmentation would be reduced through the replanting of native grass cover in areas where trees were previously removed, as well as through acquisition of additional lands. Habitat protection through acquisition would focus on high-priority conservation easements and some of the highest priority fee tracts such as “roundouts.”

In the long term, waterfowl and other grassland birds would benefit from increased amounts of native prairie that, otherwise, would have been invaded by introduced grasses and forbs.

### Monitoring and Research

The refuge staffs would improve their understanding of upland management’s effects (for example, from prescribed burning, grazing, and haying) on vegetative composition and structure. They would also better understand how wetland and upland management activities at the refuges affect overall habitat productivity.



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Shorebirds such as these red-necked phalaropes search for invertebrates.

This alternative would increase the extent of land at the refuges that is monitored (vegetation line transects) for vegetation changes in wetland and upland habitats. Ultimately, there would be an improved understanding of wildlife responses to management activities, which would allow for better management decisions that target specific wildlife objectives. The resulting understanding of habitats at the landscape scale would (1) guide acquisition efforts for habitat protection, and (2) promote management level research to improve understanding of habitat management practices.

Through additional research, the refuge staffs would improve their knowledge of the effects of large-scale wind farms on migratory bird response, particularly for waterfowl, shorebirds, and migratory grassland birds.

### Visitor Services

There would be no change to the wildlife-dependent recreational uses of hunting, fishing, environmental education and interpretation, and wildlife observation and photography. Hunting and fishing apply to those refuges that currently have these programs, which include special regulations.

Refuge staffs would have the opportunity to organize or participate in visitor services events such as teacher workshops or waterfowl identification workshops. With the additional funding and staff provided by this alternative, workshops would be held on a 3-year rotation among refuges, and media outreach would be conducted annually. Brochures and publications would be reviewed annually and updates completed as needed.

This alternative would provide a future opportunity to develop an environmental learning at Audubon National Wildlife Refuge and kiosks and interpretive panels at Lake Alice National Wildlife Refuge. Lake Alice National Wildlife Refuge would also explore opening the lake to ice fishing and, if the floodwater recedes, restoration of visitor service facilities. With expanded and new visitor facilities, refuge staffs would be able to (1) meet the demand for increased visitation, (2) provide infrastructure to conduct education programs for school groups, and (3) host larger, more diverse groups of visitors.

### Partnerships

Expanded partnerships would increase the Service’s ability to provide quality habitats for waterfowl, shorebird, and grassland bird species and improve wildlife-dependent recreational use opportunities. Refuge staffs would have improved relationships with a greater number of private landowners, government agencies, and nongovernmental organizations. Because the target bird group is popular with outdoor enthusiasts in North Dakota, this alternative holds potential for group partners, which could lead to increased money and increased likelihood that the goals and objectives are achieved.

## Operations

Increased funding would be needed for staff, equipment, and supplies (such as fuel and native grass seed). The increased resources would give refuge staffs the ability to accomplish goals and objectives associated with habitat and wildlife management, visitor services, monitoring, and research.

Increased funding and staff would enable the refuges to meet legal and obligated mandates and to provide management at high- and medium-priority tracts, as well as use limited resources for other projects. Increased resources would provide law enforcement for visitor safety and facility and wildlife protection.

## ALTERNATIVE C—ENHANCED MANAGEMENT

The estimated potential effects of alternative C are described by the major topics discussed throughout this document.

### Habitat and Wildlife

There would be the same effects as for alternative B. In addition, alternative C would also target native prairies and wetlands in the most intact ecosystems, which are more likely to support a wide range of migratory bird species (especially those of management concern such as northern pintail and marbled godwit). The emphasis would be restoration of representative examples of native mixed- and tall-grass prairies, including healthy grasslands to benefit ground-nesting species of migratory birds. There would be potential to increase the acreage of native grasses and forbs, which would result in a corresponding decrease in the acreage of nonnative grasses and forbs. Conversely, old cropland sites and badly degraded native prairies would be lowest priority, but would be managed to attract high densities of waterfowl species that use DNC.

This alternative would expand acquisition of fee-title lands to provide additional habitat protection. The highest priority for acquisition would be fee-title “roundouts” of native prairie and wetlands.

Geographic information system (GIS) mapping would provide for a proactive enforcement program.

Refuge staffs would identify invasive plants to target with limited management at high- and medium-priority tracts.

### Monitoring and Research

The refuge staffs would improve their understanding of management effects on vegetation composition. Specific research would be conducted to answer management questions and improve understanding of native prairie habitat. Money would be available for graduate student work and self-directed research. In addition, the refuge staffs would complete mandated surveys and baseline monitoring.

Grassland-, wetland-, and wildlife-monitoring activities would be increased through additional funding and resources. Vegetation transects in native prairie habitats would be expanded to include more refuge lands and done annually. Ultimately, this alternative would result in an improved understanding of wildlife responses to management activities, which would allow for better management decisions that target specific wildlife objectives. The result would be improved habitat throughout the refuges and a better ability for staffs to maintain and improve recruitment of various wildlife populations.

The refuge staffs would improve their knowledge of the effects of large-scale wind farms on migratory bird response, particularly for waterfowl, shorebirds, and migratory grassland birds.

### Visitor Services

There would be the same effects as for alternative B:

- There would be no change to the wildlife-dependent recreational uses of hunting, fishing, environmental education and interpretation, and wildlife observation and photography. Hunting and fishing apply to those refuges that currently have these programs, which include special regulations.
- Refuge staffs would have the opportunity to organize or participate in visitor services events such as teacher workshops or waterfowl identification workshops. With the additional funding and staff provided by this alternative, workshops would be held on a 3-year rotation among refuges, and media outreach would be conducted annually. Brochures and publications would be reviewed annually and updates completed as needed.
- This alternative would provide a future opportunity to develop an environmental learning at Audubon National Wildlife Refuge and kiosks and interpretive panels at Lake Alice National Wildlife Refuge. Lake Alice National Wildlife Refuge would also explore opening the lake to ice fishing and, if the floodwater recedes, restoration of visitor service facilities. With expanded and new visitor facilities, refuge staffs would be able to (1) meet the demand for increased visitation, (2) provide infrastructure to conduct education programs for school groups, and (3) host larger, more diverse groups of visitors.

In addition, through enhanced outdoor education opportunities, students would gain an improved understanding of North Dakota’s natural history, wildlife biology, history and qualities of Service lands, and the mission of the Refuge System.

Wildlife-dependent recreational use would be enhanced, outdoor classroom activities would be developed, and interpretive exhibits and displays would be added to improve the public understanding of North Dakota’s

prairie system and associated wildlife. Refuge staffs would annually conduct or support visitor services events such as teacher workshops and waterfowl identification.

These changes would give the refuges the potential to generate greater support for future refuge and Refuge System programs.

### Partnerships

There would be the same effects as for alternative B:

- Expanded partnerships would increase the Service's ability to provide quality habitats for waterfowl, shorebird, and grassland bird species and improve wildlife-dependent recreational use opportunities. Refuge staffs would have improved relationships with a greater number of private landowners, government agencies, and nongovernmental organizations. Because the target bird group is popular with outdoor enthusiasts in North Dakota, this alternative holds potential for group partners, which could lead to increased money and increased likelihood that the goals and objectives are achieved.

### Operations

There would be the same effects as for alternative B:

- Increased funding would be needed for staff, equipment, and supplies (such as fuel and native grass seed). The increased resources would give refuge staffs the ability to accomplish goals and objectives associated with habitat and wildlife management, visitor services, monitoring, and research.
- Increased funding and staff would enable the refuges to meet legal and obligated mandates and to provide management at high- and medium-priority tracts, as well as use limited resources for other projects. Increased resources would provide law enforcement for visitor safety and facility and wildlife protection.

In addition, increased resources would enable the Service to accomplish easement enforcement.

## 5.3 Cumulative Impacts

Cumulative impacts are the potential effects of each alternative in combination with past, present, and future actions. The NEPA regulations define

cumulative effects as “the impact on the environment which results from the incremental impact of the actions when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over time.” (40 CFR 1508.7)

The cumulative effects analysis for this draft CCP is based on reasonably foreseeable future actions that, if carried out, would contribute to the effects of the alternatives. No reasonably foreseeable actions are anticipated. Impacts would be monitored during the implementation of the final CCP. Implementation over an extended period would reduce the likelihood of negative cumulative impacts.

The NEPA requires mitigation measures when the environmental analysis process detects possible significant impacts to habitats, wildlife, or the human environment. All activities for the Service's proposed action (alternative B) are not expected or intended to produce significant levels of environmental impacts that would require mitigation measures. Nevertheless, the final CCP will contain the following measures to preclude significant environmental impacts from occurring:

- Federally listed species will be protected from intentional or unintentional impacts by having activities banned or restricted where these species occur.
- All proposed activities will be regulated to reduce potential impacts to wildlife and plant species, especially during their sensitive reproductive cycles.
- Hunting safety regulations will be closely coordinated with, and enforced by, refuge staffs and NDGF personnel.
- Monitoring protocols will be established to determine goal achievement levels and possible unforeseen impacts to resources for application of adaptive management to ensure habitat and wildlife resources, as well as cultural resources, are preserved.
- The final CCP can be revised and amended after 5 years of implementation, for application of adaptive management to correct unforeseen impacts that occur during the first years of the plan.

# 6 Implementation of the Proposed Action



*This American avocet searches for food along a wetland shore.*

This chapter presents the draft CCP—details of how the Service would carry out its proposed action (alternative B) for management of the 12 national wildlife refuges in North Dakota.

After public review and comment on this draft CCP, the Service will select and finalize its preferred management alternative. The Service will approve the final CCP and notify the public of its decision. The final CCP will serve as the primary management direction for the refuges over the next 15 years (2008–2023) and until the CCP is formally revised. The Service will carry out the final CCP with help from partner agencies, organizations, and the public.

## 6.1 Identification of the Proposed Action

The planning team developed three unique management alternatives based on the issues, concerns, and opportunities expressed during the scoping process (see chapter 1). The issues discussed throughout this draft CCP and EA were derived from the collective input of local citizens and communities, cooperating agencies, conservation organizations, and refuge staffs.

The Service is responsible for recommending a proposed action that

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

The Service has identified alternative B as the proposed action for management of the 12 refuges.

## 6.2 Summary of the Proposed Action (Draft CCP)

The proposed action (alternative B) allows for moderately enhanced wetland and upland management, where warranted, over the current level of management. Alternative B would increase management activities at the refuges.

Refuge staffs would manage wetland and upland habitats to meet the refuges' vision and goals by carrying out the objectives described below. 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 would emphasize adaptive management, including monitoring the effects of habitat management practices and using research results to direct ongoing management. Upland and wetland management would benefit migratory birds, particularly waterfowl species; management efforts would 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 would 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 would enhance trails, kiosks, and interpretive displays to provide the public with an awareness of the refuges' resources. Fishing and hunting would be maintained on refuges that are currently open to these uses to provide good-quality experiences for the public.

## 6.3 Goals, Objectives, Strategies, and Rationale

The objectives, strategies, and rationale that follow describe how management of Service lands would be carried out to meet the overall goals 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.

#### Wetlands

A developed wetland has a water control structure or some 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 would require that water level management is carried out in a timely and appropriate manner. Ideally, impoundments would 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 would 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 draft CCP. Although they occur within refuges covered by this draft CCP, these two wetlands have unique management plans, objectives, and purposes. Management of Lake Audubon and Lake Ilo is discussed in a step-down plans 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 description under rationale below).
- Review all water management structures for improvements or repairs that would 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 would 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 (approximately 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 mix of open water and emergent vegetation attracts high densities of different wetland birds.*

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 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 would 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 the 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 would 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 would 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 J, 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 D), “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 would focus 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 would focus more on strategies to reduce brome.



Larry Allain/USDA-NRCS PLANTS Database

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

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 would 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 J. However, each refuge staff would need 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 D), or a combination of both.
- Manage tracts with select chemical herbicides (imazapic-based).

*Rationale*

By 2 years after CCP approval, refuges would have identified 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 would improve 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 would not be met on a single tract or management unit, but rather the needs of various species groups would be met by providing a mosaic of vegetative structures (high, medium, and low) across many tracts of land in the refuges. Native prairies would 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.

**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. An integrated approach to pest management would be used 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 would need to be designed and carried out to document the spread and introduction of invasive plants. The implementation of an early detection and rapid response system would require coordination with North Dakota Department of Agriculture, warm-season weed boards, weed management areas, and other state, federal and local partners. During annual coordination, all parties would share information and discuss the most effective, economical, and environmentally appropriate control strategies for priority invasive plant species.



Alfred Brousseau/USDA-NRCS PLANTIS Database

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

**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’ (similar in organizational structure and responsiveness to ‘hot shot’ crews used in interagency fire fighting). Strike teams would 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 the RLGIS. This information would 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 would 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 would 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 the 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 would shift to more scientific surveys to provide quantifiable data. Surveys would be conducted every 3–5 years on priority areas to provide information about effectiveness of treatment, response to an IPM strategy, or results of grassland restoration.



Steven Perkins/USDA-NRCS PLANTS Database

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

### 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 the RLGIS 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 the 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. These fields would be replanted 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 D.)

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 D.)

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 1966–1996 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 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 lifecycle, 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 would restore priority tracts of old cropland back to native vegetation. These areas would be revegetated with a diversity of native vegetation that, with modest management, is relatively resistant to infestation by invasive species including noxious weeds. This would 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 would have 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 D). 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.



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*Refuge land seeded 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 would 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 would 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 would be 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  $\geq 60\%$  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 draft CCP. The proposed 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  $\geq 125$  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 D), 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 proposes to 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 lifecycle, a field is typically cultivated and farmed for 2–3 years, land then reseeded. This leads to a rotation of “seeding–managing–farming–seeding” into perpetuity to maintain the intended cover.

The refuge tracts included in the following objective are a lower management priority than native prairie and seeded native tracts. Ideally, the majority of these tracts would be seeded back 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 lifecycle. 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 D) 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 (Duebbert 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 D) to provide an appropriate seedbed for seeding.
- Manage seeded areas using tools such as fire, haying (see appendix D), grazing (see appendix D), 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 would 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 would 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 would benefit 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 would 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, the HAPET developed a “grassland bird conservation area” matrix (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 proposed 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  $\geq 10$  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 chainsaws 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.
- 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).

## Priority Species

The Service developed objectives and strategies for three species—piping plover (threatened), whooping crane (endangered), and Dakota skipper (candidate).

### Piping Plover

Piping plovers 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 4). 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.



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

#### 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. 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 would 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 would allow 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**

Each spring and fall, endangered 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 4).

**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**

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. 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

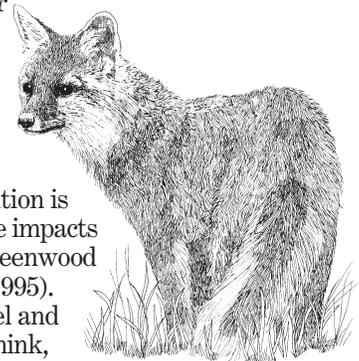
This section describes predator–prey dynamics, related waterfowl nest success, and predator management.

#### 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 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



*The red fox is a primary predator of nesting waterfowl.*

(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).



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*A mallard hen and her brood head for water.*

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 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 (Balsler 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, the  $>40\%$  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 exclosures.
- 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 would 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 would be 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.

### 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



*The refuge staff monitors grassland and restoration efforts.*

USFWS

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 proposed 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, would be 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 would be able to identify high- and low-priority native prairie tracts, invasive plant infestations, and wetland vegetation composition. The habitat management plans would identify specific habitat objectives for each refuge. Each plan would 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 would 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 would need to be prioritized because resources (funding, staff, and equipment) are always limited and oftentimes insufficient. Partnerships would 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 would 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 would 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 and maintain a good-quality experience 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 would be 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 would 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 would not conflict with migratory birds and what types of fishing (such as shoreline fishing) would 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 would 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 would 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 D contains the draft compatibility determination 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.



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*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 D contains the draft compatibility determination 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.

#### 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 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 would 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 would not continue without the support from partners. Without partners, many of the habitat protection, restoration, and enhancement projects would go unfunded. Over time, the diversity of wildlife species would 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 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.

## **6.4 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 would revise the basis for which a refuge would determine 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.

## 6.5 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 8–18 list the step-down management plans associated with each refuge (except for Stump Lake National Wildlife Refuge, which is currently under water).

**Table 8. 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 9. 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 10. 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 11. 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 12. 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 13. Step-down Management Plans for Lake Nettie 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 14. 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 15. 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 16. 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 17. 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 18. 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	—

## 6.6 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



*Monarch butterfly on switchgrass.*

Gary Eslinger/USFWS

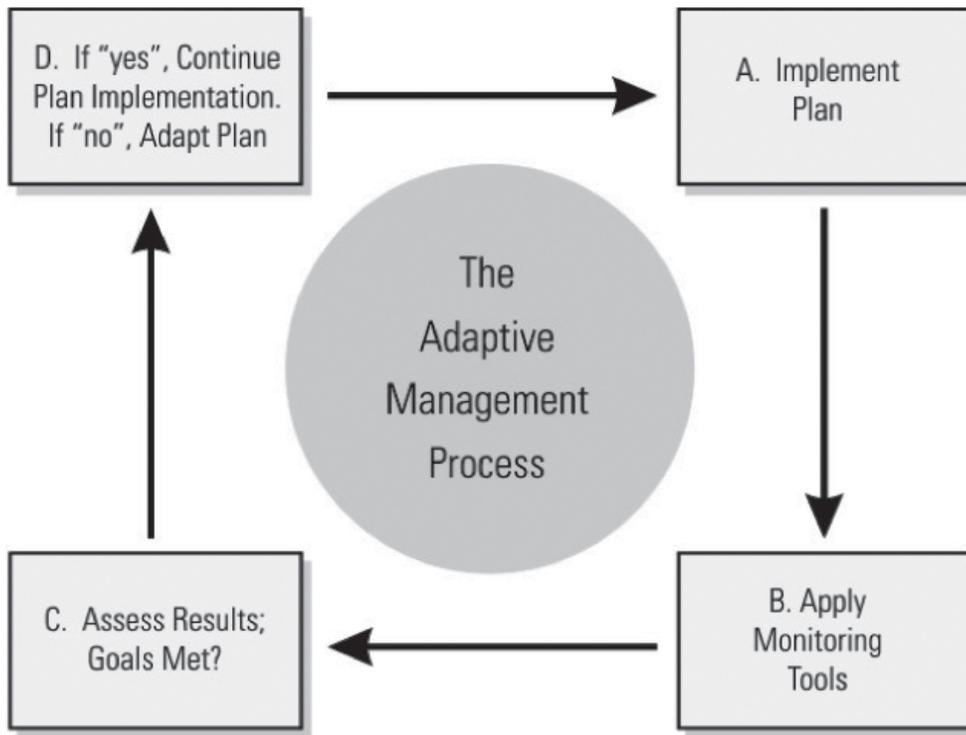
are evaluated to guide adaptive management over time. Adaptive management is a process by which projects are carried out within a framework of scientifically driven experiments to test the predictions and assumptions outlined in the final CCP (see figure 23, the adaptive management process).

To apply adaptive management, specific survey, inventory, and monitoring protocols would be adopted for each of the 12 refuges. The habitat management strategies would be systematically evaluated to determine management effects on wildlife populations. This information would 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 would be altered accordingly. Subsequently, the CCP would be revised.

## 6.7 Plan Amendment and Revision

The Service will annually review the final CCP to determine the need for revision. A revision would 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**—Plants or animals that occur naturally in a certain region and whose distribution is relatively limited to a particular locality.

**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.

**inviolate 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 (NWR)**—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.

**NWR**—See *national wildlife refuge*.

**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 partnering 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; or of 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, WMD)**—

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.

**WMD**—See *wetland management district*.

**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–ll; 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 the NEPA requires all federal agencies, with respect to major federal actions significantly affecting the quality 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	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	Refuge operations specialist	Lostwood Wetland Management District Complex

## 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	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	HAPET, Bismarck, ND
Neil Niemuth	Wildlife biologist and GIS specialist	HAPET, Bismarck, ND
Ron Reynolds	Project leader	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 draft CCP and EA. 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 and EA for the refuges and to obtain suggestions and information on the scope of issues to be considered in the planning process.

Public meetings were held in various locations throughout North Dakota starting on March 26, 2007, and ending on April 11, 2007. Numerous written comments were received during the open comment period. Comments received identified biological, social, and economic concerns about refuge management. The mailing list for the draft CCP and EA 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, Ft. 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

## *Draft 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 would continue to provide recreational hunting at Audubon, Chase Lake, Lake Alice, Lake Nettie, and Lake Zahl national wildlife refuges and expand programs. 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 would continue to allow recreational hunting of deer, ring-necked pheasant, sharp-tailed grouse, and partridge.

**Chase Lake National Wildlife Refuge**—The Service would continue to allow recreational hunting of deer.

**Lake Alice National Wildlife Refuge**—The Service would continue to allow recreational hunting of deer, ring-necked pheasant, sharp-tailed grouse, partridge, and waterfowl.

**Lake Nettie National Wildlife Refuge**—The Service would continue to allow recreational hunting of deer.

**Lake Zahl National Wildlife Refuge**—The Service would 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 would have on their abilities to manage habitat. Because the Service would 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 would ensure that hunting activities do not interfere with the purposes of the refuges or attainment of Refuge System objectives.

Temporary disturbance to wildlife would occur near the activity. Hunting would 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 would 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 would protect habitats from damage and minimizes disturbance to wildlife. Closed areas would provide sanctuary for game and nongame species, minimize conflicts between hunters and other visitors, and provide safety zones around communities and administrative areas.

There would 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 would not detract from the purposes for which these refuges were established or their habitat goals and objectives.

There would 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 would 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 would 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 would 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 would 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 would 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 would 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 draft CCP proposes placement of portable blinds to improve the viewing access at areas with exceptional wildlife-viewing opportunities.

### Availability of Resources

The Service would update existing program aspects, such as refuge signs and brochures, with available resources. Implementation of new facilities would 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 would 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 would 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 would gain knowledge and an appreciation of fish

and wildlife, which would lead to increased public stewardship of wildlife and their habitats. Increased public stewardship would 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 would 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 would 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 draft CCP proposes to continue with current uses as well as improve 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 groups" associated with the refuges.
- 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 would update existing program aspects, such as refuge signs and brochures, with available resources. Implementation of new facilities would 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 would result from these uses at the current and proposed levels. Some disturbance to wildlife would occur in areas frequented by visitors. There would be littering and minor damage to vegetation; increased maintenance would be necessary. Location and time limitations placed on environmental education and interpretation activities would ensure that these activities would have only minor impacts on wildlife and would not detract from the primary purposes of the refuges. There would 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 would gain knowledge and an appreciation of fish, wildlife, and their habitats, which would lead to increased public awareness and stewardship of natural resources. Increased appreciation for natural resources would 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 would 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 would 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 would be addressed in a separate disease contingency plan), priority would be given to research proposals that support a refuge's purposes, goals, and objectives. This would include, for example, studies that contribute to the enhancement, protection, use, preservation, and management of native wildlife populations and their habitats; studies would include cultural resources. Research applicants would submit a proposal that would 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 would review research proposals as appropriate. Evaluation criteria would include, but not be 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 would reduce the role of a refuge's staff. However, close coordination would 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 would 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 would likely be adequate to manage small and short-term research projects. The Service would 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 would be expected with research studies, because most researchers would need to enter areas that are normally closed to the public and may collect samples or handle wildlife. A special use permit would include conditions to ensure that impact to wildlife and habitats are kept to a minimum. There would 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 would 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 would 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 would 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 would 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 would be based on site-specific evaluations of the grassland under management. The prescribed grazing period generally would take place between April and September. Early spring grazing (mid-April through late May) would target cool-season invasive species and encourage 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 would require some Service resources. Most grazing management costs—fencing labor, monitoring and moving the livestock, and hauling water—are provided by the cooperator or permittee. 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 would 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 would 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 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 would provide a means to restore degraded grasslands for the benefit of grassland-dependent species.

### Mandatory 15-year Reevaluation Date: 2023

## Description of Use:

### Prescribed Haying of Grasslands

The Service would 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 would require the cooperator to cut, bale, and remove the cover crop before it matures and goes to seed. The resultant hay would 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 would permit a cooperating farmer to hay firebreak strips in the fall. Those areas would then have little standing dead vegetation in early spring, or would 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 would be needed to evaluate the proposed 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 would result in short-term disturbances to wildlife and long-term benefits to grasslands and the wildlife species that use these grasslands. Short-term impacts would include disturbance and displacement of wildlife typical of any noisy heavy-equipment operation. Cutting and removal of standing grass would 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 would typically schedule prescribed haying after July 31 to avoid impacts to

most nesting birds. Long-term benefits would accrue due to the increased vigor of regrown grasses or the establishment of highly desirable native grass and forb species, which would 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 would limit the anticipated effects on these species.

There would 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 would 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 haying practices did 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 would provide a means to restore degraded grasslands for the benefit of grassland-dependent species.

### Mandatory 15-year Reevaluation Date: 2023

## Description of Use:

### Cooperative Farming

The Service would 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) would not cover more than 50% of the tract. Areas at the refuges that are planted for food plots would 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 would be done as part of routine grassland management duties. The decision to use a cooperating farmer would occur as 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 would 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 would 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 would 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 would generally improve conditions for most of the species negatively affected by the short period of farming activity.

There would 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 would 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 15-year Reevaluation Date: 2023**

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## Signatures

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Kim Hanson Date  
Project Leader  
Arrowwood National Wildlife Refuge Complex  
(Chase Lake National Wildlife Refuge)

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Roger Hollevoet Date  
Project Leader  
Devils Lake Wetland Management District Complex  
(Kellys Slough and Lake Alice national wildlife refuges)

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Lloyd Jones Date  
Project Leader  
Audubon Wetland Management District Complex  
(Audubon, Lake Ilo, Lake Nettie, McLean, and  
Stewart Lake national wildlife refuges)

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David Gillund Date  
Project Leader  
Lostwood Wetland Management District Complex  
(Lake Zahl and Shell Lake national wildlife refuges)

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## Reviewed

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Paul Cornes Date  
Refuge Supervisor  
Region 6, National Wildlife Refuge System

## Approved

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Richard A. Coleman, PhD Date  
Assistant Regional Director  
Region 6, National Wildlife Refuge System

# Appendix E

## *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 would 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 F

## *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 plans 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 draft 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 environmental assessment 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 would 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 G

*Bird Species of the Refuges*

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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 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	
prairie falcon		2	S3		X	X	X	X																	
peregrine falcon	E	3	S1	X	X	X	X			X															
sharp-tailed grouse		2									1	1	4												
greater prairie-chicken		2	S2								1	1	1	1											
greater sage grouse		2						X																	
American coot												4							X						
Virginia rail												4	7		M									X	
sora												4	7											X	
yellow rail		1	S2	X		X	X	X		X	m	1	1		H								X	X	
whooping crane	E	3	G1																						
sandhill crane																									
American golden-plover					X	X	X			X	s							X							
piping plover	T	2	G3 S1 S2			X				X	s	1						X						X	
American avocet		2									s							X							
solitary sandpiper				X		X	X																		
willet		1		X								2												X	
upland sandpiper		1		X	X	X	X			X	s	4						X							
whimbrel							X																		
long-billed curlew		1	S2	X	X	X	X			X			X					X						X	
Hudsonian godwit				X			X			X	s							X							
marbled godwit		1		X	X	X	X	X		X	s	1	3					X					X	X	
ruddy turnstone											s							X							
red knot							X											X							
sanderling				X	X													X							
dunlin											s							X							
semipalmated sandpiper											s							X							
white-rumped sandpiper				X							s							X							
stilt sandpiper							X																		
short-billed dowitcher							X																		
buff-breasted sandpiper				X		X	X			X	s							X							
American woodcock								X	X	X	s							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	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																									
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										4									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																	
dickey		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	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	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](http://ecos.fws.gov/tess_public/StateListing.do?state=ND&status=listed)>

- 2 E=endangered, T=threatened  
 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 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 Banks:  
 G1=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.
- 4 Natural Heritage State Banks:  
 S1=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=1 or (1) 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 H

## *Primary and Secondary Bird Species of the North Dakota Prairie*

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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 I

## *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 J

## 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 4- to 5-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.



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